DOCUMENT RESUME

ED 035 122	40	EC 004 362

AUTHOR	Coates, Nadine H.; And Others
TITLE	Characteristics of Children Receiving Speech and Hearing Service in Los Angeles Area Schools. Final Report.
INSTITUTION	Los Angeles County Superintendent of Schools, Calif.
SPONS AGENCY	Office of Education (DHEW), Washington, D.C. Bureau of Research.
BUREAU NO	BR-7-0472
PUB DATE	Apr 69
GRANT	OEG-0-8-070472-1732
NOTE	654p.
EDRS PRICE	EDRS Price MF-$2.75 HC-$32.80
DESCRIPTORS	Auditory Evaluation, *Aurally Handicapped, Bilingual Students, Community Programs, Conference Reports, Elementary Grades, *Exceptional Child Education, Hearing Loss, Hearing Therapists, Hearing Therapy, *Language Handicapped, Special Services, Speech Evaluation, *Speech Handicapped, Speech Pathology, Speech Skills, Speech Therapists, Speech Therapy, Statistical Data, Voice Disorders
IDENTIFIERS	California, Los Angeles County

ABSTRACT

The characteristics of pupils receiving service in speech and hearing programs are presented in detail utilizing a newly developed standard case record. The evaluation of the strengths and weaknesses of the case record and the identification of areas in which school clinicians have difficulty obtaining information have been incorporated into the project. The description of the project is in three parts. Volume I contains the results of a workshop for participating districts. The workshop examined the project data, identified problem areas, reported on related research and considered the role of the speech and hearing specialist in educational services. Volume II contains detailed descriptions of pupils in the complete caseloads of 212 school clinicians in 39 school speech and hearing programs in 1966-67. Volume III consists of the results of three studies of clinician agreement and reliability. The studies represent a first step toward identifying critical areas of disagreement in assessing oral communication skills. The volumes are bound together in the form of a final report. (Author/WW)

BR 7-0472
OE-BR

ED035121

PA 40

FINAL REPORT

Project No. 7-0472
Grant No. OEG 0-8-070472-1732

CHARACTERISTICS OF CHILDREN RECEIVING SPEECH AND HEARING SERVICE IN LOS ANGELES AREA SCHOOLS

Nadine H. Coates
Esther L. Herbert
Maryjane Rees, Ph.D.

Los Angeles County Superintendent of Schools Office
155 West Washington Boulevard
Los Angeles, California 90026

April, 1969

U.S. Department of
Health, Education, and Welfare

Office of Education
Bureau of Research

EC 004 362E

FINAL REPORT

Project No. 7-0472
Grant No. OEG 0-8-070472-1732

CHARACTERISTICS OF CHILDREN RECEIVING SPEECH AND HEARING SERVICE IN LOS ANGELES AREA SCHOOLS

Nadine H. Coates
Esther L. Herbert
Maryjane Rees, Ph.D.

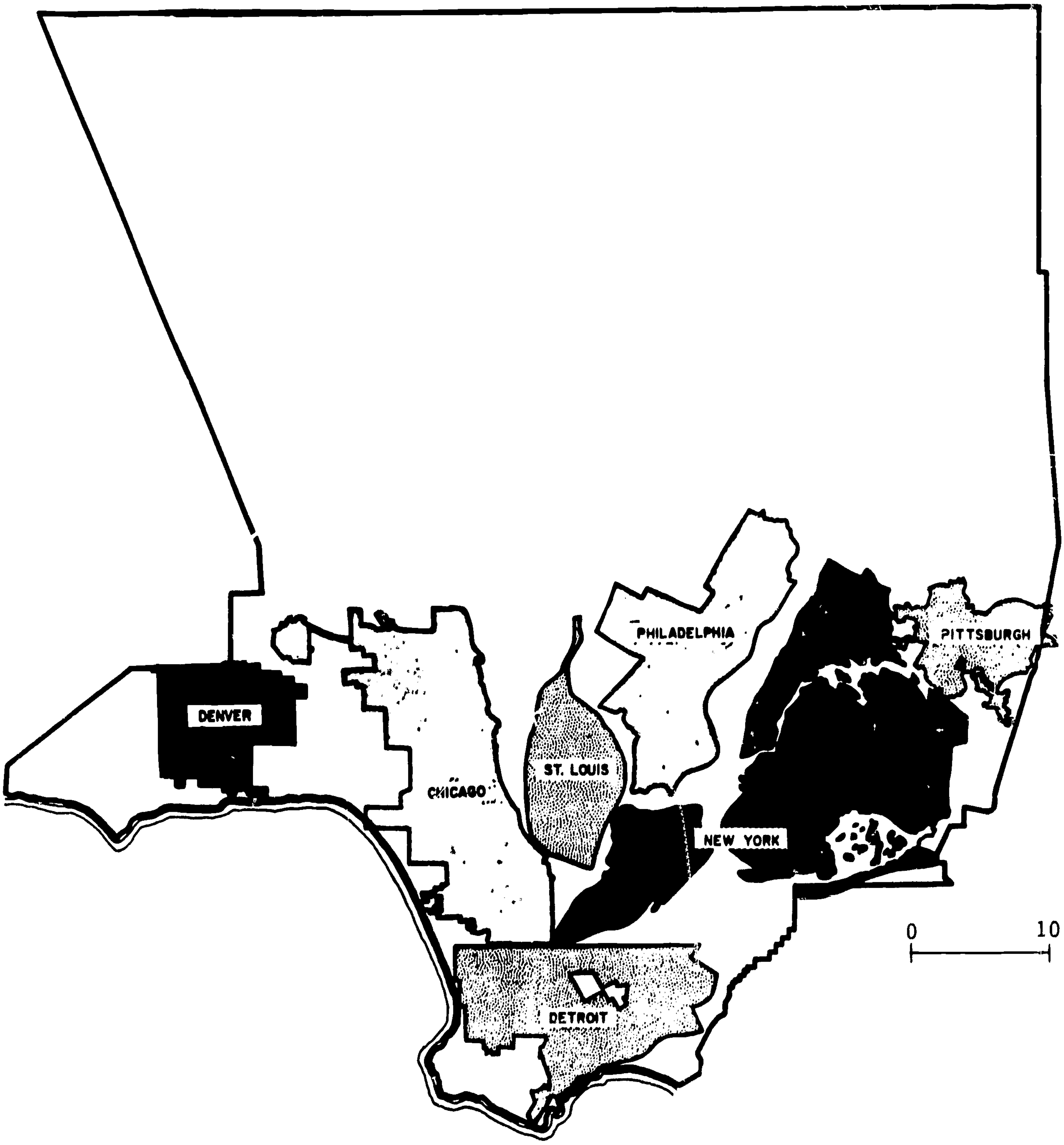
Los Angeles County Superintendent of Schools Office
155 West Washington Boulevard
Los Angeles, California 90026

April, 1969

U.S. Department of
Health, Education, and Welfare

Office of Education
Bureau of Research

CONTENTS



Los Angeles County, the geographic setting of the project, presents problems for research or survey that are peculiar to its size, population, and growth. With its total of 4,068 square miles, it is 800 square miles larger than the states of Rhode Island and Connecticut combined. Seven major cities can be placed in the southern half of the county with room to spare. The metropolitan area is twice the size of San Francisco and six times the size of San Diego, the two other metropolitan areas in California. Only seven states in the United States exceed its population of over seven million.

FOREWORD

The study described in this report entitled "Characteristics of Children Receiving Speech and Hearing Service in Los Angeles Area Schools", had three purposes. The major purpose was to describe in detail, using a newly developed case record, the characteristics of pupils in the caseloads of speech and hearing specialists in school districts in Los Angeles County. A second purpose was to initiate some studies of clinician agreement and reliability. The third purpose was to review the results of the project through a workshop conducted for participants in the study.

The project consists of three volumes or parts bound together in a Final Report. Volume I reports workshop proceedings and the highlights of the project data with next steps for follow-up action. Volume II reports what the 18,985 speech and hearing handicapped pupils in the caseloads of 212 clinicians "look like". Volume III reports eight pilot studies in clinician agreement-reliability.

Because of the vastness of space and the large pupil population of Los Angeles County a voluntary plan of grouping school districts has been developed over the past ten years to achieve better communication among personnel and to bring about coordination of speech-language and hearing programs. All major research, in-service education, or legislation in the field of speech and hearing in the county, including this project, have been organized using this plan of grouping. The plan involved participation of representatives of the State Department of Education, the Office of the County Superintendent of Schools, the Los Angeles City Unified School District, and the other 66 school districts in Los Angeles County which have speech-language and hearing programs, as well as personnel from neighboring counties, a number of training institutions, and community centers.

Consistent communication and project coordination has been carried out through regularly scheduled monthly meetings in seven geographic areas. Administrators of speech and hearing programs, speech and hearing specialists, and representatives of community agencies and training institutions participate in the meetings. Other means of carrying out communication and coordination of projects have included county-wide in-service education programs, written communications and special project committee meetings. The guiding principle underlying speech and hearing activities has been one of improving service to pupils who have communication disorders by engaging in continuous assessment and evaluation of ongoing practices and resultant change. Cooperation is achieved by working closely with school administrators and speech and hearing staffs to identify professional problems and set up priorities for problem solutions. Planning is coordinated by the County Superintendent of Schools Office.

In this research project, the Los Angeles City Unified School District and 38 other school districts in Los Angeles County, five training institutions, four adjoining counties, a community center, the State Department of Education, a number of technical consultants, and the County Schools office staff all worked together throughout the project. The project received financial support on a matching basis from Grant 0-8-070472-1732, funded by the Division of Research, Bureau of Education of the Handicapped, United States Department of Health, Education, and Welfare.

Professional staff time, facilities, and some equipment were made available to the project by the Los Angeles County Superintendent of Schools. The Los Angeles City Unified School District contributed some time of four speech and hearing supervisors. The speech and hearing specialists in the thirty-nine school districts, including Los Angeles City, who participated in the project devoted a total of 4,735 work-days to the study.

Since the end of the first year of the study, twenty additional school districts have adopted the case record for use in their speech and hearing programs, and it has become a standard case record for use in school districts of Los Angeles County.

It is anticipated that the speech and hearing specialists in the districts of the county will continue to refine the case record and the assessment procedures introduced by it so that maximum benefits in better communication and coordination among speech and hearing programs will results.

It is the intention of these speech and hearing specialists to use the study data describing the characteristics of children enrolled in speech and hearing programs as abasis for planning all aspects of their programs. They have already begun to meet and work on problem areas which were identified by the study such as hearing assessment, identification of pupils for therapy, and health history data. Additional in-service education programs are being planned to help specialists utilize new techniques and research in assessment and therapy for pupils with disorders of language, voice, and stuttering.

Modification and refinement of the pilot studies for clinician agreement and reliability will continue as speech and hearing personnel meet in geographic area groupings.

Finally, as data of speech, language, and hearing disorders in the nation at large are available from the National Speech and Hearing Survey, the Los Angeles County Project will be able to compare the types and number of disorders in the general population with the population being served by speech and hearing specialists in the school districts of Los Angeles County.

ACKNOWLEDGMENTS

We wish to express appreciation to the many individuals and institutions that made this project possible and to all who feel identified with the study. The project became a reality because of the interest and cooperation of thirty-nine school districts in Los Angeles County. Two hundred and twelve speech and hearing specialists employed by these districts completed case records on 18,985 pupils in their caseloads. The specialists contributed a total of 4,735 working days to the project and their case records provided the main project data. Many other individuals helped retrieve data, interpret and report the findings.

Participating School Districts

ABC Unified School District
Alhambra City School District
Arcadia Unified School District
Azusa Unified School District
Bassett Unified School District
Charter Oak Unified School District
Compton City School District
Covina-Valley Unified School District
Culver City Unified School District
Downey Unified School District
East Whittier City School District
El Rancho Unified School District
El Segundo Unified School District
Garvey School District
Glendale Unified School District
Inglewood Unified School District
La Canada Unified School District
Lancaster School District
Lawndale School District
Los Angeles City Unified School District
Los Nietos School District
Lowell Joint School District
Lynwood Unified School District
Manhattan Beach City School District
Monrovia Unified School District
Mountain View School District
Norwalk-La Mirada Unified School District
Palmdale School District
Paramount Unified School District
Pasadena Unified School District
Pomona Unified School District
Redondo Beach City School District
Rowland School District
San Gabriel School District
Santa Monica Unified School District
South Pasadena Unified School District

West Covina Unified School District
Whittier City School District
Wiseburn School District

Assistance from Other Projects

We are grateful to Dr. Michael Marge 1/ who at the time of the Conference on Research for Public School Speech and Hearing Personnel 2/ listened with interest to our discussion of the Los Angeles County Case Record Project. Dr. Marge suggested that we apply for federal funding in order to utilize the case record for data retrieval and initiation of clinician agreement studies and he referred us to the Research Problems in the Public Schools Project 3/ for help in defining the study and writing the proposal.

The Los Angeles County Administrators of Special Education Association assisted in planning for the project through participation in the Speech Subgroup meetings.

Acknowledgment is also made to Dr. Forrest M. Hull, Ph.D., Project Director, National Speech and Hearing Survey 4/ for his willingness to share techniques, materials and findings from that study.

The Sponsoring Agency

Sincere appreciation is extended to the Los Angeles County Superintendent of Schools Office. The Los Angeles County Board of Education, the County Superintendent of Schools, the administrative staff and all divisions of the Office gave their interest and support to the project. The following individuals in the Los Angeles County Schools Office gave their interest, time and enthusiastic support to the project:

- C. C. Trillingham, Ed.D., Los Angeles County Superintendent of Schools until July 31, 1967
- Richard M. Clowes, Ed.D., Los Angeles County Superintendent of Schools since October 1, 1967.
- William H. Clinkenbeard, Ed.D., Project Administrator, Planning Grant ESEA, Title III

1/ Director, Program Planning and Evaluation, Bureau of Education for the Handicapped, Office of Education, U.S. Department of Health, Education, and Welfare.

2/ Sponsored by the American Speech and Hearing Association, supported by a grant from the Office of Education, U.S. Department of Health, Education, and Welfare.

3/ Sponsored by the American Speech and Hearing Association, supported by a grant from the Office of Education, U.S. Department of Health, Education, and Welfare.

4/ Supported by a grant from the Office of Education, U.S. Department of Health, Education, and Welfare.

Robert C. Gerletti, Ed.D., Director, Division of Educational Media

John Hamilton, Ed.D., Administrative Assistant, Assistant Superintendent of Finance

Robert C. McCaughin, Ed.D., Assistant Superintendent, Administrative Services

George E. Sitkei, Ph.D., Assistant Director in Charge of Research, Division of Research and Pupil Personnel Services

Harry S. Smallenberg, Ed.D., Director, Division of Research and Pupil Personnel Services

William W. Snider, Ed.D., Personnel Administrator

Grant E. Thayer, Ed.D., Director, Division of Curriculum and Instructional Services

Our special gratitude is extended to the following consultants on the county office staff: Gus Dalis, Ph.D., Consultant in Health Education, Division of Curriculum and Instructional Services, for his help in interpreting health data and his gracious acceptance of project personnel as office partners; Marie Dickinson, Consultant in English and Language Arts, Division of Curriculum and Instructional Services, for her willingness to consult with us in the area of language and for her help in revising the Spontaneous Speech-Language Section of the case record; Jerry Garlock, Ph.D., Assistant Director in Charge of Research, Division of Research and Pupil Personnel Services, for his invaluable help in supervising the data retrieval program and his assistance in formulating the items to be retrieved; Elsie Semrad, Programmer, Division of Research and Pupil Personnel Services, for her patient presentation of data processing techniques, and her direct supervision of all data retrieval.

The following consultants from the Division of Curriculum and Instructional Services reviewed the data pertaining to the area of their speciality and helped with data interpretation and planning of follow-up procedures: Carol Clark, Consultant in Physical Education; Joanne Dale, Consultant in English and Language Arts; Merrill V. Goudie, Consultant in Modern Languages; Sylvia Yellen, Consultant in Health Education.

Without the help of the following administrators in the Los Angeles County Superintendent of Schools Office we could not have completed the study:

Bertram Betts, L.L.D., Assistant Superintendent of Finance, and his staff have at all times been most helpful and most patient in assisting us in carrying out all financial aspects of the project. When a budgetary problem seemed without solution to us, Dr. Betts calmly, efficiently and satisfactorily found a solution.

Arthur E. Hawkes, Ph.D., Administrative Assistant to the Superintendent of Schools, enthusiastically inspired us to write the proposal seeking federal funding and assisted us in the proposal preparation and planning stages of the project. In a most dedicated way Dr. Hawkes gave of his time and talents in getting the project launched and he has continued to be interested and helpful in the completion of the project.

Howardine G. Hoffman, Ed.D., Assistant Superintendent, Educational Programs and Services, was most gracious in her attitude, generous with her time, creative in her approach and helpful in her consultations with us relative to the resolution of a wide variety of emergencies and problems.

Others in the county office who willingly helped with the project were: Orlando V. Burrola, Assistant, Duplicating Services; Phyllis De Groot, Secretary, Division of Curriculum and Instructional Services; Otis M. Embree, Supervisor, County School Service Fund; Edward Lloyd, Offset Operator, Duplicating Services; and Ray Wilson, Supervisor, Duplicating Services.

Los Angeles City Unified School District

The cooperation of the Los Angeles City Unified School District with approval of the Committee on Research for Staff Participation made possible a large scale study, and we wish to acknowledge this major contribution. Ernest P. Willenberg, Ph.D., Director, Special Education Branch, was especially supportive and encouraging. Special mention should be made of Barbara Coyne, Lois Frederick, Tyler Hayes, and Katherine Lancaster who willingly accepted many extra tasks for the project. In addition, Elizabeth Kinstler and Angela Scalero deserve particular notice for their participation in the two kinescopes made for the project.

Technical Consultants

We gratefully acknowledge the many contributions of the special technical consultants to the project:

Donald Dirks, Ph.D., Project Audiology Consultant, Associate Professor of Surgery, University of California at Los Angeles, supervised the tabulation of information for pupils with hearing loss, presented a summary of the data at the workshop, and outlined needs to be considered for future planning. In addition Dr. Dirks assisted with the revision of the hearing section of the case record.

Richard Flower, Ph.D., Project Speech Pathology Consultant, San Francisco Medical Center, contributed to the reorganization and simplification of parts of the case record form. Further, Dr. Flower reported and commented on selected sections of the data at the workshop.

Frederick Garbee, Consultant in Education of the Speech and Hearing Handicapped, California State Department of Education, enthusiastically gave his time and the benefit of his unique background and knowledge of speech and hearing programs in California to help us plan the study and determine the most valuable information to retrieve. He worked with us to make sure that the information we planned to collect complemented rather than duplicated information about programs being surveyed by State Department studies. Mr. Garbee's interest and help has continued through the completion of the study and planning of follow-up procedures.

Elise S. Hahn, Ph.D., Professor of Speech, California State College, Los Angeles, in her role as editor of Volume I which reported the workshop proceedings, has most ably edited the papers of all participants in the workshop and summarized the findings of the discussion groups.

Marcia Meeker, Ph.D., Consultant, Los Angeles Mental Hygiene Department, gave most generously of her time in consulting with us about methods to use in determining the socioeconomic status of the 18,985 students in our study.

Hans von Leden, M.D., Project Medical Consultant, Professor of Biocommunications at the University of Southern California, and Director of the Institute of Laryngology and Voice Disorders, most graciously gave his direct interest and participation as well as lending the staff and the facilities of the Institute to the making of spectographic analyses and carrying out of medical examinations and other laboratory tests with the children having voice disorders who participated in the Clinician Agreement-Reliability Studies.

Other Contributors

We also wish to acknowledge the institutions that took part in the pilot study of the case record form:

California State College at Los Angeles
Sacramento State College
University of California at Fullerton
University of Southern California
Whittier College

A number of school districts in other California counties also took part in the pilot study of the case record form and were kind enough to share their comments about the form with us.

Finally, and most significantly, acknowledgment is made of the dedication and outstanding work of Kenneth Penhorwood, Project Secretary, who prepared copy and statistical tables, proofread and typed the Final Report, and unhesitatingly, with good humor, assumed all of the other tasks so necessary in any project of this magnitude. We are most appreciative of his considerable contribution.

Nadine H. Coates

NADINE H. COATES
Project Director and Principal Investigator; Consultant in Education of the Speech and Hearing Handicapped, Los Angeles County Superintendent of Schools Office

Esther L. Herbert

ESTHER L. HERBERT
Principal Investigator; Supervisor, Speech and Hearing, Los Angeles City Unified School District

Maryjane Rees

MARYJANE REES, PH. D.
Research Consultant; Professor of Speech and Director, Speech and Hearing Clinic, Sacramento State College

FINAL REPORT

Project No. 7-0472
Grant No. OEG 0-8-070472-1732

CHARACTERISTICS OF CHILDREN RECEIVING SPEECH AND HEARING SERVICE IN LOS ANGELES AREA SCHOOLS

VOLUME I

The Speech and Hearing Program--Problems and Promise

Elise S. Hahn, Ph.D., Editor

Los Angeles County Superintendent of Schools Office
155 West Washington Boulevard
Los Angeles, California 90026

April, 1969

U.S. Department of
Health, Education, and Welfare

Office of Education
Bureau of Research

FINAL REPORT

Project No. 7-0472
Grant No. OEG 0-8-070472-1732

CHARACTERISTICS OF CHILDREN RECEIVING SPEECH AND HEARING SERVICE IN LOS ANGELES AREA SCHOOLS

VOLUME I

The Speech and Hearing Program--Problems and Promise

Elise S. Hahn, Ph.D., Editor

Los Angeles County Superintendent of Schools Office
155 West Washington Boulevard
Los Angeles, California 90026

April, 1969

U.S. Department of
Health, Education, and Welfare

Office of Education
Bureau of Research

CONTENTS

21

INTRODUCTION

The purpose of the workshop was to review the highlights of data resulting from the study as reported in detail in Volume II and Volume III of the Final Report. The focus of the workshop was directed toward examining the project data to identify areas containing both promise and problems relative to the future direction of speech and hearing programs in Los Angeles County, California. Related research was reported and the role of the speech and hearing specialist in special education and other educational services was considered.

At the request of participating clinicians the area of language disorders was emphasized. The chairman of the ASHA Language Committee, Dr. Michael Marge, spoke on "New Directions in the Provision of Services to Communicatively Handicapped Children" with focus on management of language problems. The second day of the workshop was devoted to presentations on "Normal Language Development," "Deviations in Language Development," "Assessing Language Skills," and "Incorporation of Language Training into Speech Therapy."

PARTICIPANTS IN THE STUDY

Representatives from school districts who took part in the first year (1966-1967) of the project became the workshop participants. During 1966-1967, the entire staff of speech and hearing clinicians from the Los Angeles City Unified School District and thirty-eight other school districts in Los Angeles County participated in the study. Seven Orange County school districts and four training institutions also took an active part in the project. There were 212 speech and hearing clinicians involved: 102 from the Los Angeles City Unified School District and 110 from other school districts in the county. The clinicians completed the eight-page case record on all pupils in their case loads for the school year 1966-1967. The total enrollment in participating school districts was 1,067,886 pupils. Of this number, 642,875 pupils were enrolled in the Los Angeles City Unified School District. The enrollment in the other districts of Los Angeles County ranged from 2,892 in the smallest district to 33,443 pupils in the largest district. The pupil population came from a broad spectrum of socioeconomic, cultural and ethnic backgrounds. Most of the districts included elementary schools only. Also, districts represented a wide range of educational policies and practices--each district being a separate administrative unit.

FACTS PERTINENT TO INTERPRETING THE PROJECT FINDINGS

As the highlights of the data from Volume II are read, it should be remembered that the data represent what school clinicians said their case loads looked like. Data were not based on arbitrary standards for making judgments. Clinicians were not trained, supervised or employed to collect data; they were the practicing school clinicians who worked with the pupils on a regular basis.

4/

The project was funded in the summer instead of the spring as planned and case records with blanks and errors could not be returned to clinicians for completion and correction because schools were closed and clinicians were on vacation.

The main purpose of the project, that of describing in detail the pupils in the case loads of school speech and hearing specialists, has long been identified as a critical need in Los Angeles County to aid in program planning, evaluation, and the solution of problems. School district administrators who planned for the remedial speech and hearing programs were at a disadvantage by not being able to describe the pupils eligible to receive service whether the area of concern was legislation, case selection, organization and scheduling, housing facilities, equipment needs, inservice, or the use of paraprofessionals.

As data is reported from Volume III, it must be understood that the clinician agreement-reliability pilot studies were an initial effort to look at possible ways of studying clinician agreement-reliability with large numbers of clinicians. From the data obtained, it is our intent to continue long range studies which will lead to better case selection and management.

THE LOS ANGELES COUNTY CASE RECORD PROJECT

The highlights of Volume II can better be understood by knowing about the Los Angeles County Case Record Project upon which this project is based. Because the project being reported was an outgrowth of the County Case Record Project, there were two subsidiary objectives: (1) to continue to work with school clinicians in evaluating the strengths and weaknesses of the case record and to accomplish the necessary revisions of the record, and (2) to identify areas in which school clinicians have difficulty in obtaining information about pupils and to attempt to alleviate the problems.

The development of the Los Angeles County Case Record began in 1964 in the Speech and Hearing Subgroup of LACASE (the Los Angeles County Administrators of Special Education organization). This committee's work was evaluated and amended many times by school clinicians in monthly area meetings of speech and hearing specialists. After two years and a series of revisions of the record and pilot studies, the case record and instructions were printed in the spring of 1966. A training film was produced to clarify the instructions for completing the form and to demonstrate certain assessment procedures. The case record was originally developed for the purposes of better communication, saving of time, greater ease in the transfer of pupil records, and quality control of programs. With the help of federal funds in the summer of 1967, we were also able to use the case record for large scale data retrieval. During the 1968-1969 school year the case record became the standard record for Los Angeles County used by sixty school districts. Now that school districts are using the third revision of the case record and are more satisfied with the assessment categories, districts are working for more objective ways of evaluating the behaviors described in the record. To date, three inserts have been added to the case record for this purpose. During the 1968-1969 school year a pilot use of carbon inserts for data retrieval has been tried so that clinicians' records do not have to be taken from them for retrieval purposes. It is the intention of school districts in Los Angeles County to continue to improve the case record and the assessment procedures introduced by it.

We believe that continued effort in this direction will mean continued improvement in the identification, diagnostic, therapeutic, administrative, coordinative and record keeping procedures that make up the service of the speech, language and hearing specialist to pupils with communication disorders.

NEW DIRECTIONS IN THE PROVISION OF SERVICES TO COMMUNICATIVELY HANDICAPPED CHILDREN

by Michael Marge, Ed.D.

Before I begin my talk, please consider with me two assumptions about the profession of speech pathology and audiology. The first assumption is that speech and hearing is always ready to demonstrate its commitment to the provision of the best possible services to the communicatively handicapped in our society. The second assumption is that the profession in its dedication to this commitment is sensitive to new and promising developments and is ready to modify its professional directions to meet the needs of the population it serves. I believe in these views. Perhaps my belief is too extreme, almost to the point of chauvinism. Perhaps I am an anachronism to be grouped with the jingoists of the French and American Revolutions, especially during these times when the iconoclast is not only popular but supported. I believe that in each of you, there is the same underlying commitment and belief in these two assumptions.

Let me document why this is so. Though early professional activity in speech and hearing focused upon those with disorders of articulation, voice, and rhythm and rate, as the profession evolved its commitment encompassed other handicapped populations. For example, during World War II, in answer to the need for services of professional personnel who could collaborate with medical specialists in otology in the care and rehabilitation of hearing-impaired servicemen, the area of audiology became a new field of specialization. In a similar way, the role of the speech pathologist in the treatment of adult aphasics became one of the major responsibilities of the profession. In each of these instances, the profession demonstrated its willingness to accept new challenges in the provision of services to the communicatively handicapped and to move resolutely and expeditiously to meet its new responsibilities. Another example of the profession rising to meet new needs of the handicapped can be drawn from the purpose of this workshop and your efforts during the past year. Allow me to explain what I mean. In 1964, when I joined the Office of Education, one of my chief goals was to improve the stature and increase the magnitude of speech and hearing programs in the schools. As I reviewed the problem, it became quite evident that very little research and program evaluation were being conducted in the schools. The major research effort for the profession was carried on in college and university programs where few handicapped children are seen when compared with the large numbers in public school programs. To ameliorate this condition, the Office of Education in conjunction with ASHA, sponsored a Conference on Research for Public School Speech and Hearing Personnel in 1966. Nadine Coates and Esther Herbert were participants at that Conference. In response to the appeal by the Office of Education and ASHA to the schools to engage in more research, a number of proposals were submitted by public school personnel. One of these proposals was the Los Angeles County Case Record Project. Nadine, Esther, and each of you who participated in this project are to be congratulated for taking giant strides in the direction of standardizing the measurement of speech disorders and in the use of standard reporting forms for public school speech and hearing programs.

During the past few years the profession has been asked again to apply its resources in talent and manpower to the provision of services to another population of the handicapped. I am referring to the broad commitment to the provision of services to all language handicapped children. The profession always has had a traditional concern for the language difficulties of children. Some will argue, however, that the concern has been primarily for the speaker's phonological patterns, which include what we commonly call articulation, voice quality and rhythm and rate. We have paid limited attention to syntax and semantics. Certainly, we have worked with vocabulary development and the correction of grammatical errors. But our language teaching approaches have been unsystematic and have not reflected the new thinking in the field of language acquisition.

To accept this national demand for expanded services, the speech and hearing professional will have to realize some dramatic changes in his role. They are:

1. The speech pathologist and audiologist must be a *generalist* in the management of language programs for children with special needs. He must be able to assess and manage all types of language problems, regardless of etiology.

2. The speech pathologist and audiologist must be a manager of language programs for handicapped children. He must be able to coordinate all the necessary resources in the community in the development of an educational and therapeutic program for the child with special needs. He must be able to function as a consultant to all professionals working with the child. He must be able to supervise the activities of the professional aide. Finally, he should be able to establish a continuity of services for the handicapped where children can receive appropriate services from a preschool level to that time when they have successfully met the goals of the language program.

3. The speech and hearing professional must be a *clinician-educator*. He must be able to direct educational and therapeutic services for all types of language problems. This aspect of his new role includes the ability to engage in teaching as well as in clinical activities.

In a recent survey of directors of college and university training programs in speech pathology and audiology, it was found that almost all the directors recognized the urgency of the changing role and the need for the adoption of the new responsibility for all language handicapped children, and plan to take steps to modify their curriculums to gradually incorporate training components which will better prepare their graduates for the new role.

CURRENT STATUS OF KNOWLEDGE ABOUT LANGUAGE

Let me briefly review the current picture of language training for children. The concern is primarily for the child whose problem is secondary to mental retardation, neurological deficits and emotional disturbance.

Most of the members of our profession still use the traditional approaches alluded to earlier in my discussion. In terms of diagnosis, this includes a cafeteria style battery of tests, such as the following:

a. Oral examination
b. Templin-Darley Articulation Test
c. Memory span and handedness
d. Illinois Test of Psycholinguistic Abilities (or some modification of it)
e. The Peabody Picture Vocabulary Test
f. Draw-a-man test
g. Geometric designs test
h. Coordination board test
i. Audiometric evaluation
j. Case interview
k. Recording of child's speech and language behavior
l. Analysis of language development according to:

    1. Mean sentence length utilizing Dorothea McCarthy's data
    2. Complexity of sentence structure
    3. Vocabulary size and grammatical correctness according to norms identified by various researchers, such as J. K. Duffy and J. V. Irwin's *Speech and Hearing Hurdles* (Columbus, Ohio, School and College Service, 1951).

We collate this information and relate it to other findings from members of a team, if available. These members include the pediatrician, otologist, neurologist, psychologist, and social worker. An etiology is proposed and we outline a procedure for therapy. The assumption is that the child learns language from the adults in his environment, given certain factors: normal speech mechanisms, normal neurological development and normal environmental stimulation. Approaches to therapy include work on articulation, motivating the child to speak, successive steps in the development of oral expression of ideas and feelings, vocabulary development, and correct grammatical usage. Therapy is provided on an itinerant basis, generally three or four times weekly in individual sessions or in small groups. This then is an oversimplified description of current practices, but I don't believe it is too inaccurate.

NEW DEVELOPMENTS IN THE STUDY OF CHILD LANGUAGE

During the past ten years there has been a revolution in the thinking about language development in children or more correctly, language acquisition in children. The fields of psychology and linguistics have reexamined with new vitality and vigor this complex area of human ability. The results of new thinking and research have challenged the tenets of the traditional approaches and seriously questioned the efficacy of our efforts. Let me review these challenges.

Innate Versus Learned Behavior. I said earlier that we generally held to the thesis that language is learned behavior. A number of linguists with substantial documentation are saying instead that language acquisition is the result of a biological endowment which predetermines the type, nature, and rate of linguistic functioning. Though the supporters of the "nature" school of thinking admit that the environment plays some role in language acquisition, the role is not well understood but is probably a small one. Supporters of this position include: David McNeil, Roger Brown, Eric Lenneberg, George Miller and Noam Chomsky.

Taking each of the four facets of language: phonology, morphology, syntax and semantics, it is felt that interventional techniques, such as those used by speech pathologists, have little effect on morphological, syntactical and semantic development of children. It is recognized that modifications of phonological patterns can be realized. But practice of language in the manner speech pathologists have recommended appears to be peripheral in the acquisition of language.

Need for Synthesis of Varying Views. The arguments from both sides of the Nature-Nurture Language Acquisition cavil are so compelling and substantiated that it becomes necessary to take an eclectic position if you attempt to identify implications for the profession. As you review the rapidly increasing literature in this area of study, you become convinced that a synthesis is essential. What do we know today which will be of help for us as we approach the expanding role in the schools? Here are a few tenable observations.

1. Language is a species-specific ability; it is found only in humans.

2. Language acquisition is a result of:

    a. A biological endowment which appears to pace the development of certain linguistic characteristics (cf. language universals).

b. To some extent, still undetermined, environmental factors provide a stimulating mileau for language growth but do not affect the age of onset of certain speech and language habits.

3. The proper study of language is not limited to phonology but to each of the four facets, most importantly syntax.

4. The acquisition of the ability to use syntax *may not* be facilitated by interventional techniques. There are many other points but Laura Lee will cover this topic in greater depth during her discussion.

The need to reexamine our work with the language handicapped is evident. We have been asked to serve all language handicapped children, regardless of etiology. This includes the child who is nonverbal, delayed in language acquisition or is the speaker of a dialect. Application of the new knowledge from the fields of psychology and linguistics to speech pathology must be facilitated. The curriculum for training the speech pathologist should include the study of modern linguistics: theory and practice, methods of foreign language teaching and the application of these methods to the service of language handicapped children. The profession should step up its research into language problems by drawing upon the techniques of linguists. The clinician specializing in language handicaps should evaluate his services to test the efficacy of his modification techniques.

A Look Ahead. What I have been describing is a tall order for the profession. Whether this is the direction the profession should take or desires to take is dependent upon many factors. First, the leadership of ASHA needs to accept the desirability of this trend. Second, the college and university training program directors must be willing to incorporate changes in their curriculums and establish meaningful relationships with linguistics and psychology. Third, each of us at the child-service level of professional functioning must be motivated to seek out the promise in the change on the assumption that what we are doing today can be improved. If the profession decides it will accept a broader responsibility for language problems of children, it must recognize that the challenge is awesome.

No one has a monopoly on knowledge and speech and hearing cannot lay claim to language handicaps as if we were the only ones who can make a contribution to this area. But I firmly believe in the capability of this profession to make an outstanding contribution in this area. We have the training programs, the talent, the manpower, the experience and most of all, the dedication to accept this challenge. The helping professions serve mankind in two ways. Some, such as the field of surgical medicine, increase the quantity of life. Other professions improve the quality of life. You and I, chauvinists together, will rise to the occasion, not because "the mountain is there" but because we serve mankind in the best tradition of helping those with communicative disorders to increase the quality of their lives.

HIGHLIGHTS OF DATA ON PUPILS IN THE CASELOAD

by Esther L. Herbert

The study, *Characteristics of Children Receiving Speech and Hearing Service in Los Angeles Area Schools*, was based on a caseload drawn from 1,067,886 children attending schools in the Los Angeles City Unified School District and in 38 of the Los Angeles County school districts. This caseload, drawn from students who live in isolated, rural as well as in metropolitan, urban areas of Los Angeles County, reflects the entire spectrum of socioeconomic, cultural, and ethnic groups.

The statistics gathered represent what was learned about the caseload of 18,985 pupils who received speech and hearing services during the 1966-1967 school year: 10,874 attended the Los Angeles city schools and 8,111 lived in 38 Los Angeles county districts. This combination of 1.69% of the city school students and 1.91% of the participating county school students was selected by both screening and referral methods. The policies and practices of case selection were determined by individual districts, operating under the 90-pupil maximum caseload set by the California State Department of Education.

The ratio of clinicians to pupil enrollment was 1:5037 for the combined sample: 1:6302 the city schools and 1:3864 in the county schools. The ratio range of clinicians to enrollment in the 38 county districts, where the school population ranged from a total enrollment of 2,892 to a total enrollment of 33,443, was 1:1,401 to 1:12,855. There were 212 clinicians: 102 from the city district and 110 from the county districts, who assisted in accumulating the retrievable data of the study. These clinicians came from districts that had agreed to use the new standard case record.

In determining the descriptive data, subjective judgment by individual clinicians was used because objective measures for most aspects or oral communication were not available. Therefore these data have been collected by what might be termed uncalibrated measuring devices, by clinicians using whatever criteria they commonly use for such decision making. However, clinicians whose judgment differed radically had relatively little effect on the composite data because of the large sample. Therefore, despite the subjective judgments made, information of value was produced.

There are, however, factors which must be recognized in reviewing the data in the study: some case records were incomplete, so the number of pupils does not always reflect the total caseload population. Some records were incorrectly marked. The case record was new. Some information was not available. And some oversights were noted. Despite these shortcomings, the study was a profitable undertaking which revealed interesting and informative new information about the caseload studied.

Three areas of particular interest that will be discussed are the characteristics of pupils in the speech and hearing programs studied, the backgrounds of these pupils, and their speech problems.

The most apparent division of the caseload was by gender which revealed that male pupils outnumbered female pupils 12,431 to 6,129 or 67% to 33%. In other words, there are two boys to every girl enrolled in speech and hearing programs in the 39 districts covered by the study. The variation between the city case records and the county case records did not vary more than 1% from the combined total.

Another quite obvious characteristic studied was the age range of the pupils. Those in the city sample were from 3 years to 21 years, and those in the county sample were from 3 years to 20 years. The combined mean age of the entire caseload was 9-7 years. The city's mean was 10-3 years and the county's mean was 8-9 years. The percentage of older students differed between the city sample, in which 43% of the pupils were 10 years or older, and the county sample, in which only 23.6% were in this age range. Because the Los Angeles Unified School District includes both elementary and secondary schools and only 22 of the 38 county schools involved in the study include both elementary and secondary schools, it is to be expected that the city case records would show a larger proportion of older pupils.

Because age does not necessarily reflect grade level, grade level was also ascertained from the case records. Results showed 56.9% of the combined caseload enrolled in grades K-3: 48.4% in the city caseload and 68.3% in the county sample. Nearly 25% were enrolled in grades 4-6, where city and county samples were the same as the combined sample. Approximately 11% were enrolled in grades 7-9: 15.2% in the city caseload and 4.6% in the county caseload. The 5% of the combined enrollment in grades 10-12 had a greater proportion of the city sample: 8.0% to 1.0% of the county sample. Only 2% of the combined caseload were in ungraded classes. Also included in the study were a small number of preschool children. The varying proportions between city and county caseloads may be relative to the greater number of elementary districts included in the county caseload or may be a reflection of different case-selection practices.

While intelligence-test scores were available for 95% of the city sample, scores were available for only 40% of the county sample; therefore comparison of the samples is difficult. In the combined city-county sample for whom scores were available, two-thirds of the pupils had IQ scores of 91 or higher. Just over one-fourth had IQ scores of more than 111. Of the lower-ability scores, the city caseload showed a greater proportion, totaling 23.7% to the county's 20.6% in the 76-90 scoring range and 11.2% to the county's 7.2% in the below-75 scoring range. However, as stated above, scores were reported for less than half of the county sample.

The study also showed that of the students in the speech and hearing program, 94% were in regular classes; 5.5% were in special classes; and 0.5% were preschool children. In the special classes were 7.6% of the city's caseload and 2.7% of the county's caseload. Of the 5.5% of the entire caseload in special classes, 59.1% from the city group and 47.9% from the county group were attending classes for the educable mentally retarded; 16.5%, equally proportioned between city and county, were attending classes for children having cerebral palsy; 7.6% were in classes for other orthopedic handicaps.

Of the entire caseload in special classes, 5.4% attended classes for the aurally handicapped, with the city's proportion 6.3% to the county's 1.9%. The city had a smaller proportion of the 5.3% of the combined caseload in classes for the educationally handicapped: 1.9% of the county's 18.3%. The remainder of those in special classes were in classes for the gifted, the trainable mentally retarded, or the visually handicapped. Only one child, who was in the county caseload, was receiving home instruction.

Extremely complete information was retrieved on lateral preference, probably because an instructional film on the informal estimate of lateral preference had been shown to all clinicians participating in the study. Data collected showed that the majority (85.5%) of the students in the combined caseload were right-handed. Only 11% were left-handed and 3.5% ambidextrous. City and county percentages differed by less than 1% in these findings.

The majority of students also showed a preference for the right foot, but the percentage of preference was lower: only 63.9%. Left-foot preference was shown by 27.7% and no preference by 8.4%. 79.1% were judged to sight with the right eye and 13.9% with the left eye; 7.0% were judged to alternate sight between eyes.

In addition to the information about the pupils involved in the study, information was retrieved relating to their backgrounds. For instance, the study revealed that pupils who had had no previous therapy numbered 50.7% of the total, with city case records showing 45.5% and county case records showing 58.0% of their pupils receiving therapy for the first time. In both city and county just a fraction over 10% had been receiving therapy for four or more years.

The study showed that in the city schools, screening accounted for only 8.3% of the caseload and that in the county schools screening accounted for 34.1%. The combined caseload showed that screening accounted for 19.0%. Of the pupils placed in the program by referral, 72.6% were referred by teachers: 70.0% of the city caseload and 77.7% of the county caseload. Health personnel in the city referred 7.5%, and health personnel in the county referred 1.0%.

In determining the socioeconomic status of pupils, two reference works, the *Census Tract Street Index of Los Angeles County* and the

1960 U.S. Census Report of Population and Housing for Los Angeles-Long Beach were used. Status of pupils living in tracts with fewer than 200 dwellings could not be determined by this method, but the remaining 90.7% from Los Angeles city and 90.9% from Los Angeles county were determined.

Some of the findings in this area were quite interesting. Most heavily represented in the caseload were pupils from the upper-middle group, followed by those in the middle-income group: 29% and 23%, respectively. Roughly 20% were from homes in the lower-middle income group. Slightly more than 15% were in the low-income group, and nearly 13% were in the highest income group.

Marked differences were found between thecity and the county caseloads in regard to the socioeconomic status of caseload pupils. In the lowest income group, for instance, 24% of the city and only 4% of the county caseloads were represented. Conversely, 42.1% of the city caseload and 65.5% of the county caseload were in the middle and upper-middle groups. The highest income group, like the lowest, had more city pupils than county pupils: 14.5% to 9.8%.

The study showed that while one-fourth of the pupils in the caseload were the first-born in the family, one-third were second-born. About 22% were third-born; 11%, fourth; and nearly 10%, fifth or later-born. Only children or children with one sibling represented a larger percentage of the city caseload while children with three or four siblings represented a smaller percentage. As would be expected from the socioeconomic distribution of the pupils, a higher percentage of the children from large families were in the city caseload.

More than 95% of the pupils lived with their natural mothers, but only 81% lived with their natural fathers. Nine-and-one-half percent of the pupils had no father living in the home. Here again the higher percentage was in the city caseload where 11.9% came from no-father homes compared to 6.1% in no-father homes in the county caseload.

Information on speech problems which might exist among relatives of the pupils was quite difficult to obtain; therefore, our information refers to relatives of less than half of the caseload. Among these relatives, about 40% were reported to have speech and hearing problems. This percentage, however, may be distorted by the selective nature of the caseload reported.

Of particular concern are the data regarding the oral expressive behavior of the pupils in the caseload sample. Part I of the case record listed five categories "intended to cover all expressive disorders without inferring causal conditions." Clinicians were asked to categorize disorders of each pupil in the caseload according to articulation, voice, stuttering, language, and little or no speech.

In addition, clinicians were to note whether this was a single or multiple disorder; and, if multiple, to rank the type of disorder with respect to its disabling effect for the pupil.

More than three-fourths of the pupils had single expressive disorders only: 83.3% in the city and 84.7% in the county. Multiple expressive disorders were reported for 16.1% of the combined caseload, with approximately 12% of these pupils having three or more disorders.

For both populations, articulation disorders accounted for the majority of disorders reported both as single and primary disorders. 79.9% in the city and 87.9% in the county. While stuttering ranked second in both caseloads, there was a difference in the number of cases reported: 14.0% for the city and 5.5% for the county.

The percentages of pupils with little or no speech, language, and voice disorders reported in both caseloads were very similar with a difference of only .5 percentage points in each category. Further, voice disorders, language disorders, and little or no speech were reported as occuring more often with other disorders than as a single disorder. Commonly, voice disorders were considered as the secondary rather than the primary problem. The figures also indicate that in nine out of ten cases in which multiple disorders were recorded, one of the disorders was articulation.

The information obtained from measures of articulation skill is especially interesting since articulation disorders comprised the largest category. In order to examine all the data available on frequency of misarticulations, records showing any articulation errors were included; therefore, not all of the pupils whose records showed errors were classified as articulation cases.

As is reported in Part Two of the study, "The mean score for the entire caseload sample on the fifty items which are also included in the Templin-Darley 50-Item Articulation Test was 35.0. The mean score for Templin's sample of four-and-a-half-year-olds for sexes and socio-economic groups combined was 35.8. The mean for the city sample, 34.0, was comparable to the mean of 34.4 for the Templin sample of four-year-olds while the mean for the county, 36.2, was closer to the mean for Templin's sample of four-and-a-half-year-olds. Since the mean age for the combined city-county sample was 9-7 years, that is, 10-3 years for the city and 8-9 years for the county, the articulation skill of this group was very poor.

In the present study, /s/ and /z/ were the two most difficult consonant sounds and accounted for 15.5% and 13.6%, respectively, of all the articulation errors made on the consonants. /θ/ and /r/ accounted for 9.7% and 9.5% of the errors, /ʃ/, /tʃ/, and /ð/ accounted for 8.5%, 7.4%, and 7.0%, respectively. Only 4.7% of the errors occurred on /dʒ/, 3.9% on /l/, 3.7% on /v/, and 3.2% on /ʒ/. Each of the remaining 13 sounds accounted for errors of .3% to 1.5% each. Percentages

TABLE I

Consonants (singles) most frequently misarticulated as reported by eight investigators along with consonants appearing last in developmental sequence according to three investigators. Sounds are shown in rank order with the most frequently misarticulated sound shown first. Consonants shown under Templin, Wellman, and Davis are in approximate rank order only, with the latest developing sounds shown first.

Coates and Herbert (3 - 21 Years)	s	z	θ	r	ʃ	tʃ	ɝ	dʒ	l	v	ʒ	-
Snow (10) (1st Grade)	ʒ	θ	z	ð	s	ʃ	tʃ	v	dʒ	r	ŋ	l
Pendergast (7) (1st Grade)	s	θ	z	ð	r	v	ʃ	l	tʃ	dʒ	-	-
Roe and Milisen (8) (1st Grade)	dʒ	z	d	g	θ	ð	v	s	t	b	tʃ	-
Roe and Milisen (8) (Grades 1, 3, 5, 7)	θ	s	t	ð	z	dʒ	tʃ	r	v	k	d	-
Bass (1) (Beginning Kindergarten)	θ	ð	ʒ	v	ʃ	r	-	-	-	-	-	-
Van Riper (Children)	s	z	θ	ð	r	ʒ	l	tʃ	dʒ	ʃ	f	-
Hall (6) (Children)	s	z	ʃ	tʃ	dʒ	ʒ	θ	r	-	-	-	-
Sayler (9) (Grades 7 - 12)	z	v	tʃ	ŋ	ð	f	s	θ	g	l	b	t
Hall (6) (College Freshman)	s	z	dʒ	ʃ	tʃ	ʒ	-	-	-	-	-	-
Templin (12) (6.0 and 7.0 Years)	θ	ð	ʒ	v	z	dʒ	l	t	-	-	-	-
Wellman (17) (5 and 6 Years)	dʒ	s	ʃ	tʃ	v	ð	r	θ	ʒ	z	t	-
Davis (4) (6.5 and 8.0 Years)	s	z	r	ð	θ	l	ʒ	ʃ	-	-	-	-

for the city and the county sample were identical for five sounds, differed by less than 1% for 15 sounds, and did not exceed 2% difference for the other four sounds.

In Part Two of the study, it is also reported that these results generally agree with a number of earlier studies, though there are some differences in order and percentages of errors. Also, the present study used a population composed of pupils with oral communication disorders and with a wider age range than the subjects in most studies. Table I shows the order from high to low of the most difficult sounds as determined by the percentage of errors. The sounds from the Templin, Wellman, and Davis studies are grouped rather than ranked; they represent sounds that develop last according to each investigator.

In using the Case Record, clinicians were also asked to make judgments of pupil's spontaneous speech. It is perhaps noteworthy that for the majority of characteristics delineated in the case record, there was great similarity in city and county figures.

Of the pupils who made articulation errors, 90.2% made consonant errors while 15.7% made vowel errors, with 23.6% of the pupils inconsistent in their errors. Essentially similar figures for vowel errors were reported and consonant errors were reported as 87.2% for the city and 94.2% for the county.

Only 10.8% of the pupils were reported as using a deviant dialect: 12.7% in the city sample and 8.1% in the county sample. However, more pupils with regional dialects were included in the city sample, and more pupils with foreign dialects were in the county sample.

Generally, intelligibility was judged as adequate: in the combined sample, 79.5% of the pupils were rated as intelligible, 17.8% as partially intelligible, and 2.7% as unintelligible. A somewhat higher proportion of pupils in the city sample, 18.1% to 9.5% in the county sample, was judged as nonfluent. This would be expected since a larger proportion of pupils who stuttered was reported for the city sample.

Nearly 15% of the combined caseload was judged to have some type of deviant voice quality. Pitch deviations were reported as 8.4% in the city sample and 8.3% in the county sample. The proportion for loudness deviations was quite similar with 14.4% cases in the city and 11.4% cases in the county.

Rate deviations were reported for nearly 15% of the caseload and the distribution by type of rate was quite similar for the two samples, with a too rapid rate for approximately 33% of the pupils, a jerky rate for approximately 36% of the pupils, and a too slow rate for nearly 18% of the pupils. Thus, although judgments regarding pitch, loudness, and rate are made subjectively, the data are remarkably alike for the two groups studied.

The material discussed today covers only a fraction of the mass of information written about and tabulated in the study. Even so, it should be apparent that through use of the case record we have been able to describe a large caseload in considerable detail. Our work will, however, prove of lasting value only if we continue to refine the case record and evaluate our programs in view of the data obtained.

REFERENCES

Esther L. Herbert

1. Census Tract Street Index of Los Angeles County. Los Angeles County Department of Mental Health. October, 1965.

2. Coates, Nadine H.; Herbert, Esther L.; and Rees, Maryjane; *Characteristics of Children Receiving Speech and Hearing Service in Los Angeles Area Schools: Volume II, Data on 18,925 Pupils Served During 1966-1967 in 39 School Speech and Hearing Programs in Los Angeles County*. Los Angeles, April, 1969.

3. United States Bureau of the Census. *Censuses of Population and Housing--1960; Census Tracts: Los Angeles--Long Beach, California, Standard Metropolitan Statistical Area.*

HIGHLIGHTS OF DATA ON PUPILS IN THE CASELOAD

by Richard Flower, Ph. D.

I have been asked to review some of the data from the Case Record Project and to comment upon the interrelationships among some of the factors reported. Specifically, I will discuss the information relative to assessments of the adequacy of the speech mechanism and the reported health histories; the information about the language abilities of the children studied; and the information about their academic achievement.

SPEECH MECHANISM AND HEALTH HISTORIES

In assessing the speech mechanism, judgments were made relative to the structure and function of the following structures; the lips, the teeth, the tongue, the hard and soft palate, the nasal cavities, and the breathing mechanism.

Lip Structure and Function. On the basis of previous studies (Fairbanks and Green, 1950; Spriestersbach, Moll, and Morris, 1961), we would anticipate no relationship between lip structure and articulatory facility. Slight inferiority of lip mobility has, however, been attributed to individuals with articulatory problems (Fairbanks and Spriesterbach, 1950). It has also been suggested that disabilities in performing rapid alternating lip and tongue movements may differentiate among specific groups of children with articulatory disorders (Prins, 1962).

Among both the city and county district children, approximately 95% were judged to have adequate lip structure and function with only 5% reported as inadequate. When only those children with articulatory problems were considered, again, roughly 5% were rated inadequate. Of these, roughly two-thirds had poor mobility and approximately one out of ten had repaired clefts.

Problems in lip mobility seem to be reported less frequently than we might anticipate. Some clinicians may have evaluated lip mobility only in terms of the ability to assume certain lip postures. They may not have also evaluated the ability to perform rapid, repetitive movements. Before we could comment upon the incidence of the number of children with repaired cleft lip among the children with articulatory problems, it would be necessary to know how many of these children also had articulatory problems resulting from cleft palate.

Teeth. The relationship between dental occlusion and articulatory problems has been extensively discussed in both the speech and the dental literature (Fymbo, 1936; Bernstein, 1954; Ingervall and Sarnas, 1963; Subtelny and Subtelny, 1962; and Fairbanks and Lintner, 1951). Bloomer (1963) has provided a very cogent summary of the most widely accepted conclusions:

1. Articulatory defects of speech may exist even though the dental occlusion is normal; conversely dental malocclusions may exist in a person with normal speech.

2. Although dental malocclusions require the speaker to use special adaptations of lip and tongue movements to achieve normal articulation, they become a direct cause of defective speech only if the deformities are so great as to prevent the tongue, lips, or palate from occluding or constricting the oral and oralpharyngeal valves during speech.

3. Speech defects and malocclusions may be indirectly related through the effects that each has on the physical and mental health or the social acceptability of an individual.

4. Speech defects and malocclusions may arise from the same origins, that is from abnormal orofacial movements due to neurologic or myopathic conditions, from genetic factors, from maladaptive habits, etc.

Among the total group of children reported in the Case Record Project, 78% were judged to have adequate occlusion with 22% considered inadequate. Thus far, the data have been further broken down for only one type of speech problem: articulatory disorders. It would be interesting to observe whether the judged incidence of malocclusions is any greater among the children with articulatory problems than among children who stutter or who have voice problems. On the basis of the completed tabulations, however, it is evident that the incidence of malocclusions was approximately the same for children with articulatory disorders as it was for the population as a whole. This would seem to suggest that the incidence of malocclusion is not substantially greater among the children with articulatory disorders.

It is extremely interesting to compare the incidence of malocclusions reported in this project with reports of incidence of malocclusions among school children in general. These incidence reports range from 40% to 68% (Brandhorst, 1946; Marshall, 1945; Newman, 1956; and Bill, Blayney, and Wolf, 1959) with one study reporting that 83% of Negro children had malocclusions (Altemus, 1957). I doubt that we can conclude that the incidence of malocclusions among children with speech problems who attend schools in the city and county of Los Angeles is about half of the incidence among other school children. It seems more likely that speech clinicians are more accepting of more minimal deviations than are orthodontists.

<u>Tongue Structure and Function</u>. The most widely quoted studies of tongue structure and function report no significant differences between normal and defective speakers (Fairbanks and Spriestersbach, 1950, and Fairbanks and Bebout, 1950). It is important to note, however, that

these studies used college-aged subjects. Many children with articulatory problems, on the other hand, seem to demonstrate problems in executing rapid alternating tongue movements, particularly when these movements involve the tip of the tongue (Powers, 1957, and Prins, 1962).

The case record did not ask the clinicians to report their observations of tongue thrusting. The problem was recorded only if observed by a dentist or physician. The diagnosis of this problem and its actual significance as a cause of dental and speech problems are, of course, matters of considerable dispute (Fletcher, Casteel, and Bradley, 1961; Subtelny, Mestre, and Subtelny, 1964; and Ward, Malone, Jann, and Jann, 1961).

Inadequacies of tongue structure or function were attributed to 15% of the children reported in the Case Record Project. The incidence of tongue problems was approximately the same among the children with articulatory problems as it was among all of the children reported. Approximately 2/3 of the tongue problems were attributed to poor mobility with approximately 1/3 consisting of structural deviations.

It would be interesting to tabulate the data further to observe whether there is a relationship between descriptions of poor tongue mobility and the number and type of misarticulations present (Prins, 1962). It would also be interesting to observe the number of children described as having poor tongue mobility at various age levels. As the data now stand, fewer children than I would anticipate are described as having poor tongue mobility. I wonder, once again, whether all clinicians considered the ability to effect rapid alternating movements in assessing mobility.

Hard and Soft Palate Structure and Function. The relationship between hard and soft palate structure and function and speech production is extremely complex. The substantial literature in this field defies brief summarization. An adequate physiologic assessment of palatal competence cannot be accomplished within the usual limitations of public school facilities. It would be inappropriate, therefore, to attempt to relate the data reported in the Case Record Project to the research literature.

We can, however, note one finding of considerable interest. The most widely quoted incidence report that specifically mentions the number of children with cleft palates in a population of children with speech problems suggests an incidence of 1.2% (Pronovost, 1951). The Case Record Project reports an incidence of inadequate hard palate structure of 2.6%. It is also interesting to note that the incidence of structural inadequacy of the hard palate is approximately one-third greater among children in the city district than among children in the county districts.

Further comments about observations of palatal structure and function must await further data tabulations. It would be interesting, for example, to determine the relationships between judgments of palatal structure and function and the specific misarticulations present (Morris, Spriestersbach, and Darley, 1961).

Breathing Mechanism. The most widely prevailing attitude toward the relationship between differences in respiration and problems in speech production was well summarized by Van Riper and Irwin (1958):

> On the basis of evidence now available, it must be admitted that we cannot establish any predictable relationship between vital capacity and good voice. Moreover, with the exception of extreme upper clavicular breathing, good voice can be and is produced by any of the breathing types. Certainly so far as area of activity is concerned, there is no one best type of breathing. Whatever method gives us enough air pressure is good enough.

This point of view is corroborated by the Case Record Project. Inadequate breathing function was described among only 0.4% of the children studied.

Health Histories. Because of differences in reporting procedures it is possible to compare only portions of the health history data from the Case Record Project with previous studies. Eagles and his associates (1963) reported that about 40% of a general population of school children had frequent colds, 40% reported sore throats with fever, and about 12% had frequent ear infections. Both colds and sore throats are reported with considerably less frequency in the Los Angeles Case Record Project. The frequency of ear infections was, however, exactly the same as reported by Eagles. If we use the same study as a basis for comparison, the incidence of asthma is three times greater among the children in the Case Record Project than it is in the general population.

A history of early illnesses is reported in the Case Record Project with approximately the same frequency as was found among both the experimental group and the controls in a widely quoted study of children with delayed speech development (Beckey, 1942). The author of that study reported that single incidents of serious illness were no more common among children with delayed speech development; however, they were more likely to have experienced two or more serious illnesses. Unfortunately, the method of recording data in the Case Record Project does not permit us to observe multiple bouts of serious illness among the children studied.

ORAL LANGUAGE ABILITIES

The frequency of application of the diagnosis of language disorders in the Case Record Project will be discussed by other speakers. I am concerned here with the data elicited by three items that described different facets of language behavior: length of response, vocabulary, and grammar. Specifically, I would like to comment on the assessment of these factors among the children with articulatory problems.

Until further data tabulations are completed we cannot comment upon the factor of vocabulary. Since vocabulary is presumably closely related to intelligence, observations of limitations of vocabulary would only be meaningful among those children scoring IQs in the normal range. Even with IQ scores held constant, however, observations of vocabulary levels may be spurious. It is likely that many of the intelligence tests used relied heavily upon vocabulary.

On the basis of previous research, we would expect that when other factors are held constant, children with articulatory problems will not differ significantly from normal in the length of their verbal responses (Schneiderman, 1955, and Vandermark and Mann, 1965). In the Case Record Project, 86% of the children with articulatory problems were judged as producing verbal responses of adequate length. It seems probable, however, that even this degree of difference would diminish if other factors were constant. For example, when the data were grouped by socioeconomic levels, ratings of inadequate response length were approximately three times as frequent among lower-class children than among upper-class children. It seems likely, therefore, that the Case Record Project corroborates previous research on length of response.

The one aspect of language performance that is most commonly identified as deviant among children with articulatory problems is grammatical production (Menyuk, 1964; Vandermark and Mann, 1965; and Foster, 1964). Menyuk summarized her research with the statement that ". . . at no age did the grammatical production of a child with deviant speech match or closely match the grammatical production of a child with normal speech from two years on."

It is rather surprising to note, therefore, that only about 13% of the children with articulatory disorders in the Case Record Project were described as unacceptable in grammatical production. We note that half of the children evaluated as poor in this area came from the low or lower-middle socioeconomic groups suggesting that judgments were heavily influenced by cultural factors.

In reviewing these data we are again impressed with the limitations of speech clinicians in the assessment of grammatic complexity and accuracy. I do not mean to imply that this limitation is any more prevalent in Los Angeles City and County than it is anywhere else; nor is it any more common among clinicians working in schools than it is in other work settings. I believe that this problem bespeaks serious deficiencies in our professional education. It also identifies a need for the development of better means of assessing grammatic accuracy and complexity within the practical limitations of most clinical programs.

This problem is evident in a degree that amounts to reduction to the absurd at one point in the Case Record Project. Roughly one-third of the children described as having little or no speech were also rated as having acceptable grammatic usage.

It is quite possible that many clinicians consider accuracy alone in assessing grammatic usage. For example, if a child's verbalizations consist of such simple sentences as "I go home." at age six, in the strictest sense he may be using accurate grammar, but it may be seriously limited in complexity. Furthermore, we may be tuned only to the phonemic aspects of word production. We may for example observe that a child omits all terminal consonants and yet not realize that at the same time his language is virtually devoid of grammatic inflections.

ACADEMIC ACHIEVEMENT

A substantial number of studies have been reported indicating that reading achievement is more likely to be deficient among children with speech problems (Artley, 1948; Everhart, 1960; Hildreth, 1946; Moore, 1947; and Powers, 1957). There is some suggestion that this is more likely to be true among children in the elementary grades than among older children. It is also widely contended that these children are more likely to be deficient in reading than in arithmetic. It is difficult, however, to find support for this contention in the research literature.

If we consider only those children in the Case Record Project who scored in the average range of intelligence, 42% were below average in reading. This increases to 75% among the children scoring in the 76-90 IQ range and 90% among those scoring below 75. Our experience suggests that children with low reading achievement may obtain spuriously low scores on group intelligence tests. It may well be, therefore, that children of normal intelligence are found among the children who tested below IQ 90.

At the time these comments were prepared, achievement test data on all children in the Los Angeles City and County districts were not available. We cannot, therefore, relate these data to the entire school population from which the speech defective children were drawn. One study, however, suggests that only 13.4% of the children should be below the appropriate reading level for their MA as assessed by group tests (Thomas, 1946). On this basis, there are something over three times the expected number of reading problems among those children who scored in the average IQ range.

In striking contrast to the widely accepted notion about arithmetic achievement, we find that approximately one-third of the children scoring in the average IQ range were below average in both arithmetic fundamentals and arithmetic reasoning.

The results of the Case Record Project seem to offer firm support for the contention that in a substantial number of instances, problems in speech learning are associated with problems that significantly influence academic success. From the moment he arrives at school, therefore, the child with limited or deviant speech must be regarded "at risk" for special problems in academic learning.

DISCUSSION

In my comments thus far, I have not expressed adequately my profound respect and admiration for the accomplishments of the Case Record Project. Never before to my knowledge has so much information been drawn together about children receiving speech and hearing services. To this extent the Project is invaluable.

As with all good and dispassionate data-gathering projects, however, the results expose some chinks in our professional armor. In reviewing the results of the Project, I began to reflect about several matters that seem to relate to the overall state of our art. I commend three of these reflections for your consideration.

First, one of the real values of this Project may be putting to final rest some of our needless evaluative procedures. Most of the current texts in our field recap the research that minimizes the significance of such factors as breathing patterns, lip structure, most dental malocclusions, and hard palate structure; yet they all persist in presenting diagnostic protocols that require assessments of each of these factors.

Time is far too precious to every clinician to expend heedless minutes in tribal customs that have no meaning. Our primary interests relate to communicative behaviors. We should concentrate, therefore, on describing those behaviors as accurately as possible and appraise other factors only when they are significantly related to the particular communicative behaviors we observe.

Second, it is very obvious in the literature of our field that our research efforts have been more concerned with describing communicative behaviors than with developing new approaches to modifying these behaviors. Nevertheless, we still have developed few standardized techniques for assessment that can be applied within the usual clinical service program. No better laboratories can be found for the development of these procedures than public school programs. In no other settings are such large numbers of children available and virtually all of the practical limitations of any clinical setting are found in most school programs.

Third, the present Case Record, like all previous case records, consists primarily of demographic data and an inventory of each child's deficits. Unquestionably these are important factors. On the other hand, we should not be merely interested in the description of pathology. We must also detail a child's current level of achievement in the sequence of tasks that comprise each aspect of communicative behavior.

Let us assume, for example, that a child does not produce a particular phoneme in a word on an articulation test. At one extreme this may constitute a specific mispronunciation that is unique to that one word. At the opposite extreme, the child may consistently substitute a phoneme that is grossly different with respect to several features and be unable to recognize these differences even when the two phonemes are produced by another speaker. There are of course many levels of proficiency between these two extremes. Unless our evaluation tools permit us to identify some specific levels of achievement between complete success and total failure, we cannot really plan a program that is appropriate for a particular child.

Furthermore, it is of extreme importance to observe the kinds of reinforcers that are particularly effective in modifying each child's communicative behaviors. Someone has described this as observing "what turns a child on".

Again we must note that few if any practical means are available for assessment of specific levels of achievement in communicative behaviors and for determining which reinforcers are particularly effective. Until we evolve some means for observing and recording these phenomena however, any case record will be inherently limited in its usefulness in daily clinical practice.

If a criterion for important research is that it assists in the identification of ignorance or defines some highly important questions, the Case Record Project has succeeded mightily. The final step in Wendell Johnson's statement of the scientific method consists of the formulation of new questions, questions that reflect the notions that have been revised by the research that has just been completed. I hope that the Case Record Project has chiefly served as a vehicle for the formulation of some new questions that the school districts of the City and County of Los Angeles will attack through continued research.

REFERENCES

Altemus, L. "The Incidence of Malocclusion in American Negro Children Twelve to Sixteen Years of Age". *Am. J. Orthodont.*, 43, 1957, pp. 874-878.

Artley, A. "A Study of Certain Factors Presumed To Be Associated with Reading and Speech Difficulties". *J. Sp. Hear. Disord.*, 13, 1948, pp. 351-360.

Beckey, R. "A Study of Certain Factors Related to Retardation of Speech". *J. Sp. Hear. Disord.*, 7, 1942, pp. 223-250.

Bernstein, M. "The Relation of Speech Defects and Malocclusion". *Am. J. Orthodont.*, 40, 1954, p. 149.

Bloomer, H. "Speech Defects in Relation to Orthodontics". *Am. J. Orthodont.*, 49, 1963, pp. 920-929. Excerpt (page 23) reprinted by permission of the author and publisher.

Brandhorst, W. "Will Orthodontics Become a Part of Contemplated Government Health Programs for Children?" *J. Dent. Ed.*, 10, 1946, pp. 138-140.

Eagles, E., et al. "Hearing Sensitivity and Related Factors in Children". St. Louis: *The Laryngoscope*, 1963.

Everhart, R. "Literature Survey of Growth and Developmental Factors in Articulatory Maturation". *J. Sp. Hear. Disord.*, 25, 1960, pp. 59-69.

Fairbanks, G., and Bebout, B. "A Study of Minor Organic Deviations in 'Functional' Disorders of Articulation: 3. The Tongue". *J. Sp. Hear. Disord.*, 15, 1950, pp. 348-352.

Fairbanks, G., and Green, E. "A Study of Minor Organic Deviations in 'Functional' Disorders of Articulation: 2. Dimensions and Relationships of the Lips". *J. Sp. Hear. Disord.*, 15, 1950, pp. 165-168.

Fairbanks, G., and Spriestersbach, D. "A Study of Minor Organic Deviations in 'Functional' Disorders of Articulation: 1. Rate of Movement of Oral Structures". *J. Sp. Hear. Disord.*, 15, 1950, pp. 60-69.

Fairbanks, G., and Lintner, M. "A Study of Minor Organic Deviations in 'Functional' Disorders of Articulation: 4. The Teeth and Hard Palate". *J. Sp. Hear. Disord.*, 16, 1951, pp. 273-279.

Fletcher, S., Casteel, R., and Bradley, D. "Tongue-thrust Swallow, Speech Articulation, and Age". *J. Sp. Hear. Disord.*, 26, 1961, pp. 135-144.

Foster, S. "Language Skills for Children with Persistent Articulatory Disorders". Abs. in Bateman, B., *The Illinois Test of Psycholinguistic Abilities in Current Research.* Urbana, Illinois: Institute for Research on Exceptional Children, 1964.

Fymbo, L. "The Relation of Malocclusion of the Teeth to Defects of Speech". *Arch. Speech*, 1, 1936, pp. 204-217.

Hildreth, G. "Speech Defects and Reading Disability". *Elem. Sch. Jour.*, 46, 1946, pp. 326-332.

Hill, I., Blayney, J., and Wolf, W. "Evanston Dental Caries Study: XIX. Prevalence of Malocclusion of Children in a Fluoridated and Control Area". *J. Dent. Res.*, 38, 1959, pp. 782-787.

Ingervall, B., and Sarnas, K., "Comparison of Dentition in Lispers and Nonlispers". Abs. in *Dent. Abs.*, 8, 1963, pp. 504-505.

Marshall, T. "Survey of Dental Service Needs". *J. Canad. Dent. Assn.*, 2, 1945, pp. 202-204.

Menyuk, P. "Comparison of Grammar of Children with Fundamentally Deviant and Normal Speech". *J. Sp. Hear. Res.*, 7, 1964, pp. 109-121. Excerpt (page 26) reprinted by permission of the publisher. Our thanks to the author whose address we were unable to locate.

Moore, C. "Reading and Arithmetic Abilities Associated with Speech Defects". *J. Sp. Hear. Disord.*, 12, 1947, pp. 85-86.

Morris, H., Spriestersbach, D., and Darley, F. "An Articulation Test for Assessing Competency of Velopharyngeal Closure". *J. Sp. Hear. Res.*, 4, 1961, pp. 48-55.

Moss, M. "The Effect of Speech Defects on Second-Grade Reading Achievement". *Quart. Jour. Sp.*, 24, 1938, pp. 642-654.

Newman, G. "Prevalence of Malocclusion in Children 6 to 14 Years of Age and Treatment in Preventable Cases". *J. Am. Dent. Assn.*, 52, 1956, pp. 566-575.

Powers, M. "Functional Disorders of Articulation: Symptomatology and Etiology". In Travis, L. (ed.) *Handbook of Speech Pathology*, New York: Appleton-Century-Crofts, 1957.

Prins, D. "Motor and Auditory Abilities in Different Groups of Children with Articulatory Deviations". *J. Sp. Hear. Res.*, 5, 1962, pp. 161-168.

Pronovost, W. "A Survey of Services for the Speech and Hearing Handicapped in New England". *J. Sp. Hear. Dis.*, 16, 1951, pp. 148-156.

Schneiderman, N. "A Study of the Relationship Between Articulatory Ability and Language Ability". *J. Sp. Hear. Dis.*, 20, 1955, pp. 359-364.

Spriestersbach, D., Moll, K., and Morris, H. "Subject Classification and Articulation of Speakers with Cleft Palates". *J. Sp. Hear. Res.*, 4, 1961, pp. 367-372.

Subtelny, J., Mestre, J., and Subtelny, J. "Comparative Study of Normal and Defective Articulation of /s/ as Related to Malocclusion and Deglutition". *J. Sp. Hear. Disord.*, 29, 1964, pp. 269-285.

Subtelny, J., and Subtelny, J. "Malocclusion, Speech, and Deglutition". *Am. J. Orthodont.*, 48, 1962, pp. 685-697.

Thomas, G. "A Study of Reading Achievement in Terms of Mental Ability". *Elem. Sch. Jour.*, 47, 1946, pp. 28-33.

Vandermark, A., and Mann, M. "Oral Language Skills of Children with Defective Articulation". *J. Sp. Hear. Res.*, 8, 1965, pp. 409-414.

Van Riper, Charles, and Irwin, John V. *Voice and Articulation.* Englewood Cliffs, New Jersey: Prentice-Hall, 1958, p. 353. Copyright 1958 by Prentice-Hall, Inc. Excerpt (Page 25) reprinted by permission of the publishers.

Ward, M., Malone, H., Jann, G., and Jann, H. "Articulatory Variations Associated with Visceral Swallowing and Malocclusion". *J. Sp. Hear. Disord.*, 26, 1961, pp. 334-341.

HIGHLIGHTS OF HEARING DATA ON PUPILS IN THE CASELOAD

by Donald D. Dirks, Ph.D.

The hearing information section is divided into three parts. The first portion includes basic numerical information indicating the number of children tested, the types of tests administered, the calibration used, and the source of the test information (Table II). The second part contains a description of the degree of hearing loss, the cases with hearing loss as a function of degree of loss, and the average monaural and binaural hearing impairment (Table III). Finally, in the third section there is a more specific analysis of the amount of loss as related to the type of speech disorder (Tables IV-VII).

Table II shows the type and number of hearing tests administered to the children with speech disorders, the calibration used, and the source of test material. It is of special interest to note the rather small percentage of children who received both air conduction and bone conduction tests, speech reception threshold tests, and measures of sound discrimination. A later table shows that there were 1,382 children, or 10% of the total group, who had a possible hearing loss. If only 185 of these children were administered air and bone conduction thresholds, then almost 90% of the children with hearing loss did not receive bone conduction threshold tests. Further, only 18 children in the combined group were administered speech reception threshold tests, and only two children received PB words tests. Thus, the number of children with hearing loss who were administered speech audiometric tests was almost negligible.

The second portion of Table II contains information concerning the calibration employed in the test audiometer. As you will notice from the relatively small numbers in the ISO or ASA categories, this item was often not checked. This becomes a critical point, since in 1964 the American Academy of Otolaryngology and Ophthalmology, as well as the American Speech and Hearing Association accepted the proposed ISO calibration norms. The ISO 1964 norms replaced the older ASA 1951 norm; however, practically all the threshold tests were administered with audiometers using the old norms. While it is possible to convert ASA results in terms of ISO norms, it does cause some confusion in recording, and in the criterion to be used for rehabilitation services. Most audiology clinics and otologic offices in the Los Angeles area as well as in the United States have changed their audiometers to comply with ISO 1964 values.

The third portion of Table II indicates the person or agency who performed threshold tests on children who presumably did not pass the screening test. In most cases, the audiometrist employed by the public school system carried out these tests. In some cases the nurse in the school system also performed the threshold tests. Fewer cases were tested by audiologists or by the speech clinician. The fact that so few of the children were seen by an otologist or by an audiologist,

TABLE II

Types of hearing tests, calibration used, and source of test information for children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Hearing Test Information	L.A. City		L.A. County		Combined	
	Number	%	Number	%	Number	%
Types of Tests						
Screening Only	6493	85.4	3293	82.9	9786	84.5
A/C and B/C Thresholds	182	2.4	3	.1	185	1.6
A/C Thresholds Only	893	11.8	667	16.8	1560	13.5
B/C Thresholds Only	18	.2	--	--	18	.2
Speech Reception	11	.2	7	.2	18	.2
PB	2	--	--	--	2	--
TOTAL	7599	100.0	3970	100.0	11569	100.0
Calibration						
ISO	12	.5	7	.7	19	.6
ASA	2195	99.5	1020	99.3	3215	99.4
TOTAL	2207	100.0	1027	100.0	3234	100.0
Source of Test						
Audiometrist	1382	92.1	129	8.3	1511	49.6
Nurse	6	.4	1156	74.6	1162	38.1
Otologist	78	5.2	14	.9	92	3.0
Speech Clinician	3	.2	231	14.9	234	7.7
Audiology Clinic	29	2.0	18	1.2	47	1.5
Other	2	.1	1	.1	3	.1
TOTAL	1500	100.0	1549	100.0	3049	100.0

correlates well with the fact that very few speech audiometric tests were performed on these children. On consulting the first part of Table II, you will note that only twenty children had received speech reception tests or PB words tests. This no doubt may be attributed to the fact that school audiometrists or nurses are often not qualified or did not have the appropriate materials to perform this type of testing.

Table III gives specific information concerning the number of children who had normal hearing, as suggested by screening test results, and those who have a hearing loss. Observe that of 12,534 children tested, 1,382 or 10% of the children have a hearing loss as suggested by a pure tone average loss in one ear of 25 dB ISO or more. Ten per cent would be slightly higher than the national averages usually found in a general public school population. However, it may be somewhat low when one considers that the population tested was composed of children with speech disorders and not the general population of school-age children. The results in Table III also show that 65.2% or 901 of the children with a hearing impairment had a binaural hearing loss, while 481 or 34.8% had a monaural hearing loss only.

The final portion of Table III indicates the number of children with monaural or binaural hearing loss in terms of the degree of hearing impairment. The average loss was computed on the basis of the air conduction thresholds obtained at 500, 1000, and 2000 Hz. For a binaural hearing loss, these three numbers were obtained from the most sensitive pure tone thresholds obtained from either one or the other ear. Notice that Table III shows losses of 25 dB or less as the first category. Older surveys usually considered 15 dB as the average loss at which some difficulties began to occur in social communication. Because of the change to ISO audiometric norms, however, a 25 dB loss ISO is roughly equivalent to a loss of 15 dB ASA. Since all the audiometric results obtained were converted to ISO values, the results in Table III are all reported using the new norm values.

Table III indicates that the greatest number of children with a monaural hearing loss fall in the category from 26 to 36 dB; 41.2% of the children were found in this category. As loss progressively increases, the percentage of children found in each group gradually decreases.

A majority of the children with binaural hearing loss (61.8%) have hearing losses below 36 dB; thus they would be considered to have a mild hearing impairment. 34.8% of the children with binaural loss are found in the categories from 37 to 76 dB, and 3.4% of the children have losses of over 77 dB in both ears. Some of the children in the 77 dB or more category must be legally deaf. The hearing impairment found in the moderate to severe categories must be heavily considered in the rehabilitation and therapy of the speech and language disorder. The fact that only twenty children were administered speech

TABLE III

Hearing information for children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Hearing Condition	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
Hearing Status						
Normal Hearing	7722	90.0	4812	90.3	12534	90.0
Hearing Loss	865	10.0	517	9.7	1382	10.0
TOTAL	8587	100.0	5329	100.0	13916	100.0
Level of Loss						
Monaural Loss Only	340	39.3	141	27.3	481	34.8
Binaural Loss Only	525	60.7	376	72.7	901	65.2
TOTAL	865	100.0	517	100.0	1382	100.0
a. Average Monaural Loss*						
25 dB or Less	87	25.6	22	15.6	109	22.7
26-36 dB	120	35.3	78	55.3	198	41.2
37-54 dB	78	22.9	25	17.7	103	21.4
55-76 dB	34	10.0	11	7.8	45	9.3
77-94 dB	18	5.3	5	3.6	23	4.8
95 dB or More	3	.9	--	--	3	.6
TOTAL	340	100.0	141	100.0	481	100.0
b. Best Binaural Average*						
25 dB or Less	74	14.1	210	55.9	284	31.5
26-36 dB	191	36.4	82	21.8	273	30.3
37-54 dB	180	34.3	54	14.4	234	26.0
55-76 dB	54	10.3	25	6.6	79	8.8
77-94 dB	15	2.8	3	.8	18	2.0
95 dB or More	11	2.1	2	.5	13	1.4
TOTAL	525	100.0	376	100.0	901	100.0

*Based on average air-conduction thresholds at 500, 1000, and 2000 Hz re ISO, 1964.

audiometric tests becomes a considerably alarming result since 344 children had binarual losses that must severely impair their receptive communication and ability to monitor their own speech.

Tables IV and V show the distribution of children receiving speech and hearing services in the Los Angeles City Unified School District (Table IV) and in the county districts (Table V), categorized in terms of their expressive speech disorders within monaural hearing loss groups. It would be rather difficult to evaluate the relationship here between the monaural hearing loss and the speech disorder. If all the children who had monaural hearing losses have always had one good ear, one would not necessarily anticipate significant alteration in speech development or production due to the hearing problem. There are certain classroom and acoustic problems that should be given consideration for children with monaural hearing loss, as well as in other situations in which stereophonic listening is imperative. However, for the speech clinician monaural hearing loss in and of itself may not be of extreme importance in the therapy process. The type of hearing loss, however, is of utmost importance in terms of the health of the child. If some of these children have permanent sensorineural hearing losses they are entirely dependent upon the other good ear. If anything should happen to this ear they will have severe difficulties in terms of speech and language development. So possible changes in threshold in the good ear should often be monitored.

Tables VI and VII show a similar distribution of children receiving speech and hearing services in the Los Angeles and County school systems, categorized by the expressive speech disorder within the children who have binaural hearing impairments. These are an extremely important set of data, since there are numerous children within this group whose speech disorders must be definitely related to the hearing impairment. In some cases there are no doubt hearing disorders which have been acquired or which are fluctuating because of the conductive-type impairments. While in these cases the speech disorder might not be as directly related to the hearing loss as in other cases of more permanent sensorineural hearing loss, there still are no doubt stages in the speech and language therapy inwhich the child is not functioning receptively at an adequate level to understand the therapist or to monitor his own vocal production. Within the county and the city unified school districts there are 285 children whohave binaural hearing losses greater than 36 dB who have one or more expressive speech disorders. All of these children are not only deserving of air conduction, bone conduction, and speech audiometric tests, but each child should be evaluated in terms of the possibilities of the need for amplification, such as a hearing aid. Further, the speech and hearing therapist who is engaged in the rehabilitation of these children must be acutely aware that the hearing loss may well be a significant influence in the amount of improvement from therapy. There must be numerous children in this group who are in extreme need of therapy under conditions of amplification. If the speech and hearing therapist is required to see these

TABLE IV

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by single and multiple expressive speech disorders separately within monaural hearing-loss levels re ASA audiometric zero. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

	Monaural Loss Only											
Expressive Speech Disorder	26-36 dB		37-54 dB		55-76 dB		77-94 dB		95+ dB		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Single Disorder												
Little or No Speech	1	1.1	--	--	--	--	--	--	--	--	1	.6
Language Disorder	2	2.3	--	--	--	--	--	--	--	--	2	1.1
Articulation	80	89.9	49	92.4	23	88.5	6	100.0	1	50.0	159	90.3
Stuttering	5	5.6	3	5.7	3	11.5	--	--	--	--	11	6.3
Voice Disorder	1	1.1	1	1.9	--	--	--	--	1	50.0	3	1.7
TOTAL	89	100.0	53	100.0	26	100.0	6	100.0	2	100.0	176	100.0
Multiple Disorders												
L./No Speech-Lang.	--	--	--	--	--	--	--	--	--	--	--	--
L./No Speech-Artic.	5	20.8	7	35.0	--	--	--	--	--	--	12	24.0
L./No Speech-Stut.	1	4.2	--	--	--	--	--	--	--	--	1	2.0
L./No Speech-Voice	1	4.2	--	--	--	--	--	--	--	--	1	2.0
Lang.-Artic.	--	--	--	--	1	25.0	1	50.0	--	--	2	4.0
Lang.-Stut.	--	--	--	--	--	--	1	50.0	--	--	1	2.0
Lang.-Voice	--	--	2	10.0	--	--	--	--	--	--	2	4.0
Artic.-Stut.	7	29.1	4	20.0	--	--	--	--	--	--	11	22.0
Artic.-Voice	9	37.5	7	35.0	3	75.0	--	--	--	--	19	38.0
Stut.-Voice	1	4.2	--	--	--	--	--	--	--	--	1	2.0
TOTAL	24	100.0	20	100.0	4	100.0	2	100.0	--	--	50	100.0

TABLE V

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by single and multiple expressive speech disorders separately within monaural hearing-loss levels re ASA audiometric zero. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

	Monaural Loss Only											
Expressive	26-36 dB		37-54 dB		55-76 dB		77-94 dB		95+ dB		Total	
Speech Disorder	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Single Disorder												
Little or No Speech	--	--	--	--	--	--	--	--	---	--	--	--
Language Disorder	--	--	1	5.6	--	--	--	--	--	--	1	1.2
Articulation	54	94.7	17	94.4	4	100.0	4	100.0	--	--	79	95.2
Stuttering	1	1.8	--	--	--	--	--	--	--	--	1	1.2
Voice Disorder	2	3.5	--	--	--	--	--	--	--	--	2	2.4
TOTAL	57	100.0	18	100.0	4	100.0	4	100.0	--	--	83	100.0
Multiple Disorders												
L./No Speech-Lang.	--	--	--	--	--	--	--	--	--	--	--	--
L./No Speech-Artic.	2	11.8	--	--	2	33.3	--	--	--	--	4	15.4
L./No Speech-Stut.	--	--	--	--	--	--	--	--	--	--	--	--
L./No Speech-Voice	--	--	--	--	--	--	--	--	--	--	--	--
Lang.-Artic.	1	5.9	--	--	--	--	--	--	--	--	1	3.8
Lang.-Stut.	--	--	--	--	--	--	--	--	--	--	--	--
Lang.-Voice	1	5.9	--	--	--	--	--	--	--	--	1	3.8
Artic.-Stut.	4	23.5	--	--	--	--	--	--	--	--	4	15.4
Artic.-Voice	8	47.0	2	100.0	4	66.7	1	100.0	--	--	15	57.8
Stut.-Voice	1	5.9	--	--	--	--	--	--	--	--	1	3.8
TOTAL	17	100.0	2	100.0	6	100.0	1	100.0	--	--	26	100.0

TABLE VI

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by single and multiple expressive speech disorders separately within binaural hearing-loss levels re ASA audiometric zero. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive	Binaural Loss											
	26-36 dB		37-54 dB		55-76 dB		77-94 dB		95+ dB		Total	
Speech Disorder	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Single Disorder												
Little or No Speech	--	--	2	1.9	--	--	--	--	--	--	2	.7
Language Disorder	--	--	2	1.9	--	--	--	--	1	50.0	3	1.1
Articulation	116	95.9	91	85.8	36	94.8	5	100.0	1	50.0	249	91.5
Stuttering	4	3.3	6	5.7	1	2.6	--	--	--	--	11	4.1
Voice Disorder	1	.8	5	4.7	1	2.6	--	--	--	--	7	2.6
TOTAL	121	100.0	106	100.0	38	100.0	5	100.0	2	100.0	272	100.0
Multiple Disorders												
L./No Speech-Lang.	--	--	1	3.3	--	--	2	22.2	--	--	3	3.3
L./No Speech-Artic.	10	35.7	3	10.0	2	14.3	--	--	2	22.2	17	18.9
L./No Speech-Stut.	--	--	1	3.3	--	--	--	--	--	--	1	1.1
L./No Speech-Voice	--	--	1	3.3	--	--	--	--	--	--	1	1.1
Lang.-Artic.	3	10.7	2	6.7	--	--	--	--	4	44.5	9	10.0
Lang.-Stut.	--	--	--	--	--	--	1	11.1	--	--	1	1.1
Lang.-Voice	--	--	--	--	--	--	1	11.1	2	22.2	3	3.3
Artic.-Stut.	3	10.7	5	16.7	--	--	--	--	--	--	8	8.9
Artic.-Voice	11	39.3	17	56.7	12	85.7	5	55.6	1	11.1	46	51.2
Stut.-Voice	1	3.6	--	--	--	--	--	--	--	--	1	1.1
TOTAL	28	100.0	30	100.0	14	100.0	9	100.0	9	100.0	90	100.0

TABLE VII

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by single and multiple expressive speech disorders separately within binaural hearing-loss levels re ASA audiometric zero. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

	Binaural Loss											
Expressive	26-36 dB		37-54 dB		55-76 dB		77-94 dB		95+ dB		Total	
Speech Disorder	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Single Disorder												
Little or No Speech	--	--	--	--	--	--	--	--	--	--	--	--
Language Disorder	2	3.1	--	--	--	--	--	--	--	--	2	1.7
Articulation	63	96.9	33	97.1	13	92.9	2	100.0	2	100.0	113	96.6
Stuttering	--	--	--	--	--	--	--	--	--	--	--	--
Voice Disorder	--	--	1	2.9	1	7.1	--	--	--	--	2	1.7
TOTAL	65	100.0	34	100.0	14	100.0	2	100.0	2	100.0	117	100.0
Multiple Disorders												
L./No Speech-Lang.	--	--	--	--	1	20.0	--	--	--	--	1	3.1
L./No Speech-Artic.	1	8.3	7	46.7	2	40.0	--	--	--	--	10	31.3
L./No Speech-Stut.	--	--	--	--	--	--	--	--	--	--	--	--
L./No Speech-Voice	--	--	--	--	--	--	--	--	--	--	--	--
Lang.-Artic.	1	8.3	--	--	--	--	--	--	--	--	1	3.1
Lang.-Stut.	--	--	--	--	--	--	--	--	--	--	--	--
Lang.-Voice	1	8.3	--	--	--	--	--	--	--	--	1	3.1
Artic.-Stut.	1	8.3	--	--	2	40.0	--	--	--	--	3	9.4
Artic.-Voice	8	66.8	8	53.3	--	--	--	--	--	--	16	50.0
Stut.-Voice	--	--	--	--	--	--	--	--	--	--	--	--
TOTAL	12	100.0	15	100.0	5	100.0	--	--	--	--	32	100.0

children for individualized or small-group type speech therapy, the use of group aid and auditory training devices would be extremely beneficial.

Although the original survey form made provisions for information concerning the use of hearing aids and group aid devices, these items were not adequately checked. At any rate it became perilous to attempt to quantify this information for the children with hearing loss. There are two possible reasons for the lack of information in amplification devices: (1) the children with binaural loss really do not have adequate amplification in terms of hearing aids or for therapy purposes; (2) all the pertinent information was not reported. It is entirely possible, however, that there are numerous children within the group of those with binaural hearing loss who do require hearing aid and auditory training devices who are not using such devices at the present time.

In summary, the information on the use of amplification devices was meager. This fact suggests that information on amplification devices among the hearing impaired children deserves emphasis in succeeding surveys. This fact in and of itself points out the critical need to search for the causes of the lack of information on these items.

GENERAL RECOMMENDATIONS FOR FUTURE SPEECH AND HEARING SURVEYS

1. General reorganization of the hearing information form would be helpful so that more precise audiological information can be obtained.

2. The speech therapist should be carefully instructed to fill our all items precisely. If forms were obtained by February of the school year, a recorder could check the results and possibly indicate the items which were not adequately filled. These charts could be returned to the therapist for further consideration. Another possibility would be to hire some recorders who go to each school to aid the therapists in the search for precise information.

3. The results of the survey should be interpreted to the speech therapists.

CLINICIAN AGREEMENT AND RELIABILITY

by Maryjane Rees, Ph.D.

Two kinds of questions were considered in the agreement and reliability studies of judging articulation errors.* The first concerned agreement among clinicians in making judgments about articulation errors. The second related to self-agreement or reliability from trial to trial. The first question is like asking if you get the same hearing sensitivity threshold for a particular individual while using a number of different audiometers. Will the results be the same whether you use audiometer A, B, C, or so forth, or will tests made with some audiometers show hearing loss while tests made with others show normal or supranormal hearing? The second question is tantamount to asking whether repeated measurements with the same audiometer show the same results, or whether the results fluctuate from day to day, from week to week, or month to month when testing individuals with stable hearing.

Agreement among listeners on a single trial is often taken as a measure of reliability. However, our data indicate that this kind of estimate is not satisfactory. Agreement between or among clinicians differs from self-agreement based on multiple trials with the same stimuli; therefore, we need to have both kinds of information. That is, we need to know how well clinicians agree with each other and we also need to know whether clinicians judge the same stimuli in the same way on repeated trials. The latter is particularly important, since decisions about a pupil's change in articulation are made by a single clinician, not a group of clinicians.

Finally the concept of validity should be mentioned. There is no such thing as validity in articulation testing, as there is no independent validating measure for correct articulation. Considering the low level of agreement among clinicians reported in the literature, which clinician's ears would you choose to be preserved behind glass in the Bureau of Standards as representing the ultimate criterion for judging articulation? In the case of hoarseness, for example, there are independent measures--laryngoscopic examination and spectrographic analysis. But such is not the case in articulation, at least not at the present time.

You are probably wondering how well you agreed in the two studies. The median agreement for the large-group study on the first trial was 88.4% for the 240 test items (40 items for each of the six speakers). In the second trial four hours later, the median agreement was 89.1%, which is not really different from agreement during the first trial. Results of the small-group study, in which just 29 clinicians participated, were similar. Mean agreement on the 240 items was 90.6% on the first trial and 88.4% on the second trial, which was given one week later.

---

*The results of the hoarseness study appear in Volume III of this report.

It was necessary to use the median as the index of agreement for the first study because the number of responses differed from item to item. In the large-group study, the mean number of responses was 265 for the first trial and 228 for the second trial. The mean was used for the data from the small-group study, since there were 29 responses for each of the items.

The best index of agreement and reliability, however, is based on the judgments that were consistent from trial to trial and is derived by placing the data in a contingency table like this:

		Trial 1	
		Correct	Incorrect
Trial 2	Correct		
	Incorrect		

This arrangement shows the number or percentage of clinicians making the same judgment on both trials as well as the number or percentage making one judgment on the first trial and reversing it on the second trial. It shows, also, whether the majority making the same judgment on both trials agreed that the item was correct or incorrect.

With the data arranged in this way, the index of agreement and reliability for the small group was 83%. The majority of the consistent judgments was used to determine whether an item was correct or incorrect and was taken as the criterion for agreement and reliability on each item. The index of 83% represents the mean number of judgments based on the majority of consistent judgments for the 240 items converted to a percentage. This figure indicates rather poor agreement and reliability, since it means that only 83 out of every 100 items were scored the same from trial to trial or 42 to 43 items out of every 50. Unfortunately, the data from the large-group study could not be analyzed in this way because the protocols could not be matched due to numerous errors in entering clinician-code numbers on the forms.

The data were analyzed to determine the percentage of items on which agreement might be considered satisfactory. Two arbitrary criteria were used: 95% or better agreement and 90% or better agreement. Using the more rigid criterion of 95% or better agreement, the number and percentage of items were as follows:

Large Group
(95% or better agreement)

Trial 1	76 items or 31.6%
Trial 2	84 items or 35.0%

Small Group
(95% or better agreement)

Trial 1	112 items or 46.7%
Trial 2	111 items or 46.2%
Trials 1 and 2	75 items or 31.2%

Agreement of 95% or better was obtained for roughly one-third of the items in the large-group study and on slightly less than half of the items in the small-group study. A little less than one-third of the items met the criterion of 95% or better agreement when only those judgments that were consistent from trial to trial were examined.

Considerably more items had 90% or better agreement. When this criterion was applied, the results were as follows:

Large Group
(90% or better agreement)

Trial 1	112 items or 46.7%
Trial 2	127 items or 52.9%

Small Group
(90% or better agreement)

Trial 1	143 items or 59.6%
Trial 2	139 items or 57.9%
Trials 1 and 2	108 items or 45.0%

In this case, agreement was relatively good on approximately half of the items in the large-group study and on nearly 60% in the small-group study. When the criterion was applied to items on which judgments were consistent from trial to trial, only 45% of the items were adequately agreed on.

As a matter of curiosity, you might like to know that agreement reached 100% on a few items. In the large-group study, three items (1.2%) received 100% agreement on the first trial, while two items (.8%) received 100% agreement on the second trial. In the small-group study, 66 items (27.5%) and 61 items (25.4%) received 100% agreement on the first and second trials, respectively.

Of the items on which agreement reached 100% in the small group, only 45 or 12.5% were the same on the two trials. That is, 21 items that received 100% agreement in the first trial received less than 100%

agreement in the second trial; 16 items that received 100% agreement in the second trial did not receive 100% agreement in the first trial. Thus, of a total of 81 items on which agreement was 100% in the first or second trials or both, only 55% received 100% agreement on both trials, which indicates considerable shifting of judgments. Such a finding is rather disappointing, as it might be supposed that a substantial number of items would be so unequivocally correct or incorrect that judgments would not change from trial to trial.

The number of items on which agreement was so low that scoring could be considered a matter of chance was also determined. Here again two criteria were used. Agreement could not be less than 50%, because the majority rating was used to determine whether an item was correct or incorrect. The number of items on which agreement ranged from 50% to 60% was as follows:

Large Group
(50% to 60% agreement)

Trial 1	22 items or 9.2%
Trial 2	17 items or 7.1%

Small Group
(50% to 60% agreement)

Trial 1	20 items or 8.3%
Trial 2	18 items or 7.5%

When the criterion for equivocal items was intended to include items on which agreement ranged from 50% to 70%, about 20% of the items in the large-group study and approximately 15% of the items in the small-group study were equivocal as shown below:

Large Group
(50% to 70% agreement)

Trial 1	47 items or 19.6%
Trial 2	45 items or 18.8%

Small Group
(50% to 70% agreement)

Trial 1	39 items or 16.2%
Trial 2	33 items or 13.8%

A somewhat different estimate of low agreement obtained when consistent judgments were examined. In this analysis, agreement could extend below 50%, since the majority of the listeners changed from a rating of correct on the first trial to a rating of incorrect on the second trial or vice versa on some items. Considering stable judgments only, agreement was 70% or below on 52 items (21.7%). Of these items agreement ranged from 60% to 70% on 11 items (4.6%), 50% to 60% on 16 items (6.7%), and from 28% to 50% on 25 items (10.4%).

Another way of illustrating agreement is through comparing the total scores assigned to each speaker. The number of correct items as determined by the majority rating on each item is shown below for each speaker:

	Large Group		Small Group		Consistent
	Trial 1	Trial 2	Trial 1	Trial 2	Trial 1 & 2
Speaker 1	20	18	23	21	23
Speaker 2	27	26	30	27	28 or 29
Speaker 3	22	22	24	24	23 or 24
Speaker 4	20	18	22	21	21
Speaker 5	13	13	13	15	14
Speaker 6	14	14	13	13	13
TOTAL	116	111	125	121	122 or 124

It is not surprising that some variation inpercentage of agreement occurred. However it is surprising that the majority shifted on five items in the large-group study and on eight items in the small-group study. Disagreement is often greater than the totals appear to indicate. For example, in the small-group study, the total number of correct items was 125 for the first trial and 121 forthe second trial--a difference of four items. Nonetheless, eight items were actually involved. Scores for three speakers were lower on the second trial while one speaker had a higher score on the second trial. Cancellation caused the difference between totals for the two trials to appear smaller than was really the case.

Scoring based on judgments that were the same on the two trials, again using the majority as the criterion for correct or incorrect, produced peculiar results. The number of correct items for two speakers could not be determined. Each of these two speakers produced one item on which the number of listeners consistently rating it correct was the same as the number consistently rating it incorrect.

As you examine the data, it may occur to you that it does not seem logical for the total score based on consistent ratings for the two trials to exceed the smallest number of correct items as determined by a single trial. Item 39 for Speaker 1 illustrates how such a result can occur:

		Trial 1		
		Correct	Incorrect	Total
Trial 2	Correct	8	4	12
	Incorrect	12	5	17
	Total	20	9	29

In this instance the majority agreed the item was correct on the first trial, but changed to incorrect on the second trial. There were 13 listeners who scored the item the same way on both trials. Since the majority of those making the same rating indicated that the item was correct (eight vs. five), the item was regarded as correct in computing the total score for the speaker.

This item illustrates just how poor agreement was in some cases. Sixteen listeners changed ratings, while only 13 were consistent. The 13 consistent ratings came close tobeing evenly divided between correct and incorrect. It should be evident also that comparisons based on total scores do not accurately reflect the extent of disagreement in some instances.

Why is agreement among clinicians for each of the trials so low? Why are the ratings from trial to trial so inconsistent?

It is quite true that a number of sources of error were present that may have depressed agreement, particularly in the large-group study. Hopefully, we profited from our experience with the first study and eliminated many of the problems in the second study. Further, the clinicians who participated in the small-group study had also participated in the first study and were, thereby, familiar with the procedure and forms and experienced in the method of scoring. Nonetheless, agreement was not substantially improved over that found in the first study.

Reports of agreement based on live testing do not support the hypothesis that performance isbetter under these circumstances. In the one study in which a direct comparison was made, agreement in scoring articulation errors was lower during live testing than when scoring tape recordings ofthe original tests. (See the review of Wright's study entitled *Reliability of Evaluation During Basic Articulation and Stimulation Testing* in Volume III of the final report.) In the early stages of another study, as yet unpublished, agreement among clinicians in scoring during live testing was only 90%, which is not different from agreement found in the present studies, even though the test situation was structured so that the participating clinicians could request repetition of any questionable response.

Taped or filmed tests are necessary for this kind of study in order to have constant stimuli for repeated trials in scoring, since a speaker's performance is likely to vary somewhat on successive trials. In addition, it is virtually impossible to arrange a live-test situation in such a way that an adequate sample of clinicians could score responses simultaneously. Presumably a film is a better approximation of the conditions found in actual practice than a tape recording, as the latter does not provide visual cues.

I assure you however that you are no more disagreeable or unreliable than other clinicians. The review of results of other studies show both a wide range of estimates of agreement and considerable instability. Irwin and Krafchick (see Volume III of the final report) conducted a study much like this one using a film of articulation-test responses of six speakers. Their sample of 50 experienced clinicians scored 84.7% of the sounds produced in words in isolation correctly. Their scoring method was different from the one used in our study, and the agreement figure comes from a single trial and represents agreement only. Your 83% consistent agreement between trials compares favorably with their figure. Furthermore, your agreement ranging from 88% to 91% for single trials is higher.

The results of the present studies do, however, raise some questions about the accuracy with which change in articulation skills is assessed. The results also place the usefulness of tests that require even more exacting discriminations, such as the McDonald Deep Test of Articulation, in serious question. If we are to place confidence in statements about the phonetic aspects of speech and if tests requiring fine discrimination are to have any meaning, performance in judging articulation errors obviously needs to be improved.

I suggest for your consideration a factor that seems to me to play a major role in depressing agreement. It seems likely that the judgment of whether a given sound is correct or incorrect is confounded with judgments about the relation of articulation to age. The experienced clinician is likely to further compound the judgment with predictions of success in changing particular deviations. We might agree better if we separated these three kinds of decisions. First, we need to agree on whether a given sound is a good example of the intended phoneme. The decision should be independent of other considerations. Once we have learned to agree on that kind of decision, we could address ourselves to the many ramifications of whether the errors identified are compatible with the speaker's age. Finally, we could decide whether the deviation would require an undue expenditure of time in view of probable success were we to attempt to change it.

Perhaps you are saying, "All of this is well and good, but isn't this just one of those funny little chicken dances that researchers do? What do all of those numbers have to do with getting my job done?" Perhaps you are feeling restive and wondering, "Isn't it hopelessly old fashioned? Isn't it a waste of time to talk about articulation when we are all going to be language therapists?"

I suspect that for a number of years to come, you are going to have to continue to be concerned with articulation disorders because of the demand by teachers and parents. I further believe, as is suggested by Paula Menyuk's work, that most of the children with articulation disorders also have language difficulties of one kind or another. We should not abandon out interest in articulation just because we are expanding our skills to include training in other aspects of language.

At this point I should like to take up two considerations relevant to the importance of uniform and consistent judgments. The first is concerned with case selection; the second has to do with improvement of methods of teaching articulation skill.

If there is to be adequate quality control in school speech and hearing programs, it is necessary to be able to assert with a reasonable degree of confidence that service is indeed provided for that segment of the speech and hearing handicapped population designated to receive it. I wish to make very clear my belief that the segment of the speech and hearing handicapped population designated to receive service is necessarily a matter of the policy arrived at by the individual school districts. Stated differently, the issue at hand is not *who* should receive service, but rather, *when* we know who should receive service, can we and do we select all of those who qualify? We have no need to get into the polemics of the adequacy of particular policies at this time.

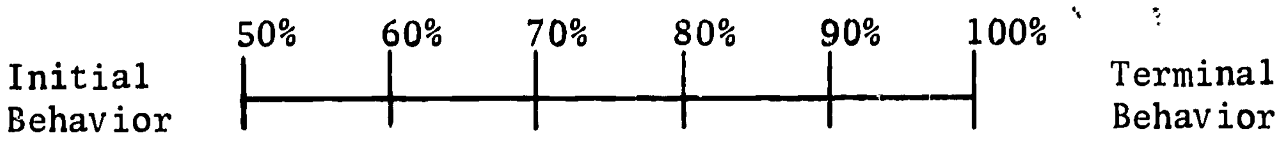
Whatever the policy may be, the implementation of that policy depends first of all on uniform case selection. Otherwise there is no assurance that those designated to be served do, in fact, receive the service. Without the kind of quality control that depends on uniform case selection, those responsible for the expenditure of public funds cannot assert that the funds are being spent for the purpose for which they were allocated. I believe we have an obligation to be exact about services supported by public monies. Without uniform case selection, whether a student receives service becomes a matter of the happenstance of the particular clinician who is assigned to a particular school. Without uniformity of case selection, what you have is essentially a group of clinicians in private practice that happens to be conducted in public schools and paid for by public funds. Why should a taxpayer's child who attends one school in a district receive service while another taxpayer's child with an equivalent speech deviation who attends a different school in that district not receive service?

The second area of quality control to be considered is that of improved methods. To quote Dr. Robert Mager in *Developing Attitude Toward Learning* (Palo Alto, California: Fearon Publishers, 1968, p. vii), three questions are basic to any instructional activity or plan for behavior modification:

"Where am I going?"
"How shall I get there?"
"How will I know I've arrived?"

It is first necessary to determine where the student is with respect to the desired or terminal behavior at the time he begins the instructional program. Without accurate and reliable measurement, it is impossible to specify where the student is and consequently, whether he is making progress, standing still, or falling behind.

Without uniform and reliable measurement of articulation skill, the efficacy of particular methods for modifying articulatory behavior cannot be accurately determined. It is necessary to have frequent measurement, perhaps session by session measurement, if we are to improve the efficiency of instruction and reduce the amount of time required to achieve terminal behavior. Without accurate assessment of what the learner is doing, we do not know how much time is lost in teaching behaviors already acquired. We need also to be able to specify the amount of time required to move from various levels of performance to terminal behavior and whether there are time differentials associated with achievement of equivalent percentages of change. Consider the following diagram:



Is the time required to move from 50% to 60% of the desired behavior the same as the time required to move from 90% to 100%? Suppose the initial behavior represents 60% rather than 50% of terminal behavior. Do the time factors remain the same as when initial behavior represents 50% or 70% of the terminal behavior? Establishing the time factors depends on stable measures of the behaviors being modified. Further, a model such as this provides a means for assessing improvement in teaching without having to resort to untreated control groups and groups receiving instruction by other methods. Reduction in the amount of time required to move a reasonable sample of learners from one level to the next constitutes evidence of greater efficiency. Detailed study of the learners who deviate markedly from the learning rate of the majority would undoubtedly improve our knowledge of the conditions related to communication disorders which either interfere with or accelerate alleviation of the disorders.

In the hope that the reasons for studying and improving agreement and reliability in judging articulation are compelling, we should perhaps look at some findings in this area. Within the limits imposed by the design of the study, the data answer several other questions, among them are the following: Is agreement and reliability better on correctly or incorrectly articulated sounds? Are some sounds easier to judge than others?

The answer to the first question is that agreement is better on correct items. Consistent agreement from trial to trial of 95% or better obtained for 51 or 40.8% of the 125 correct items and for 24 or 21.2% of the 113 incorrect items. Consistent agreement of 90% or better obtained for 65 or 52.0% of the correct items, but for only 43 or 38.1% of the incorrect items.

The answer to the second question is not as sharply defined. It was not out intent to study all sounds. We chose only 40 of the sounds contained in the Templin-Darley 50-Item Test, as these sounds tend to be most frequently misarticulated and would serve best as a beginning in the exploration of clinicians' performance in judging errors. As a consequence of this selection, some sounds were sampled in all positions in which they can occur, while others were sampled in only one or two positions.

When ordered by percentage of consistent agreement, no sharp breaks occurred in the distribution. Highest agreement was found for /j/ and /v/. The /l/ blends were next, followed by /ʃ/, /s/ blends, /l/, /ʒ/, /ð/, and /θ/. The range of consistent agreement for this second group of sounds was from 86% to 88%. All sounds with an /r/ element, either as singles or blends, were at the low end of the distribution, though /z/ ranked lowest of all of the sounds. However, /z/ was sampled in the initial position only. Whether samples in other positions would have enhanced agreement cannot, of course, be inferred from this study. /s/ was sampled in blends only, so agreement on this sound cannot be compared with that found for its voiced counterpart. One wonders whether agreement would be as low as that for /z/.

Time does not permit more than a brief mention of the judgments about error consistency, severity of the articulation disorder, and intelligibility.

All six speakers were judged as making consistent errors in spontaneous speech. Consistent agreement on the ratings for the speakers ranged from 66% to 83%. A detailed examination of the data suggests that the usefulness of this rating is questionable. I think it would be best to decide first if consistency of errors in spontaneous speech is a really useful measure. If you decide that it is, criteria for that which constitutes consistency as opposed to inconsistency should be developed. For example, should a rating of consistent be given if the errors are primarily consistent or only if no instance whatsoever of inconsistency is detected? It is likely that a few ground rules would materially improve agreement among the listeners in making this kind of rating.

There can be no doubt, I think, that severity ratings are needed, since severity is one of the most frequently used criteria for determining need for service. The mild-moderate-severe categories do not seem very useful in their present form, as agreement on these ratings was less than satisfactory considering their importance. Consistent agreement on a single rating ranged from 48% to 93% for the six speakers. Agreement on half of the speakers was below 60%. Four of the six speakers received some ratings in two of the three rating categories. Two of the six received ratings in all three categories of severity, which means that some listeners thought the disorder was mild, while others said it was severe.

While it is quite true that a number of elements are involved in the severity of any disorder, the need to achieve a substantial level of agreement on the various elements remains. Individual elements must be assessed with reasonable accuracy before their interactions can be ascertained and an orderly, unambiguous, transmittable set of criteria established. Possibly a better approach to the severity parameter would be to develop a taxonomy of the elements deemed related to it first, followed by an attack on the problems of uniform identification of individual elements. The third step would involve trying to specify the interactions of the elements. We might then return to testing global ratings to determine whether specifying the bases for severity ratings more exactly results in greater uniformity in applying them.

The same question can be asked about ratings of intelligibility that was asked about ratings of consistency of articulation errors in spontaneous speech. Is this measure a useful one? Is it a useful one considering that only 3% of the caseload was said to be unintelligible, 18% partially intelligible, with the remaining 79% intelligible? Consistent agreement on the intelligibility ratings for the speakers ranged from 45% to 90%.

The problems posed by this portion of the project seem to me to be encompassed by the following questions, which I hope you will consider in your deliberations this afternoon.

1. What are some of the reasons for the low level of agreement and reliability in judging articulation errors?

2. What step should be taken next to improve performance in judging articulation errors?

3. Are ratings of consistency of errors in spontaneous speech and intelligibility really useful to the practicing clinician?

4. If so, what should the criteria be for ratings of consistent and inconsistent errors and for intelligible, partially intelligible, and unintelligible speech?

5. What are some of the ways in which better agreement on ratings of severity can be achieved?

GROUP MEETINGS OF PARTICIPANTS

The participants in the workshop met for a total of two hours in small group discussions. Those acting as leaders of the four groups were: Lois D'Asaro, Lois Fredericks, Glenn Smith and Edward Stark. Each of the consultants visited the groups in turn, presenting ideas and answering questions.

Because of the similarity of the data, the gist of the discussions of all four groups is here presented.

Miss Herbert, in meeting each group, asked first if the data provided by completing the case record had been helpful to the speech clinicians. The project actually had a dual purpose: the collection of research data and the collection of information on the child receiving remedial care.

The participants felt that having a uniform record was of great importance and enabled the clinician to make similar judgments on each child. The completion of case records would improve future communication between successive therapists and would help to provide consistent records for children transferring from one school to another.

The form would also guide clinicians in looking at their children more "completely". By being asked to examine all aspects of a child's background, the speech specialist could better understand the complexity of his problem. The record-taking also pointed up discrepancies in information in some areas so that clinicians have been forced to seek information from the school nurse, classroom teachers and parents. The form, therefore, had improved relationship between many persons concerned with the child. It could also be used to demonstrate to other professions the variety of factors which constitute important influences on a child's speech behaviors.

Miss Herbert wanted to know whether the case record information influenced planning for therapy. Participants felt that it was too soon to make that conclusion, but that by helping the specialist to examine all aspects of the individual's background and behavior, more individualized therapy could be planned in terms of long range and immediate goals.

Miss Herbert requested suggestions on changes in the form. Some believed that a specific therapy planning sheet should be added to the form and kept as part of the permanent record. It was felt that the form could and should be simplified and that more room should be provided under headings which require tabulation of findings. For example, on the articulation blank, the whole picture of progress could be shown by providing test-retest forms so that one could see progress or regression. Also, a provision for stimulability scores would be helpful.

There should also be some consistent way of filing these forms so that their existence would be mentioned in the Cumulative Records, and so that the data would follow the child more efficiently and rapidly when he transferred.

Dr. Flower discussed the evaluation of the oral mechanism required in the record form. He believed that several items were present in the record which were not necessary since, in themselves, they did not cause speech defects. The instructions had been given to record structural deviations only if they related to the speech problem, but the directions were not always followed. At times, deviations in structure were noted which bore no relationship to the articulation disorders.

Dr. Flower suggested that perhaps one should not begin the assessment with the accumulation of all the data pertaining to the case history, structural deviations, etc., since many of the items would not relate to the problems of speech. The starting place could be as complete a description of the child's behaviors as possible. A thorough examination of the articulation test findings would indicate whether one should then look for deviations in structure as contributing causes.

He stated that he felt that the present case record was one of the best that he had ever seen; it did however need some modification. A group member suggested that the line "Does not apply" should be added after certain statements. Insert sheets could be included to be used at the discretion of the speech specialist for such items as detailed descriptions in the areas of greatest deviation. Profile sheets could also be used advantageously.

Dr. Flower asked if the therapeutic approach had been influenced by data in the case history forms. The groups believed that the forms provided a basis for communication with supervisors who had not seen the child, and for conferences with parents. The forms also recorded what was true of a given child at a given point in time; these data could be used to record progress. Some discussants believed that the case records were too "depersonalized" to assist in therapy. Discussants felt that anecdotal notes had considerable value in planning future therapy.

In summary, Dr. Flower urged that greated emphasis be placed on prognostic tests and on comprehensive descriptions of communicative behaviors than on etiology.

Dr. Dirks presented as his first problem for discussion the fact that although many children were found to have hearing problems, many did not appear to have the proper follow-up. Air conduction tests were frequently given as the only hearing test at frequency levels of 500, 1000 and 2000. Both air conduction and bone conduction tests are needed; however, bone conduction tests have to be administered by well qualified personnel. He stated that children with hearing loss require thorough evaluations by qualified audiologists in space designed for such testing.

Members of the groups pointed out that not all speech clinicians had comprehensive audiological training. Even when well qualified audiologists were available, lack of adequate testing facilities was a real problem in our over crowded school settings. The groups made various suggestions: funds should be provided through legislation to upgrade skills of school personnel; additional in-service training should be provided; a full time diagnostic speech and hearing center should be set up. The most favored suggestion was the use of sound proofed mobile testing facilities. Dr. Dirks thought that federal funds were available for the study of this kind of project.

The problem of follow-up was discussed further. The evidence from the case record study indicated great need for follow-up; the study showed only recorded data on losses at 500, 1000 and 2000 frequency levels. It would be significant from a medical standpoint to test for losses at a higher frequency to catch indications of sensory-neural losses; losses discovered at low frequencies such as 250, could indicate middle ear infection; this physical problem could respond to medical treatment and the loss could be alleviated.

Dr. Dirks asked about procedures for referral of pupils with hearing losses. It was pointed out that referral usually fell within the province of the school nurse; she interpreted all findings to the parents. Dr. Dirks asked about the efficiency of this procedure: did the nurses report back to the speech specialists so that the clinicians could make educational suggestions? The replies indicated that this was a slow process or that reports were not made consistently; parents were often unwilling to face the fact that their children had hearing losses, and frequently did not follow through with the medical referrals. Pupils were also referred back to their pediatricians or family doctors and the needed information was never obtained by either nurse or speech clinician.

The groups suggested that colleagues in other professions had to be informed about the need for information on the children before educational procedures could be planned. The nurse could be provided with specifically worded questions to submit to the doctor; these could be returned for the records of the speech clinician. Questions such as the following were suggested: Will this child be able to use amplification in an educational setting? What type of amplification was suggested? If a sensory-neural loss or a conductive loss was present, what type of medical treatment was suggested to the parents? The speech specialist could also provide descriptions of particular behaviors suggesting hearing loss in the particular child. All data could be formulated to constitute a permanent record on the child. Better communication could also be established between speech specialists and nurse if special meetings could be arranged to discuss the problems peculiar to both professions.

In summary, Dr. Dirks urged improvement of diagnostic methods and better two-way communication with colleagues.

Dr. Rees faced the discussants with these questions: Why did speech clinicians disagree in their judgments of articulation disorders? Is it important to have definite criteria to judge severity of the articulatory defect and the general intelligibility of children's speech?

She indicated that other studies of judgment of articulation showed differences in agreement regardless of the fidelity of the instrument used. The lack of agreement had to be attributed to the listeners, not to the materials or media used. She stated that speech clinicians have a responsibility to the public to set criteria for assessing articulation skills and disorders; this assessment would make possible the selection and the dismissal of the population with whom they work. At present we rely too heavily on subjective judgment.

The groups indicated that the assessment might have depended on whether the clinician who made the judgment listened to auditory cues only or attended to visual clues only or to a combination of the two aspects. The time element might also have affected judgment. In the real situation, the clinician adapts the time for judging to his needs; in the recorded situation, the time was predetermined.

The group members discussed criteria for measurement of severity: educational achievement as related to each individual's potential; consideration of social factors such as peer and adult acceptance; self-evaluation of his defect by the pupil. Dr. Rees felt that these were all valuable criteria, but she asked if there were any ways in which more help could be given at the training centers to better equip clinicians to make more consistent ratings of severity of articulation disorders. The participants suggested that standardized gadgetry may yet be devised to assist in judgment. Dr. Rees replied that it was still the fault of the training institutions in not giving students enough background and experience in articulation assessment. Some suggested that ratings of severity could not be quantified.

Dr. Rees indicated that although anecdotal records were time consuming, they could be used to define some of the criteria upon which clinicians' judgments were based.

RELATIONSHIP OF SPEECH AND HEARING PROGRAMS TO OTHER SPECIAL EDUCATION PROGRAMS

by Ernest P. Willenberg, Ph.D.

I should like to approach the topic that has been assigned to me by presenting for your consideration and reaction a program model for special education which will highlight the particular role of the speech and hearing specialist as a member of a coordinated multi-function team. The program model is called the Educational Assessment Service Center Program. The aim of the program is to provide essential information and resources in order to personalize and individualize the instruction for all categories of handicapped children.

HUMAN ECOLOGY

Each individual contends with two environments. The internal environment consists of a variety of capabilities such as intellectual, emotional, and social. The external environment consists of the variety of conditions that impinge upon the internal resources of the individual. Under most circumstances, the individual possesses capabilities for normal growth and development, and fundamentally society is geared to facilitate so-called normal growth and development. Therefore, we are not so conscious of the problem of human ecology as it relates to the normal individual. We become conscious of the problem when the individual is not able or finds it difficult to mediate between his internal resources and the external conditions with which he must contend. Such is the problem of the handicapped child. Our task as professionals concerned with special pupil needs is to assess significant divergencies as they relate to the ecological problem and, based upon this assessment, devise a plan of intervention that will enable the individual to overcome or ameliorate those conditions that impede normal growth and development.

PERSONALIZING EDUCATION

The problem of personalizing or individualizing instruction for the handicapped is basically the same as that for the non-handicapped. The difference relates to those divergencies which have significance in planning special education programs and services. In order to individualize instruction, one is required to devise a tailor-made plan that fits the characteristics of the internal and external environments relevant to a given handicapped pupil. When such a plan is formulated, it is then possible to consider the implications of implementation.

An example of a system of pupil analysis can be represented on a tri-dimensional taxonomy based upon those characteristics generally associated with the condition of mental retardation. Let us examine three sets of information which should be useful in planning a special education program for an individual mentally retarded child.

On one dimension we might list the significant tasks that generally relate to mental retardation. Among the tasks the following would be included:

Cognitive
Affective
Communicative
Social
Physical
Economic

On the second dimension would be listed some of the major contingencies (or interventions) which may be applied as they relate to the identified tasks. Among the contingencies there would be:

Specialized instruction
Counseling and guidance
Therapy
Environmental modification

The third dimension would include some of the primary resources essential to the implementation of the contingencies. These would include:

Educational (material and personnel)
Psychological
Medical
Social
Economic

One would employ the tri-dimensional taxonomy as a relevance check list. For example, one might ask this question based upon the items included in the foregoing dimensions: in what way can specialized instruction remedy or ameliorate a serious communication disorder of a mentally retarded child by drawing upon the specialized professional skills of speech and hearing personnel of the school system in which the child is enrolled? Once this question is posed, it becomes obvious that the answers must be obtained to many other questions. The nature and extent of the communication disorder was not disclosed. There was no mention of the age, physical condition, intellectual capabilities, and socioeconomic circumstances of the child. All we know at this point is that he has been identified as mentally retarded with a communication disorder.

If we know more about the significance of the child's condition, information can be stated in terms of educational tasks; it would then be possible to detail more appropriately those contingencies of specialized instruction that would be in the domain of professional activities of the speech and hearing specialist. Some of the questions prompted by the foregoing analysis include the following:

1. To what extent would the child's plan of individualized instruction include clinical work aimed at remediation of speech disorders?

2. In what manner would the speech and hearing specialist relate to other school personnel in facilitating a plan for language development?

3. How would the speech and hearing specialist provide consultation to facilitate a more positive influence by those having a direct influence upon the child's use of language and oral communication?

In order to avoid the impression that one example or case in point constitutes the full repertory in the system described above, let me add that similar questions can be posed relative to the position of the speech and hearing specialist as a resource for any of the contingencies listed that bear some relevance to all of the tasks enumerated. It is conceivable that one might profitably spend a few moments analyzing the relevance of speech and hearing to counseling and guidance, the various therapies, including medical as well as psychological, and environmental modifications as these contingencies may relate to the cognitive, affective, social, physical, and economic tasks that confront mentally retarded children in life. Since our task is to delineate the role relationship of the speech and hearing specialist to various other special educational personnel, we must proceed to develop the program model in which the analysis will take place.

ASSESSMENT SERVICE CENTER

An assessment service center consists of two components: (1) a unit concerned with the study of the individual child and what should be done to help him mediate effectively between his internal resources and the conditions in the external environment; and (2) a unit concerned with following up the recommendations of the assessment unit.

The Assessment Component. The assessment unit will receive third echelon referrals. Third echelon referrals include children who are so divergent as to require intensive functional or operational analysis over a period of days or weeks in a classroom type of setting by a multi-function team working toward the development of a comprehensive educational plan for each child. First echelon referrals consist of those pupils who undergo the usual general pupil evaluation program provided by the school system. Second echelon referrals include children studied individually in the regular school setting.

The emphasis of the assessment unit is upon devising workable educational plans for individual children. Since teachers will have to be implementers of such educational plans, it is imperative that the suggestions for educational follow-up be stated in such a manner as to allow for contingencies appropriate for classroom teachers and the resources available to them. One example of the staffing pattern is illustrated by covering areas of educational assessment as follows:

1. Communication (oral and graphic)
2. Academic
3. Visual-motor
4. Behavior

One assessment teacher will have primary responsibility for a designated area of educational assessment. Each assessment teacher will have backup professional assistance from resource personnel including the following:

1. Speech and hearing specialist
2. Specialist in academic areas
3. Specialist in visual-motor development and remedial physical education.
4. Specialist in learning and behavior

The foregoing individuals constitute the primary team concerned with the development of the child's educational plan, its tryout in the assessment unit, and its transplantation to the setting in which the child's educational program will be offered on a continuing basis. Some of the pertinent questions which might be raised as to the role of the speech and hearing person in the assessment unit setting include the following:

1. What does the speech and hearing specialist contribute to the assessment of the child's oral communication facility?

2. In what way can the speech and hearing specialist contribute to the analysis of the child's language facility and plan for remediation?

3. In what manner can the speech and hearing specialist facilitate implementation of the remedial plan?

4. In what way does the work of the speech and hearing specialist relate to the work of each of the other specialists in the resource team and to the assessment teachers?

It is evident that a comprehensive plan of educational followup, if realistic, must provide for a synthesis of assessment data based upon tests of practicality in order that classroom teachers and other resource personnel may apply this information in the settings in which children receive their continuing education.

<u>The Service Component</u>. The service unit will receive those youngsters who have been assessed and require intensive specialized instruction or environmental modifications. Usually these are the children who are multi-handicapped, severely mentally retarded, or severely emotionally disturbed. In some instances, children have severe physical limitations which require special school placement. These children would be included in the enrollment of the service unit.

The emphasis of the service unit is upon providing a program of individualized instruction which utilizes a non-graded format of instructional organization and employs team teaching and flexible grouping whenever appropriate. Areas of instructional content are organized to provide an orderly sequence of learning opportunities starting as early as eighteen months (developmental age) and progressing upwards to complete the full range of learning opportunities required for graduation from high school. Examples of materials presently sequenced for preschool age and primary youngsters include the following content areas:

1. Communication
2. Quantitative-qualitative
3. Social
4. Physical

Service teachers are selected so as to provide strengths in all of the areas listed above. Working as a team, these teachers are able to stitch their competencies together in the creation of a complete instructional program in which pupils can make continuous progress at rates commensurate with their capabilities. The service teachers also have benefit of backup resource personnel. These include resource teachers for:

1. Language-reading
2. Quantitative-qualitative
3. Social knowledge and skills
4. Physical development and skills

The foregoing persons constitute the primary team concerned with the instructional offerings and other services comprising the service component of the educational assessment service center. At this point one might raise the following questions concerned with the role of the speech and hearing specialist in the service component:

1. What is the service function of the speech and hearing specialist relative to the several categories of pupils who may be programmed in the service component?

2. In what way can the speech and hearing specialist contribute to an overall language development program as well as a program of remediation of communication disorders?

3. How should the speech and hearing specialist relate to the other members of the team constituting service teachers as well as resource personnel for the remaining areas of instructional content?

INTERNAL ORGANIZATION FOR INSTRUCTION AND SPECIAL EDUCATION SERVICES

A plan of individualized instruction can be successful provided there are sufficient alternatives in the organization of the instructional program so that appropriate contingencies can be applied when needed. A comprehensive plan of organization for instruction would include educational offerings and services in various settings. These settings would range from regular school situations in which minimal provisions are made for handicapped children to the most divergent setting in which the child obtains his specialized instruction in a residential institution. Organized sequentially, these settings for instruction and service may be described on seven different levels.

Level One.	Regular day class, regular teacher, no modification of technique or materials.
Level Two.	Regular day class with small clusters of handicapped pupils. Instruction by regular classroom teacher with slight modification of teaching technique and resources.
Level Three.	Regular day class with special teacher for individual or small group remediation.
Level Four.	Regular day class with special teachers for groups of children in integrated programs utilizing resource rooms and materials.
Level Five.	Special day class with special teachers and programs self-contained with some degree of homogeneous grouping.
Level Six.	The special day school, self-contained, and providing for homogeneous grouping.
Level Seven.	Home, hospital and institutional setting in which instruction is provided for children who otherwise are not able to attend school.

Both the assessment and service components of the Assessment-Service Center must relate to the several types of instructional organization listed above. It is obvious that an effective Assessment-Service Center must function in such a manner as to provide assistance to children in the situations most appropriate for their educational needs. It is an established fact that most handicapped children will be programmed for instruction and other services in school facilities which enroll non-handicapped children. An educational plan devised for a child who will return to any one of the situations described in levels one through five must take into account the critical gap that often exists between prescription and treatment. The role of an assessment specialist must include the transmission of pupil and plan to an appropriate instructional setting and alternative where resources are available for implementation of the recommended contingencies. Since the speech specialist is a member of the assessment team, this person will also be concerned with that part of the pupil's instructional plan which includes communication. Some of the questions pertinent to the role of the speech specialist in relation to programming of children in regular school situations include the following:

1. In what way can the speech specialist prepare assessment information so that it will be meaningful to persons other than speech specialists who may be required to follow-up on recommendations?
2. What should be the relationship of the speech specialist in the assessment team with other speech specialists who may be on the receiving end of the recommendations for educational follow-up?
3. In what manner should the speech specialist relate to other instructional and ancillary personnel involved in follow-up on the child's plan of individualized instruction.

CONCLUSION

Speech and hearing is a component in a complex of special programs and services for handicapped children. As a member of the professional team, the speech and hearing specialist will be called upon to carry an increasing responsibility in helping to nurture encouraging trends in special education. A common goal is a favorable balance between a child's capabilities and the fruition of these capabilities. The process of education demands that we identify the specific tasks to which each of us will address our energies. A test will be how well all components team up to achieve a better result than could be attained by the efforts of individual components working independently. Facility in communication is the key to many other accomplishments. The speech and hearing specialist in a modern organization for special education assessment and service is challenged to define and demonstrate proficiency in several roles. He may act:

1. As a diagnostician directly engaged in helping to assist the child's speech proficiency.

2. As a clinician active in the remediation of communication disorders.

3. As a language expert involved in helping to plan a program for language instruction.

4. As a consultant to other members of the professional team, guiding those activities that contribute to effective oral communication.

THE RELATIONSHIP OF SPEECH AND HEARING PROGRAMS TO OTHER EDUCATIONAL SERVICES

by Howardine H. Hoffman, Ed.D.

This workshop has been a rewarding experience. We have been impressed by the story of the project "Characteristics of Children Receiving Speech and Hearing Services in Los Angeles Area Schools," and of the cooperative involvement of so many people from so many of the school districts of this County with assistance from state and national resources. We have heard some of the many findings of the study ably summarized and we have been stimulated to think of the potential contributions of this research to the improvement of speech and hearing programs throughout our country. We have listened with interest as "Mr. Special Education" described the relationship of speech and hearing programs to special programs and later tonight we will hear of other related research projects.

As significant as the substance of the presentations and the findings of the study are, the unifying focus of the workshop is upon human beings and their progress toward becoming the "fully-functioning, self-actualizing individuals" they are capable of becoming. Speech and hearing programs have come into being because of the differences among individuals. They exist because of human variability and their major function is to help each individual reach his greatest potential.

Two true stories which I have related many times through the years seem appropriate here. The first is of a kindergarten lad who excitedly exclaimed, "Oh mama, mama, thee da mama in da wee on da more, wit a pour." His mother responded, "Yes, funny isn't it!" Nothing more was said yet she and young John seemed to share an observation. A few days later I stepped into a kindergarten in Claremont in time to hear a little boy reply to his teacher's question, "Whose turn is it to play on the slide this time?" He had hesitated a few moments, perhaps waiting for someone else to respond. Then he said, "Well, I think it's an insult to our intelligence to have to answer that question every time we go out to play. But, if we must, well, the girls were first yesterday so obviously it's the boys' turn to be first today." These kindergartners, about the same age, each living with professional parents had something to say and each said it using his own unique pattern of speech. The parents undoubtedly held similar expectations of their boys and their schools yet it is apparent to us that the boys were quite different in their language development. Hence their abilities to communicate and to handle the skills of reading varied greatly.

A child having a physiological speech or hearing defect is usually easily recognized even though the exact nature and cause of his handicap and what to do about it may be difficult to determine. For a long time most schools have attempted to assist such children in coping with and correcting their handicaps. Today, however, there is greater understanding of the relationship between physiological and psychological or emotional causation of speech handicaps and means of correcting or compensating for such disabilities.

Today, too, schools are extending their diagnostic and therapeutic services to still other individuals who may have articulation or other problems needing some corrective treatment in order that the individual learn to make optimum use of his normal but underdeveloped faculties.

While teaching at an eastern university, in the summer of 1956, I was invited by the college president to accompany him on a brief visit to Helen Keller. During our introduction Miss Keller placed her thumb beneath my chin and two fingers lightly across my lips and listened to my humble remarks. Then she said, "You are so welcome! You are a teacher." For me, being a teacher is even more meaningful since that time! Miss Keller held our profession in such high esteem. A teacher had made a difference in her life and through her in the lives of countless other people whom she had inspired and challenged by her lectures. With Miss Keller it was a patient, persistent teacher who had helped a little girl find meaning and significance in life and to communicate with others despite multiple handicaps. By comparison then, the special speech and hearing programs to which you are giving your time and effort have the potential of helping a child, youth, or perhaps another adult with a speech or hearing handicap to have a positive feeling about himself and his worth, to reach new heights in his achievement, to become a more fully functioning human being. You are engaged in providing special speech and hearing programs for children with very special needs within the framework of the public school where all educational services are interrelated.

Speech and hearing programs that are designed to help children meet behavioral objectives consist of a wide range of individualized approches. Therapy and practice are meaningfully related to what goes on in the total curriculum. Such programs are an integral part of the total educational experience and are planned to enable each student to function effectively in his home, school and community relationships.

In a sense, speech and hearing programs are similar to remedial reading or tutorial programs. They are the organized means of helping individual students who have identified needs to achieve specified behaviors. They can be evaluated in terms of the product--that is, the changed behaviors they produce.

Whenever the specialized services, activities or programs of the modern school, they have in common certain elements:

1. They are responsive to needs or problem assessment related to goals which are increasingly referred to as behavioral objectives.

2. New services and programs are systematically planned. They are designed to provide a variety of approaches capable of producing specific goals or behaviors when appropriately matched to student needs and interests.

3. They are evaluated by measurable change in pupil behaviors.

4. They interrelate and coordinate needs assessment, curriculum planning, instructional development and program operation, evaluation, educational technology and teacher education.

5. They are individualized as much as is feasible and are paced to the learning rates of students.

6. Content, methodology and media are relevant to the needs and demands of the individual and the community.

In summary, speech and hearing programs are integral though specialized parts of the total educational program and are designed to serve students having identifiable speech and hearing needs. They, like all other educational services are planned in response to needs assessment and are individualized to the greatest extent possible.

Hopefully, the speech and hearing programs of your schools will generate new hope and increased confidence in your students as they enhance self-image, improve communication skills and function more effectively in other aspects of the school programs and in their out-of-school activities.

Speech and hearing programs are people-centered and are interrelated with other educational services to the extent that they reinforce and supplement one another.

Now a closing story which illustrates the complexity of communication even when the individuals involved in dialogue have perfect hearing, clear diction, excellent articulation and normal speech.

Asked for advice about what might be included in a presentation I was to make before business education students of high schools of the county, a fifteen-year-old replied, "How does that grab you! You ask me? I don't dig you! But since you ask, I'd say keep your cool, do your thing, do it fast, and get out of the way so the kids can do their thing! That's what they'll come to do." And so, if I understood the advice, we teachers do our thing and get out of the way so the youngsters can learn to do their thing! That's what they come to school for!

PROMISE AND PROBLEMS, CALIFORNIA'S PROGRAM FOR THE SPEECH AND HEARING HANDICAPPED

by Frederick E. Garbee

Here is a poem which may perhaps give us a few clues as to what our mandate is with children in the field of communicative disorders:

The Leaden Eyed

Vachel Lindsay

Let not young souls be smothered out before
They do quaint deeds and fully flaunt their pride.
It is the world's one crime its babes grow dull,
Its poor are oxlike, limp, and leaden-eyed.

Not that they starve, but starve so dreamlessly,
Not that they sow, but that they seldom reap,
Not that they serve, but have no gods to serve,
Not that they die, but that they die like sheep.

My topic is "Promise and Problems, California's Program for the Speech and Hearing Handicapped." What *is* promising in California's public schools in 1968, 1969, and the future for the child with a communicative disorder? Is there reason to expect meaningful change to take place in our programs? And if so, how? If not, why this stagnation? If there *is* promise for the child with a speech, hearing or language disorder, will this promise help the child in need demonstrate his capacity to learn? Will it take into account the individual child's varying prenatal and postnatal opportunities? Will this promise take into account the ways individuals are treated differently if they are female or male, Afro-American or white, one social class or another, or one employment setting of the parent or another? Will this promise, if it can be brought into existence, take into consideration that "the researcher who says that two children live in the 'same' environment is quite wrong, for the environment that each child perceives may be quite different from that perceived by the researcher?" (*Saturday Review*, October 19, 1968, p. 77).

If there is promise for children with whom we concern ourselves as speech clinicians (therapists, specialists, teachers, correctionists, communicologists, pathologists, etc.) are the disastrous effects of the schools on lower-class children going to be continued? According to Boyer and Walsh in the October 19, 1968, issue of *Saturday Review*: "When intelligence is defined as abstract verbal-conceptual ability drawing on the model experience of middle class environment, as it is in most IQ tests, a selection has been made which excludes many other plausible and often more useful definitions." (Page 78.) As part of a democratic society we should do everything possible to develop the abilities of children. In assisting the child in eradicating a communication deficiency we help eliminate economic deprivation, ghettoized living, and elitist schools and businesses. We must base our policy of service on a foundation of the most generous and promising assumptions about human nature rather than the most parsimonious and pessimistic. Are we currently following this policy? Our programs are mandated by law in California for every child in need. Children will do their best only when they assume they are capable. (I suggest you read *Pygmalion in the Classroom*, a recent book reporting statistical findings of an experiment in the South San Francisco Schools which show if a teacher expects a child to be intelligent, he will actually demonstrate greater intellectual capacity.) Let us not have the indictment bestowed on us as professional "communication specialists" as has been bestowed on others in American education, i.e., poor teaching is protected in the American educational system in assuming that the child doesn't have the ability. We need to make our contribution in *creating* ability, *increasing* intelligence, and *developing* interests. If our field which is identified specifically to aid the speech, hearing and language handicapped child holds promise for the future we will either have to re-examine our beliefs and practices and therefore contribute to creating real and equal opportunity for individuals, or else risk making a contribution to perhaps violence and malcontent which are alternative and dominant instruments of social change.

I believe there is promise for us in our California speech and hearing programs and this includes this 464-square-mile community of Los Angeles, whose boundaries would encompass the combined areas of St. Louis, Cleveland, Minneapolis, Milwaukee, Boston, Pittsburgh, San Francisco, and Manhattan (*Time*, October 11, 1968, page 101). Perhaps a valid assumption is that those of you contributing to the Los Angeles County Project do represent a microcosm (a little world; the universe in miniature) of our statewide programs, but, let us not assume too much or take too much for granted. Do you represent a "universe in miniature" in Los Angeles as reflected by information submitted to us for the 1966-1967 school year (the year being reported in the Los Angeles County Research Project)? One thousand ninety speech and hearing specialists throughout California schools indicated in 1966-1967 (from the State Speech and Hearing Specialist's Annual Reports):

1. There was a ratio of 83.22% female to 16.78% male specialists employed.

2. The specialist earned a median salary of $8,385 and a mean salary of $8,318.

3. 85% of the specialists were employed by districts, 15% by county superintendents.

4. 94% were employed full time.

5. The specialist served an average of four (4) schools during the year.

6. He or she provided speech therapy to children where:

   a. 84% had articulation disorders
   b. 6% had disorders of stuttering
   c. 2.5% had voice disorders
   d. 3.5% had language disorders
   e. 4% had other kinds of disorders.

7. 71% of the children were scheduled in group therapy; 19% in individual therapy; and 10% in both.

8. Only 9% of the total number of children receiving speech therapy were physically handicapped and mentally retarded.

9. 33% of the exceptional children receiving therapy were mentally retarded; 22% were hard of hearing; 13% were orthopedically handicapped or cerebral palsied; 11% were educationally handicapped; 3% were gifted; and 1% were deaf.

10. When scheduling other exceptional children, 50% were seen in group therapy, 38% individually, and 12% in both.

11. The specialist served children in programs where 1% were preschool; 8% were from kindergarten; 22% from first grade; 20% from second grade; 86% from grades kindergarten through grade six; 6% from grades 7-8; and 5% from grades 9-12. 3% were ungraded.

12. A mean caseload of 76 children was maintained. The median caseload was 85.

13. There was an average of 61 children on a specialist's waiting list (a total of 66,982 children reported on waiting lists). In other words 669 more speech and hearing specialists were needed in the state to fill the need based on one therapist having 100 children a year in his caseload.

14. The specialist provided speech therapy to children where an average of 45.83% were scheduled on session each week; 48.49% for two sessions each week; and, 5.20% three or more sessions each week.

15. The state report results indicated 52% of the specialists scheduled 3-5 hours each week for conferences and coordination activities; 14% scheduled 6 hours or more each

week; 26% scheduled 1-2 hours each week; and 8% scheduled no time for conferences and coordination activities.

16. An average of 26.95% of the children were dismissed when professional objectives were accomplished.

17. 69.44% reported their supplies and equipment were adequate.

18. 63.76% reported a need for improvement in room and space facilities.

1966-67 was the year Los Angeles County reported 276 speech and hearing specialists were employed (or 23.7% of the total number of specialists employed in California's public schools). This was the year State Excess Expense Reports indicated statewide totals of 98,402 speech defective children, 1,424 hard-of-hearing children in remedial classes, and 301 aphasic children (a total of 100,127 children with communicative disorders). In 1966-67 approximately 2% of California's school children were reported enrolled in speech and hearing programs. In 1966-67 the total school population in Los Angeles County (grades K-12) was 1,430,295 pupils (Spring 1967 report of the Bureau of Administrative Research and District Organization). So, if 4% of the total school population (a conservative estimate) of Los Angeles County were communicatively handicapped children, this means a total of 57,212 children. Therefore, 276 speech and hearing clinicians in Los Angeles County in 1966-67 represented a ratio of one clinician to every 5,182 pupils in the school population.

Incidentally, the total enrollment of school children in the public schools in California in the Spring of 1967 was (K-12) 4,636,558 (published by the Bureau of Administrative Research and District Organization). With 1,164 speech and hearing clinicians reported in California schools in 1966-67, a statewide ratio was one clinician to every 3,983 pupils in the school population. Los Angeles County and the state ratio vary by 1,199 pupils. We in the State Department recommend a ratio of one full-time speech and hearing specialist for every 1,000 to 1,700 pupils in grades kindergarten through eight, and one full-time specialist for every 2,500 to 4,500 students in grades nine through twelve.

What do these facts mean? Obvious interpretation indicates we have extensive programs, vast needs, and certainly considerable potential. A simplex approach to solving the problems of our speech and hearing programs is of course ridiculous. In the December, 1967, issue of *The Voice*, on pages 91-98, I have attempted to spell out an approach to providing services for children with communicative disorders. Will you please read this item if you haven't already? It is at least one attempt at answering my mandate in speaking about the topic assigned me.

In my opinion none of the points I make should be omitted in a comprehensive operational plan for "Promise" and solving "Problems" in California's Program for Speech and Hearing Handicapped School Children.

Therefore I would like to concentrate very briefly on just a few matters I believe particularly germane to our deliberations in this workshop.

First, we must remember we are educated as clinicians to provide a specialized service to children with communicative disorders. No other breed of professional cat has the same training as well as the practical clinical experience. Therefore our talents should be applied with children having significant communicative disorders. The primary purpose of speech and hearing programs in the schools is to provide thorough assessment, diagnosis (appraisal, if you like), and evaluation of each child's speech, language and/or hearing disorder and to provide a therapeutic program to meet the individual's needs.

The classroom teacher and the speech and hearing clinician have separate but joint roles in the development of good speech for all children. The teacher and clinician work closely together in sharing the responsibility of distinguishing which children need speech and language development training and which children need speech therapeutic services. The clinician makes the final decision concerning identification of children who will be placed in his caseload for therapeutic services. The effective speech/hearing clinician will find the classroom teacher's contributions to understanding the child extremely valuable. In turn, the teacher may integrate suggestions given by the clinician into the child's daily experiences and also profit from guidance from the clinician. Never forget, the services required of the public school speech and hearing clinician indicate he must have an understanding of the total school philosophy and programming. His or her specific goals, skills, and fundamental identity, however, remain that of the specialist offering services to children with significant communicative disorders. . .disorders far beyond the realm and specialized training of the teacher and other school personnel.

The clinician cannot do everything whether he or she be Batman, Robin, or their Superwoman counterparts. Perhaps he or she should assume *one role* or *another*. *Yes*, he *is* uniquely qualified as a speech pathologist, but, he or she *is* also uniquely prepared to function in a consultative capacity within the schools. Let's stop pulling the clinician in all directions. Let's give her an alternative. Be assessors, evaluators, appraisors and therapists of communicative disorders, *or* follow the guidance of the ASHA Committee on Language and follow three types of programs (*Asha*, May, 1968, p. 222):

1. Language development programs for preschool children;

2. Language training programs for preschool children and school-age children with language problems related to mental retardation, brain damage, and emotional disturbance; and

3. Language training programs for school-age children who use a dialectal language form, such as Negro dialect.

Become a generalist, or a manager of language programs, or supervise a professional aide, or be a clinician-educator (engage in teaching as well as clinical activities), but *make a choice*! This includes placing the clinician in an educational assessment center or a teaching environment or not. All of these services are needed in the schools plus the great need for clinical services *not* provided by other community agencies. Los Angeles County's needs (and the needs of population centers throughout the nation) have never been completely met in the population of children with communicative disorders. (I have cited my evidence in therapist-pupil ratios.) Let's not forget this important responsibility. Our colleges and universities gear their programs to training clinicians. (Cite me evidence of adequate academic training in language education. Look at college curricula nationwide.)

Our observations on practices of clinicians throughout California indicate practices and procedures do not change very rapidly. (Our maximum caseload regulation has borne this out.) Of the total school population (K-12) in Los Angeles County in 1966-67 less than 2% of the children were reported enrolled in programs for the communication handicapped.

Second, "promise" for the future may depend to a great extent on the results of well-controlled research which seeks to guide the clinician at the operational level. Efficient use of professional time, the merit ("validity") of criteria used in case selections, therapeutic procedures, scheduling patterns, appraisal of therapeutic results, the value of family involvement, the effects of communicative disorders on the individual's adjustment and progress, are examples of areas needing research. If you will recall, in an article I wrote for the *Caseload Study* (*The Voice*, May, 1963) entitled "Research Implications for Public School Speech and Hearing Programs: A Need for Unity", I enumerated at least fifteen (15) areas of critical importance in setting standards for statewide programs.

We enthusiastically commend the Los Angeles County office and the cooperating districts throughout the County in *your* research project which is a most significant beginning to carefully scrutinizing the characteristics of children receiving your services. We sincerely hope there will be consistent and widespread use of your standard case record. You can be assured you will have all of the support possible from us in the State Department of Education. You as individual clinicians have made real contributions in conscientiously keeping accurate records and reporting them. The Research Project has given Mrs. Nadine Coates in the Los Angeles County office, and Miss Esther Herbert in the Los Angeles City Schools another opportunity to demonstrate their excellent and exemplary devotion, labor, and talents to our field. We appreciate their efforts and believe they are outstanding contributors in this wasteland of research specifically designed for understanding the schools as an employment setting in our field.

Third, there will be "promise" for school programs if well-qualified specialists in speech and hearing are available to fill positions in districts and counties. We now have population projection figures from the California State Department of Finance. A total school population in California of 4,435,100 pupils in grades K through 12 is projected for 1968-69. The State Department of Education projection figures go through the 1980-81 school year. During that year a projected public school enrollment (K-12) is 5,021,500 pupils. Potential enrollment for remedial speech and hearing programs will be 248,564 pupils: in other words more than double the enrollment during the 1966-67 year of your research project. These figures are a challenge to our colleges and universities with accredited speech and hearing programs as well as to us in the schools. In Los Angeles County, the University of Southern California, California State College at Los Angeles, California State College at Long Beach, San Fernando State College, and Whittier College have a great responsibility in adequately training personnel to serve in the Los Angeles County schools. Their curricula and procedures should be geared to the needs of the schools. There should be close rapport and reciprocal communication between academicians and school administrators, supervisors, and clinicians at district, county and state levels. This is still a vulnerable area and one of critical importance in supplying the schools with appropriately qualified personnel.

Fourth, there is "promise" for California's programs (including Los Angeles County's programs) if children receive the needed assistance in language, including pertinent stimulation and experience at early developmental stages. Both the Los Angeles County Research Project (0.5%) and the State Speech and Hearing Specialist's Reports (1%) indicate insufficient involvement of preschool children. A deficiency, in my opinion, is reported in the number of children receiving help for their language deficiencies, as my colleagues have more than adequately called to your attention earlier today, particularly in Dr. Marge's and Dr. Willenberg's remarks. Head Start programs and research in child development have given us more than sufficient evidence to substantiate placing our talents and "know-how" at the early stages of a child's development and in the area of language (in other words, in areas beyond the "speech" correction concept involving mainly phonemic change). Look carefully at Jane Beasley Ralph's article in *JSHD*, August, 1967.

Fifth, and perhaps the most challenging to us, is the "promise" we as professional workers hold for the disadvantaged child; perhaps more than the 15% found in the low socioeconomic status (Los Angeles

County Research Project) are involved, including too often the Afro-American and Mexican-American populations of children with dialectal characteristics. In a recent review of language of economically deprived children by Baratz (*Asha*, April, 1968), it is reported these children often have a fully developed but a nonstandard language code. We then must not try to obliterate the language that is present but rather to teach a language that is necessary for the child when he enters the middle class culture (i.e., when he is in school). He must be allowed to maintain his nonstandard language because a majority of his experience makes it appropriate. Teach the child a second language system (dialect, if you like), but do not devalue *his* language. This obviously cannot be done in sessions twice a week for 30 minutes each. Therefore I suggest we need specialists who concentrate on teaching the child with a different language code (i.e., dialect) a new language. This is not however the primary function of the speech pathologist. His role may be one of identifying and treating communicative disorders in these children particularly during the preschool and kindergarten years. Incorporated in an approach to helping these children should be a preventive approach rather than a remediation one. Also, I encourage you to read Dr. Marge's statement in the May, 1968, issue of *Asha* on our role in the management of language problems.

Sixth, there is "promise" in local school systems assuming greater responsibility for programming. But with this "promise" (and I am referring to the new law, Senate Bill 1, 1968) there is great commitment, e.g., standards must be maintained, caseloads must be limited, financial responsibility must be adequate. Also along with more local responsibility for programming more provisions for in-service training is crucial. This workshop has great merit in emphasizing guidance to you particularly in the area of language. The case record is a meaningful instrument for better coordination and record keeping, and an example of assisting in the implementation of county responsibility. We will continue our inservice training in the State Department of Education's Special Study Institutes. This year we are concentrating on stuttering.

Seventh, if we succeed in the future we must strengthen our ties of communication and agree on our objectives in district, county, state and federal agencies with responsibility for educating public school children. We must never lose sight of the importance of the specialist in decision making. We must never demand of him to the degree that he or she is reluctant to participate or give valid information. We must upgrade our standards based on a cooperative endeavor of us all, e.g., clinicians, supervisors, administrators, et al. Only in this way can we maintain a meaningful perspective. Taking the initiative to communicate is the responsibility of *all* of us. Our policies must be flexible so we are not subdued in our efforts to communicate. It is always a great feeling for us as State Consultants to be *asked* to assist (preferably before a crisis arises).

In conclusion, I thank you for your research findings, your fine ability to coordinate your objectives and procedures with federal, state and local personnel and your ability to avoid being reactionary. Perhaps a short poem by Hughes Mearns will rather candidly tell you what I mean. It is called:

The Perfect Reactionary

Hughes Mearns

As I was sitting in my chair
I *knew* the bottom wasn't there,
Nor legs nor back, but I *just sat*,
Ignoring little things like that.

SUGGESTED READING

"Ad Hoc Committee on Guidelines for Speech and Hearing Services in Project Head Start", *Asha*, December, 1966, pp. 463-464.

Baratz, Joan C., "Language in the Economically Disadvantaged Child: A Perspective", *Asha*, April, 1968, pp. 143-145.

Boyer, William H., and Walsh, Paul, "Are Children Born Unequal?", *Saturday Review*, October 19, 1968, pp. 61-63, 77-79.

Clark, Ann D., and Richards, Charlotte J., "Auditory Discrimination Among Economically Disadvantaged and Nondisadvantaged Preschool Children", *Exceptional Children*, December, 1966, pp. 259-262.

"Committee on Language Development and Disorders", *Asha*, October, 1967, p. 415.

Frazier, Alexander, *A Guide to Language Development*, Talent Development Project, Bulletin No. 7, Ohio State University, 1962.

Garbee, Frederick E., "The California Program for Speech and Hearing Handicapped School Children", California State Department of Education, Bulletin, 1964; 1967 Edition with Assistance of Edward Stark.

Garbee, Frederick E., "New Directions in Planning for the Provision of Services for Children with Communication Disorders", *The Voice*, November, 1967, pp. 91-98.

Mackintosh, Helen K., *Children and Oral Language*, ACEI, ASCD, IRA, NCTE, 1964.

Marge, Michael, "The Role of the Profession of Speech Pathology and Audiology in the Management of Language Problems," *Asha*, May, 1968, pp. 221-222.

Ralph, Jane Beasley, "Language and Speech Deficits in Culturally Disadvantaged Children: Implications for the Speech Clinician", *Journal of Speech and Hearing Disorders*, August, 1967, pp. 203-214.

Rosenthal, Robert, and Jacobsen, Lenore F., *Pygmalion in the Classroom*, Holt, Rinehart and Winston, Inc., 1968.

REFERENCES

Baratz, Joan C., "Language in the Economically Disadvantaged Child: A Perspective", *Asha*, April, 1968, pp. 143-145.

Boyer, William H., and Walsh, Paul, "Are Children Born Unequal?", *Saturday Review*, October 19, 1968, pp. 61-63, 77-79. Copyright 1968 Saturday Review Inc. Excerpt (page 70) reprinted by permission of the authors and publisher.

California State Department of Education, Excess Expense Reports, 1966-1967.

California State Department of Education, School Population Projection Figures for 1980-1981.

California State Department of Education, Speech and Hearing Specialists Annual Reports, 1966-1967.

California State Department of Finance, School Population Projection Figures for 1968-1969.

Garbee, Frederick E., "The California Program for Speech and Hearing Handicapped School Children", California State Department of Education, Bulletin, 1964; 1967 Edition with Assistance of Edward Stark.

Garbee, Frederick E., "New Directions in Planning for the Provision of Services for Children with Communication Disorders", *The Voice*, November, 1967, pp. 91-98.

Lindsay, Vachel, "The Leaden-eyed", *Collected Poems*, MacMillan Co., 1923. Copyright 1923 by the MacMillan Co. Reprinted by permission of the publisher.

Marge, Michael, "The Role of the Profession of Speech Pathology and Audiology in the Management of Language Problems", *Asha*, May, 1968, pp. 221-222.

Mearns, Hughes, "The Perfect Reactionary", *Collier's*, March 20, 1948. Copyright 1948 by *Collier's*. Reprinted by permission of the publisher.

Ralph, Jane Beasley, "Language and Speech Deficits in Culturally Disadvantaged Children: Implications for the Speech Clinician", *Journal of Speech and Hearing Disorders*, August, 1967, pp. 203-214.

Time, October 11, 1968, p. 101.

NORMAL AND DEVIANT LANGUAGE DEVELOPMENT

by Laura L. Lee

Speech therapists have traditionally laid great emphasis on the articulation aspects of language and the production of correct-sounding speech. Case selection has often been slanted toward problems which would respond to traditional therapy techniques for voice, articulation, and rate of speaking, or dysfluency. More recent emphasis has been placed on the content, or meaningful aspects of speech, not just on its manner of utterance. The speech therapist is now turning attention to matters of vocabulary, conceptual and cognitive growth, grammatical competence, and to the use of language for thinking, reasoning, and problem-solving.

Professional training for speech therapists should include courses in the areas of linguistics and psycholinguistics, where current research is being focused on language structure and language acquisition. Linguistics considers language to be composed of (1) phonological, (2) semantic, and (3) grammatical aspects, all of which combine to make up the language structure. A speech therapist who worked only with phonological problems would be omitting some of the most significant aspects of language. To call phonology "speech" and to call semantics, syntax, and morphology "language" is to make an artificial dichotomy of man's total language behavior. All uttered speech has content, meaning, and communicative intent; the therapist must be concerned with the message as well as with its manner of utterance.

In all language-cultures, children follow a similar developmental pattern of language learning as they accomplish the phonological, semantic, and grammatical features of whatever language is presented to them as the speech model.

Phonology. By six months of age a child's babbling begins to be somewhat imitative. He is developing the auditory feedback loop by which he can match the sounds he is making to the speech sounds of the input model. Prosodic features of duration, pitch, stress, and melody are imitated first; phonemic features are accomplished later. The consonant-vowel babbling syllables are probably universal characteristics of speech sound learning. Any interruption of the natural process of phonological development may lead to impairment in other aspects of language growth. A deaf child who cannot hear the input model nor the sound of his own voice must learn to depend upon cues other than auditory. A mentally retarded child will be slow to develop the phonemic categories of sounds. A cerebral palsied child who cannot control the speech musculature may be delayed in accomplishing speech sound production although he may learn sound discrimination on a receptive basis. A child who is not sufficiently stimulated with environmental speech sounds, who is neglected or ignored, has insufficient input from which to abstract the phonemic categories. The basic learning skills of abstraction and categorization are essential to phonological development.

Semantics. Once a child begins to imitate simple syllabel combinations and to remember them, he can associate them with events in the environment. Even the earliest words name not individual things but categories of things. The child must learn to classify his experience, to see recurrence and repetition of similar events, to abstract these similarities and to give names to these abstractions. A nonverbal level of conceptual development underlies the learning of a vocabulary. One knows that a child has a concept for a word when he can appropriately name a novel experience, when he can classify and name something he has never seen before. Concept formation can also be demonstrated when the child can name something which is not in immediate view, when words can call to his mind images, recollections, and memories of events and things which he has previously experienced. Each language differs in the categories which it names and many languages cannot be translated into one another because the concepts underlying their vocabularies are not mutually shared. However, certain universal conceptual areas seem to be contained in all languages. All languages will contain some kind of vocabulary for time, space, size, color, direction, etc., which are universal observations of any human nervous system. Deaf children, for whom the input language is reduced or highly structured, may have difficulty in forming the classifications of experience for which words stand; their meanings for words may show restricted categorical boundaries. Culturally deprived children may not be exposed to a wide vocabulary in the input model; to the extent that vocabulary and cognitive development are interrelated, their opportunity for intellectual development is diminished. A cerebral palsied child may live in a restricted environment where his opportunity for experience is dependent upon what others bring into his field of vision, touch, and audition; words will have shallow meaning for a child who has not had an opportunity to explore and investigate his environment freely. The basic learning skills of abstraction and categorization are operative in learning concepts and the words which symbolize them.

Syntax. No language is without grammatical rules for stringing words together into meaningful units, although the grammatical rules are considerably different from one language to another. The transformational grammar of Noam Chomsky has proved to be a useful model in explaining and analyzing child grammar and the developmental aspects of syntactic structure.

ASSESSING LANGUAGE SKILLS

Tests which measure only isolated individual features of language skill should not be considered comprehensive evaluations of over-all language development. Each type of test is necessary even though it may be partial and fragmentary. The best kind of language evaluation contains a battery of tests which evaluate different aspects of the total language process.

Phonology. Tests for speech sound learning have traditionally been used by speech therapists, but they are not in any sense measures of language usage. Articulation tests such as the Templin-Darley, the Hejna, the McDonald Deep Test, etc., measure a child's production of English speech sounds. Receptively, speech sound discrimination tests are still undeveloped for young children. The tests by Wepman, Schuell, etc., test a child's discrimination of a few minimal pairs of words, but refined close measurements of auditory discrimination are not yet widely used. New tests for speech sound discrimination are being devised, constructed around a child's knowledge of the distinctive features of phoneme groups; some of these may give us a more accurate means of assessing sound discrimination in young children. Koenigsknecht at Northwestern University is developing such a test.

Concept Formation. Nonverbal conceptual development is an essential prerequisite for language development, as a substrate for vocabulary and word meanings. Tests of conceptual development are included in standard intelligence test batteries as performance or nonverbal subtests. The *Illinois Test of Psycholinguistic Abilities* contains visual-motor tests which reveal a child's ability to form the sort of categories of experience for which words could become symbols. Speech therapists are not trained to administer most tests of this nature but an understanding of the principles involved will enable them to work more effectively with psychologists and to interpret psychologists' reports.

Semantics. Many tests for receptive vocabulary are available. The *Peabody Picture Vocabulary Test* and the *Ammons Full-Range Picture Vocabulary* are the most commonly used and measure a child's comprehension of individual words. Such tests are extremely useful but should not be equated with comprehensive over-all language development since they tell nothing about the child's expressive behavior or his understanding of syntax and grammatical rules. Measures of expressive vocabulary are more difficult to find. The naming of flash cards can reveal not only a child's vocabulary but his quickness of recall; work latency or word-finding problems can often be detected by such tests. The *ITPA* subtest which elicits word opposites can be considered a kind of vocabulary retrieval test. Those parts of traditional intelligence tests which yield a verbal score can be considered tests of semantic development. The ability to retrieve, associate, define and compare words all indicate a substrate of conceptual development and a vocabulary to symbolize these concepts.

Syntax. Measurements of a child's grammatical skill are only recently being recognized as essential. Jean Berko's study of children's ability to put proper word endings on nonsense syllables has often been used as a test of morphological achievement, although it is not standardized with norms. A more recent test of this nature was developed and used with deaf children at the Central Institute for the Deaf in St. Louis by Helen Woodward. It is assumed that if the rules of syntax and morphology are operative in a child's competence, he can use them on unfamiliar, even nonsense vocabulary. Sister Mary Arthur Carrow has developed a test for receptive use of grammatical rules which includes both semantic and syntactic subtests. At Northwestern University we are developing a short screening test for syntax, which compares a child's use of certain linguistic structures receptively as against his expressive use of the same forms.

Each of these tests reveals some aspect of language skill, but no single test is adequate by itself. At Northwestern we have been developing a measure of children's language based upon the final stage of language development, the spontaneous expressive language in response to adult stimulation. We have collected language samples of children in various stages of language acquisition and analyzed them for certain linguistic forms. These investigations have resulted in two types of charts: (1) Developmental Sentence Types, which classifies a child's utterances prior to the development of kernel sentences, and (2) Developmental Sentence Scoring, which yields a numerical score for use of sequentially more difficult transformational items. Such a measure is useful in determining a child's language level or his rate of progress during therapy, but it is not useful in differential diagnosis. It will tell you what the child does but not why he does it. We are now attempting to keep a close check on children's progress in several areas which we feel are interrelated and interdependent in language acquisition: auditory memory span, *Peabody Picture Vocabulary Test* for verbal comprehension and vocabulary growth, the syntax screening test, and an analyzed speech sample (Developmental Sentence Score) taken every three months. A battery of measurements such as this is necessary for an over-all assessment of language development.

INCORPORATING LANGUAGE TRAINING INTO SPEECH THERAPY

Speech therapists are traditionally trained for teaching in the area of phonology, and often 80% to 90% of a speech therapist's caseload contains cases labeled "articulation." But phonology is only one aspect of language; speech is always about something, always has content and message and communicative value. The speech therapist must be concerned with the semantics of the vocabulary and the acceptability of the grammatical rules in the speech which she elicits from children. Often the cases which she has labeled "articulation," upon closer scrutiny, exhibit problems in vocabulary and sentence structure as well as in articulation. The child with immature articulation often has just as immature concepts and vocabulary and syntactic structure as he has phonological mastery. Current research is revealing that there are usually large language components in other types of cases formerly labeled as stuttering, cleft palate, cerebral palsy, or even voice. Dysfluency is not always a neuromuscular blocking in the patterning of speech movements but may be a problem of word latency, the failure to retrieve vocabulary fast enough for speech to be smooth and fluent. The developmental lag in cerebral palsied children is not only failure to control the muscles of speech but may also involve a failure to develop conceptually, semantically, experientially; language development may lag because there is not a wide enough basis of things to talk about, judgments to be made, ideas to express. Many studies seem to indicate that cleft palate children get a slower start than others in vocabulary growth and sentence structure; receptive language may exceed expressive language attempts for such children. Speech therapy which aims to improve only the quality of the pronunciation is often ineffective and shallow and does not contribute to the over-all development of these handicapped children. The speech therapist therefore must give close attention to means and methods for bringing other aspects of language development into her teaching goals, procedures, and plans.

Teaching Concepts and Vocabulary. In normal language acquisition, words are introduced by the parent model at an optimum time, when the child is attending to something which can be named. The parent does not select a word to be learned and then hunt for the child, or create for him an experience which it can mean. Instead, the child himself, in his endless activity, shows that he has made some observation, some abstraction for which a word can be provided. Thus words and things are in very close proximity when words are presented in normal language acquisition. The language teacher, on the other hand, has the unfortunate necessity of reversing this natural order, of selecting a vocabulary item to be presented, explained, and learned, and then of trying to develop the underlying nonverbal concepts. Nevertheless, the language teacher's job is two-fold: (1) she must introduce a word, but (2) she must also provide the conceptual category of many experiences which form the substrate of meaning for the word. Such speech or language teaching requires an endless array of objects, pictures, activities, toys, and demonstration materials in which the child and teacher act out and make explicit the meanings of words. First language acquisition is never accomplished in a static situation with a quiet child listening to an adult teacher; it is learned as the child comes into contact with the perceptual world which is to be symbolized with words.

There are certain large areas of perceptual experience which might guide a teacher in her choice of vocabulary to be presented to a child. Each area has its concrete vocabulary and its more abstract elaboration; the teacher should judge whether to introduce simple concepts and words or to present more difficult, abstract ideas. For example:

Color: blue, red, etc. bright, dark, light; pretty, beautiful, etc.

Size: big, little, short, tall; bigger than; the biggest, tallest, etc.

Number: one, two, etc.; how many, how much; more than, less than, most, etc.

Time: now, later; yesterday, tomorrow, next time, last time; before, after, during, while; early, late, soon; often, seldom, never, always, etc.

Space: on, in, under; between, around, toward, away; close, far, distant, etc.

Pronouns: all personal pronouns; everybody, nobody, somebody; others, person, people, etc.

Quantity: some, all, none; other, another, lots; many, few, each, etc.

Conjunctions: and, but; because, so, if, so that; unless, even though, etc.

These are only a few of the areas of early perceptual experience from which a teacher might select vocabulary to be presented. She will then have to invent activities where these words will have immediate, contrastive meanings for the child and where they can be used in many different contexts until a firm category of experience is built to provide useful word meanings.

A further language goal, beyond the enrichment of vocabulary and concepts, could be to strengthen the organization of vocabulary, the means by which words are related to one another and are retrieved in a structured, organized fashion. Activities should include such wordplay as the following:

Word Associations. Vocabulary should be built around a central theme or subject: the circus, the farm, school, family, a holiday, a time in history, or a geographical location. Children with adequate language facility have no difficulty with this type of verbal thinking, where one word leads to the retrieval of a related word quite apart from the presenting situation. However, children with language difficulties seem to have words stored in a disorganized fashion and often seem unable to think of more than one or two related words. Activities which organize vocabulary into thought-groups may help with word retrieval as well as with vocabulary growth.

Word Opposites. The English language is rich in polar words, words which name extremes of continua, and children often increase vocabulary by pairing such words: cold-hot, rich-poor, day-night, etc. If children showed facility with such pairing, the difficulty could be increased to finding in-between words such as lukewarm, well-off, evening or dawn, etc. Color words such as lavender, aqua, pink, and tan lend themselves to this kind of in-between naming and induce a vocabulary suited to more careful, accurate thinking and naming.

Word Categories. English is rich in subordinate and superordinate word-chains which encourage categorial thinking and word associations. For example: clothes, furniture, food, sports, occupations, states, buildings, etc. A vocabulary drill could be built around finding as many subordinates as possible under these headings. The game can be played in reverse, giving such words as football, tennis, hockey; toast, eggs, bacon; daisy, rose, dandelion; etc., to elicit the superordinate. Since categories form the conceptual bases for word meanings, this kind of exercise encourages the abstracting and classifying of experience which is basic to vocabulary meaning.

Another type of language goal is that of verbal reasoning. Stimulus pictures which tell a story often elicit nothing but object naming from a child with language problems. In order to see the action or the interrelatedness of parts in a picture, a child must be led to imaginative kinds of thinking, to add to what he can see, to create information which is not readily observable. Asking a child what has just happened or what will happen next forces a kind of simple reasoning and logic based on past experience. Since one of the goals of all language is to solidify and crystallize past experience into verbal symbols, a language teacher should take every opportunity to talk about things not present, out of sight, stored in memory, or created in imagination. This use of language cannot be one of the first goals nor can it be effective with a child who does not have a fairly good vocabulary for concrete immediate events, but it provides another step toward abstract uses of language.

Teaching Syntax and Morphology. Current psycholinguistic research in language acquisition stresses the child's creative, spontaneous role in learning language from an adult model. In a sense, one cannot teach a child to talk; he can only present a meaningful, easily comprehended input model from which the child himself can abstract the linguistic rules. The act of learning to talk is an act of the child, not an act of the adult. The child himself must "induce the latent structure" from the input model. The normal human nervous system may be "programmed" for such activities. Since the speech therapist is often working with impaired or dysfunctioning nervous systems, allowances must be made for short memory span, poor sound discrimination, inability to remember the sequential order of auditory stimuli, and often accompanying visual perceptual problems and motor inadequacies. The input model language must be presented in a highly structured, reduced, simplified form so that the rules can be generalized by an inadequate nervous system.

Developmental Sentence Types. Normally developing children do not begin syntactic development with complete sentences. There are many intermediate levels between single word responses and complete sentences. The first word combinations may be of the pivot-open class type, where the subject-verb-object sequence is not evident. Children who have no word combinations at all may be encouraged to produce these earliest syntactic structures if the teacher herself will introduce them into her own speech. Noun phrases can be used without other words cluttering up the structure, and simple constructions without subject-verb-object order can be presented as models. As long as the teacher herself knows the normal developmental order of syntax, her own model can contain these immature grammatical building blocks, and the child can be induced to expand his own expressive speech in a normal developmental pattern. The teacher's speech should always be slightly ahead of the child's level so that he has an input model for successive steps at every moment.

Developmental Syntax and Morphology. Once subject-verb-object order has been incorporated into the child's expressive syntactic system, the simple transformational structures can be emphasized as language goals. Negatives, interrogatives, *wh*-questions, and pronouns can all be introduced without expanding sentences beyond the child's auditory memory span. Even a sentence of four words can contain simple transformational features. One measures the effectiveness of the teaching by the degree to which the child incorporates more sophisticated syntax into his own expressive utterances. The teacher listens attentively or analyzes recorded lessons to determine whether the child is beginning to use productively the structures which she has introduced receptively. As the simpler transformations begin to appear in the child's speech, the teacher should begin to emphasize other more difficult structures: verb tenses, simple infinitive forms, conjuctions which require the combinations of two or more kernel sentences, etc. The Developmental Sentence Scoring technique provides a chart which shows the normal progression of syntactic and morphological accomplishment, and with this as a guide, the difficulty of the input model to the child can be increased in a normal developmental pattern.

Articulation. A child should have good command of kernel sentence structure and the simpler transformations before emphasis is laid on his articulation. It would be a mistake to try to correct a faulty /s/ sound in a child who was not yet speaking in sentences. However, articulation can be worked into language training as a secondary consideration or as a means of highlighting the syntactic structures which are being taught. For example, a child who omits /s/ loses a great deal of grammatical structure in English. He omits plurals, possessives, the auxiliaries *is* and *has*, and many other essential uses of /s/. A child who did not pronounce final consonants would not produce many past tenses of verbs and might not even be picking up this feature receptively. Emphasis on correct pronunciation at this point may greatly enhance a child's acquisition of syntax and morphology, even though correct articulation is not the primary goal. Drill work on single error phonemes ought to include grammatical structures, not miscellaneous word lists. The judicious choosing of appropriate drill material is an effective means of teaching articulation and grammatical usage at the same time.

Lesson Planning. Children with language problems need much more therapy time than the usual half-hour twice a week, which is customary in therapy scheduling. Group lessons are effective and the therapist can arrange daily sessions with groups of four or five children without taxing her scheduled time. Lessons should be planned with specific language goals in mind: vocabulary enrichment, sentence structure, individual linguistic features such as past and future tense, plural pronouns, etc. The materials to be used, whether stories, pictures, table-top activities or conversation, are not as important as the teacher's own verbal presentation of an input language model which highlights the language features which she wants to emphasize. It is her manner of talking, her repetitious, highlighted, structured use of a linguistic item, in the context of play and activity, which will provide the structured example from which a child can generalize appropriate linguistic rules. She should intersperse her own speech with questions to the children so that there is constant fluctuation between reception and expression for them, thus providing ample opportunity for them to imitate and incorporate her grammatical structures. In this manner, one duplicates the normal language learning environment as closely as possible. Thus, the speech therapy session can provide a simplified, repetitive, structured language input from which even an impaired nervous system can abstract and generalize grammatical rules.

Laura L. Lee
Northwestern University

DEVELOPMENTAL SENTENCE TYPES

	NOUN PHRASE	DESIGNATIVE	PREDICATIVE
TWO-WORD COMBINATIONS	Article a car, the car Possessive Daddy car, my car Quantifier more car, two car Adjective big car, dirty car	Locator there car, here car Demonstrator + noun this car, that car Identifier it car	Adjective car broken, light off Locator car there, car here Demonstrator + adjective that pretty, that mine
CONSTRUCTIONS	(2-word NP incorporated into constructions) $\begin{matrix}\text{art.}\\\text{poss.}\end{matrix} + \text{(quant)} + \text{(adj)} + \text{N}$ my big car no more car the other big car NP + Prep. phrase (not a predicative by context) the car in front $\text{quant.} + \text{of} + \left\{\begin{matrix}\text{NP}\\\text{N}\\\text{Pro.}\end{matrix}\right.$ one of the cars all of them	DESIGNATIVE CONSTRUCTION $\begin{matrix}\text{locator}\\\text{demonstrator}\\\text{identifier}\end{matrix} + \text{NP}$ there the big car that my car it a car	PREDICATIVE CONSTRUCTION $\text{NP} + \begin{matrix}\text{adjective}\\\text{prep. phrase}\\\text{locator}\\\text{NP}\end{matrix}$ the car broken that car in garage the car there David a good boy that one pretty that car mine
SENTENCES	(All noun phrases incorporated into sentences.)	DESIGNATIVE SENTENCE $\begin{matrix}\text{locator}\\\text{demonstrator}\\\text{identifier}\end{matrix} + \begin{pmatrix}\text{is}\\\text{'s}\end{pmatrix} + \text{NP}$ there's the car this is a big car it is a car it's my car	PREDICATIVE SENTENCE $\text{NP} + \begin{pmatrix}\text{is}\\\text{'s}\end{pmatrix} + \begin{matrix}\text{adjective}\\\text{prep. phrase}\\\text{locator}\\\text{NP}\end{matrix}$ the car is broken that car's in garage my car's there David is a good boy that one is pretty that one is mine

DEVELOPMENTAL SENTENCE TYPES

VERBAL Verb + Noun see car, push it Verb + Particle go up, fall down Noun + Verb I see, Mommy do that pull, boy sleep boy sleeping	FRAGMENTS PHRASE STRUCTURE FRAGMENTS 2-word locator: up here, down there Prep.phrase: to office, for Mommy Adverb: car too, do again, ride now TRANSFORMATIONAL FRAGMENTS Negative: not car, not ride Conjunction: and car, and ride Wh-question: Noun Phrase: what car Designative: what that, who that Predicative: where car Verbal: where go, where put	STEREOTYPES AND VOCABULARY ITEMS don't cry be careful I donno byebye Daddy
VERB PHRASE NP V + (part) + Prep. Ph. loc. put away the car ride in a car put car up there	EXPANDED PHRASE STRUCTURE FRAGMENTS Locator: right up there Prep.phrase: in the car Adverb: the doggie too, there car now see car again, car broken too EXPANDED TRANSFORMATIONAL FRAGMENTS Negative: not the car, not ride car Conjunction: and the car, go and see car and truck Wh-Question: Noun phrase: what big car Designative: what that one who that boy Predicative: where the car who in car, what color car Verbal: where put car	EXPANDED STEREO. go-round-and-round listen to-ticktock reach-the-top Counting in series: 1, 2, 3, 4.... Words in series: dog, cat, horse... eat, play, sleep.. Monday, Friday...
ACTOR-ACTION SENTENCE NP + VP I see a car me ride in car Mommy put car there me take car again the boy riding (you) bring it here (imp.)	(Phrase structure fragments incorporated into sentences) TRANSFORMATIONAL SENTENCES Negative: the car not go Conjunction: Mommy and Daddy come Wh-Question: Designative: what is that one who's that boy Predicative: where is the car who's in the car what color is the car Actor-Action: where car go where he put car who put car	(Stereotyped constructions incorporated into sentences.)

Laura L. Lee
Northwestern University

DEVELOPMENTAL SENTENCE SCORING

INDEFINITE PRONOUNS AND ADJECTIVES	DEFINITE PRONOUNS AND ADJECTIVES	PRIMARY VERBS	SECONDARY VERBS
1. it, this, that	1. I, me my, mine, we, us you, your(s), our(s)	1. verb uninflected, is, 's	1. Infinitival complement (early) wanna see (want to see) gonna see (going to see) gotta see (got to see) like to see
2. no, some, more, all one(s), two (etc.), other(s), another, lot(s)	2. he, him, his she, her, hers	2. is...ing, let's + verb	2. Infinitive of purpose, etc. I stopped to play it's time to play it's easy to do it's for me to play with
3. something, somebody someone	3. they, them, their	3. -s, -ed, irregular past are...(ing) am...(ing) was...(ing) were...(ing)	3. Participle I see a boy running I found the toy broken I heard the bell ring (ing) he started laughing he kept (on) playing
4. nothing, nobody, no one, none	4. those,these	4. will + verb may + verb can + verb obligatory do, emphatic do,	4. Infinitival complement (later) I ought to go I have to go I can make it (to) go I told him to do it wh-words + infinitive I know how to do it I know where to put it
5. any, anything, anybody, anyone every, everything, everybody, everyone	5. myself, himself, herself themselves	5. would ('d), could, should might obligatory does, did emphatic does, did	5. Passive infinitival complement I have to get dressed I want to be pulled
6. both, few, many each, several, none, only else, much	6. who, which, whose, whom, that, howmany, howmuch what	6. have+en, must, shall have ('ve) + got had ('d) +better + verb	6. Gerund Swinging is fun
7. extra, pair, couple, part	7. one, oneself, (his) own whichever	7. Passive, present or past	
		8. have been + verb + ing had been + verb + ing modal + have + verb + en modal + be + verb + ing	

DEVELOPMENTAL SENTENCE SCORING

NEGATIVE

1. not, inserted in a designative or predicative sentence or is + not + verb + ing
2. can't, don't
3. isn't, won't
4. aren't, weren't
   doesn't, didn't
   couldn't, wouldn't
   shouldn't, wasn't
   aux + not + verb
   they're not, he's not
5. haven't
   have + not + verb
   never
6. un...
   dis...

CONJUNCTION

1. and
2. but
3. because
4. so, if
5. or, except, only
6. where, when, while, after before, how, why, till, until, as, like, that
   I think that I have it
   wh-words + infinitive
   I know how to do it
   I know where to find it
7. therefore, however, whenever, wherever, whatever

INTERROGATIVE

1. Reversal of is and subject
   is it red?
2. Reversal of first of two verbs
   is he coming?
3. Obligatory do, does, or did + interrogative
   do they eat?
   does he walk?
   did they go?
4. Reversal of first of three verbs
   has he been going?
   can he have gone?
   will he be coming?

WH QUESTION

1. who, what (+ noun)
2. where, howmany, howmuch what...do, what...for
3. how (+ adjective), when
4. why
5. which (+noun)
6. whatever, however, whenever, whyever, whoever (rare)

Score one additional point if the entire sentence is correct. This accounts (partially, at least) for grammatical features not otherwise scored: plurals, possessives, adverbs, articles, etc.

Sentences which begin with conjunctions may be counted as complete sentences, but the conjunctions are not scored:

(because) I wanted it.
(but) I saw them.

Allow only one and conjunction per sentence when the and connects two independent clauses. Break the sentence up as follows:

1. I came home and my dad was there...
2. (and) he saw my dog and he started laughing.

And used in a series or compound predicate is always counted:

1. My brother and sister came and we went out and played...
2. (and) it began to rain and get cold and we came home and played in the house.

Internal conjunctions, other than and, do not require the sentence to be broken up:

1. He came back and we played but we got tired so we quit...
2. (and) then we had lunch and some kids came over but we didn't like them...
3. (and) we told them to go home so they went

APPENDIX

Program of the San Dimas Workshop

BY INVITATION:

THE LOS ANGELES COUNTY
CASE RECORD PROJECT WORKSHOP

THE SPEECH AND HEARING PROGRAM--
PROBLEMS AND PROMISE

ELISE S. HAHN, PH.D., EDITOR

FOR: SPEECH AND HEARING PERSONNEL WHO PARTICIPATED IN THE FIRST YEAR (1966-1967) OF THE CASE RECORD PROJECT

SPONSORED BY: THE LOS ANGELES COUNTY SUPERINTENDENT OF SCHOOLS OFFICE

FUNDED BY: GRANT 08-070472-1732, UNITED STATES OFFICE OF EDUCATION

PLACE: THE EDUCATIONAL CENTER, CALIFORNIA STATE POLYTECHNIC COLLEGE, SAN DIMAS, CALIFORNIA

DATE: TUESDAY, OCTOBER 22ND, AND WEDNESDAY, OCTOBER 23RD, 1968

PROGRAM PARTICIPANTS

Mrs. Nadine H. Coates, Project Director; Consultant in Education of the Speech and Hearing Handicapped, Los Angeles County Superintendent of Schools Office

Dr. Donald D. Dirks, Project Audiology Consultant; Associate Professor of Surgery, University of California at Los Angeles

Dr. Richard Flower, Project Speech Pathology Consultant; Associate Professor of Speech Pathology and Audiology, University of California, San Francisco Medical Center

Mr. Frederick E. Garbee, Consultant in Education of the Speech and Hearing Handicapped, California State Department of Education

Miss Esther L. Herbert, Principal Investigator; Supervisor of Speech and Hearing, Los Angeles City Unified School District

Dr. Howardine Hoffman, Assistant Superintendent of Instruction, Los Angeles County Superintendent of Schools Office

Mrs. Laura L. Lee, Associate Professor of Speech Pathology, Northwestern University

Dr. Michael Marge, Director of Planning and Evaluation, Bureau of Education for the Handicapped, United States Department of Health, Education, and Welfare

Dr. Max Mueller, Project Consultant and Contract Officer; Acting Chief of Projects and Programs, Division of Research, Bureau of Education of the Handicapped, United States Department of Health, Education, and Welfare

Dr. Maryjane Rees, Project Research Consultant; Professor of Speech and Director of the Speech and Hearing Clinic, Sacramento State College

Dr. Ernest Willenberg, Director of Special Education, Los Angeles City Unified School District

GROUP LEADERS

Mrs. Lois D'Asaro, Speech and Hearing Specialist, Culver City Unified School District

Mrs. Lois K. Frederick, Speech and Hearing Specialist, Los Angeles City Unified School District

Mr. Glenn Smith, Coordinator, Speech and Hearing, Orange County Superintendent of Schools Office

Mr. Edward Stark, Consultant in Education of the Speech and Hearing Handicapped, California State Department of Education

PROGRAM

October 22, 1968

8:30 - 9:00	Registration	
9:00 - 9:30	*Greetings from Washington--Comments about Our Project and Its Relationship to Other Projects in Progress*	--Dr. Mueller
9:30 - 10:30	*New Directions in the Provision of Services to Communicatively Handicapped Children (Focus on Management of Language Problems)*	--Dr. Marge
10:30 - 10:45	Coffee	
10:45 - 11:00	*Background and Orientation to the Project*	--Mrs. Coates
11:00 - 12:00	*Highlights of Data on Pupils in the Caseload*	--Miss Herbert --Dr. Flower
12:00 - 1:15	Lunch	
1:15 - 1:45	*Highlights of Hearing Data*	--Dr. Dirks
1:45 - 2:15	*Highlight of Clinician Agreement-Reliability Studies*	--Dr. Rees
2:15 - 2:30	Coffee (Please take your coffee to your designated group meeting)	
2:30 - 4:30	Group Meetings of Participants--Discussion of Problems Presented by Consultants	
4:30 - 5:30	Free Time	
5:30 - 6:30	Social Hour in Patio	
6:30 - 7:30	Dinner	
7:30 - 8:00	*Relationship of Speech and Hearing Programs to Other Special Education Programs*	--Dr. Willenberg
8:00 - 8:30	*Relationship of Speech and Hearing Programs to Other Educational Services*	--Dr. Hoffman
8:30 - 9:00	*Promise and Problems, California's Program for the Speech and Hearing Handicapped*	--Mr. Garbee

PROGRAM

October 23, 1968

9:00 - 10:15	*Normal Language Development--Deviations in Language Development*	--Mrs. Lee
10:15 - 10:30	Coffee	
10:30 - 12:00	*Assessing Language Skills*	--Mrs. Lee
12:00 - 1:00	Lunch	
1:00 - 3:00	*Incorporating Language Training into Speech Therapy*	--Mrs. Lee
3:00 - 3:15	*Reactions to the Los Angeles County Project and the Workshop*	--Dr. Mueller
3:15 - 3:30	*Summary*	--Mrs. Coates

FINAL REPORT

Project No. 7-0472
Grant No. OEG 0-8-070472-1732

CHARACTERISTICS OF CHILDREN RECEIVING SPEECH AND HEARING SERVICE IN LOS ANGELES AREA SCHOOLS

VOLUME II

Data on 18,925 Pupils Served During 1966-1967
in 39 School Speech and Hearing Programs in Los Angeles County

Nadine H. Coates
Esther L. Herbert
Maryjane Rees, Ph.D.

Los Angeles County Superintendent of Schools Office
155 West Washington Boulevard
Los Angeles, California 90026

April, 1969

U.S. Department of
Health, Education, and Welfare

Office of Education
Bureau of Research

FINAL REPORT

Project No. 7-0472
Grant No. OEG 0-8-070472-1732

CHARACTERISTICS OF CHILDREN RECEIVING SPEECH AND HEARING SERVICE IN LOS ANGELES AREA SCHOOLS

VOLUME II

Data on 18,925 Pupils Served During 1966-1967
in 39 School Speech and Hearing Programs in Los Angeles County

Nadine H. Coates
Esther L. Herbert
Maryjane Rees, Ph.D.

Los Angeles County Superintendent of Schools Office
155 West Washington Boulevard
Los Angeles, California 90026

April, 1969

U.S. Department of
Health, Education, and Welfare

Office of Education
Bureau of Research

CONTENTS

2/

INTRODUCTION

The first purpose of this project was to describe the pupils in school speech and hearing caseloads in detail using a newly developed case record. Further, the strengths and weaknesses of the case record were to be evaluated, and areas in which clinicians have difficulty in obtaining information about pupils were to be identified. The second purpose was to initiate some studies of clinician agreement and reliability in assessing oral communication skills. In addition, a workshop for reviewing the results of the project and formulating future goals was planned for the participants.

The three aspects of the project produced different kinds of information; in view of this fact, the project is reported in three parts. Part I contains the results of a workshop for districts that participated in the project. It includes a review of results of the project, discussion of implications of the data for school speech and hearing programs, and identification of areas needing further development and study.

Part II contains detailed descriptions of pupils in the complete caseloads of 212 school clinicians. The clinician population and, therefore, the pupil population were drawn from two samples--the Los Angeles City Unified School District and 38 school districts in Los Angeles County. Thus, the combined samples included districts varying greatly in size and representing many different educational policies and practices. The pupil population came from a broad spectrum of socioeconomic, cultural, and ethnic backgrounds. Data from these two samples should provide a reasonably definitive statement about pupils typically receiving service in school speech and hearing programs. The data from this part of the study are displayed in a series of 228 tables.

Part III contains the results of three studies of clinician agreement and reliability. These studies represent a first step toward identifying critical areas of disagreement in assessing oral communication skills.

CHAPTER I

THE PROBLEM

The purpose of this project was to describe the characteristics of pupils receiving service in school speech and hearing programs using samples selected in such a way that the results would constitute a reasonably definitive statement about pupils typically enrolled in these programs. This project was the outgrowth of a study resulting in the development of a standard case record that makes large-scale data collection and retrieval possible. Because the case record being used was newly developed, two additional purposes, subsidiary to the major purpose, were incorporated into the project. These were to (a) evaluate the strengths and weaknesses of the case record, and (b) identify areas in which school clinicians have difficulty in obtaining information about pupils.

This kind of population description is important for several reasons. A detailed knowledge of the characteristics of the pupils now receiving service necessarily precedes any meaningful discussion of possible discrepancies between current caseloads and theoretic versions of what they ought to be. Similarly, evaluation of current programs and identification of areas in need of strengthening depends on a knowledge of the pupils for whom service is provided, since service is expected to meet the needs of those being served.

Descriptive information collected from a significant segment of pupils in current caseloads would provide a referent for comparing caseloads in schools throughout the nation. These comparisons would, in turn, make it possible to determine whether school speech and hearing programs are similar or vary with local, state, or regional conditions. Finally, when national prevalence figures become available, it will be possible to describe the extent to which caseloads, such as those represented by these data, conform to the expected distribution of speech- and hearing-handicapped children in the population.

Considering the length of time school speech and hearing programs have been in existence, it is surprising that detailed descriptions of typical caseloads are not available. A great mass of data about pupils in school caseloads has already been collected; unfortunately, the data are not retrievable, at least not on a significant scale. The amount and kind of information gathered, specific items of information, descriptive nomenclature, and the format employed for organizing and presenting information vary markedly from district to district and, sometimes, from clinician to clinician within a given district. Thus, caseload descriptions collected at the district level are not comparable from district to district. Further, the information frequently lacks the details necessary for a comprehensive description of the program.

While it may seem that school clinicians have only to follow some established policy about case selection and that caseload composition could be inferred from that policy, such is not the case in actual practice. Two kinds of conditions or influences function in the school setting in ways that significantly affect the implementation of stated policies. The first condition has to do with the large subjective element in assessing oral communication skills and estimating the extent to which inadequacies in these skills pose or will eventually pose obstacles to specific individuals. The second condition is concerned with factors that influence case selection, but are independent of the assessment of the individual's inadequacies in communicating orally.

The subjective element in assessing oral communication skills can be illustrated in many ways. We do not yet have a taxonomy of effective oral communicative behavior. That is, the behaviors constituting effective oral communication and the relative contributions of the behaviors to over-all effectiveness have not yet been determined and itemized. Consequently, terminal behavior, as it would be established for any program of behavior modification, remains in the province of each clinician's opinion about that which constitutes effective oral communication. It follows that the extent to which particular pupils are said to be deficient is equally subjective, since deficiency represents the discrepancy between the target behavior and present behavior. For want of a means of relating specific skills to a larger context, assessment must continue to be based primarily on isolated aspects of speech behavior. The individual clinician must estimate the effect of each of these aspects on over-all communicative effectiveness.

Objective measures for many aspects of oral communicative behavior have yet to be devised. Multiple-observer agreement can be used to establish a degree of objectivity based on a measure of central tendency; nonetheless, going through the process of arriving at multiple-observer agreement does not eliminate the original problem of variability, since it has little effect on the judgment of individual clinicians. Furthermore, the process requires large-scale duplication of clinicians' time. For this reason, it is simply not feasible in school programs, or most other service programs for that matter.

For the most part, independent measures for validating clinician judgment do not exist. When they do, as in the case of spectrographic analysis in hoarseness, these measures are rarely available on a routine basis to school clinicians. Assessment depends primarily, then, on the judgment of individual clinicians, and clinicians differ widely in listening and observing skills due to both innate ability and training. The particular interests, background, experience, and biases of each clinician serve to compound these differences. Clinicians not only disagree about the presence or absence of deviations in articulation and fluency, for example, they disagree, also, about the significance of the deviations even when they may agree that deviations are present. Disagreement is particularly noticeable when age of the subject is presumed to be a factor.

The highly subjective nature of estimating which children are most severely handicapped further compounds the subjective element in case selection. Many factors are related to the extent to which a given condition poses or will pose obstacles to an individual. The limitations of a speech disorder cannot be estimated by a comparison of premorbid and postmorbid functioning, as in cases of traumatic aphasia, since pre- and post-conditions rarely obtain for school-age children with speech and hearing handicaps. Potential limitations depend largely on the vocational and social milieu in which the pupil will function as an adult, as some deviations pose obstacles in some environments but not in others. Nonetheless, future vocational and social choices cannot be determined in advance. Furthermore, some deviations may serve to determine or restrict the choices available. The individual's capacity to compensate for a condition in other ways is also relevant. The critical question is whether pupils who have the potential for learning effective oral communication skills are more handicapped without service than pupils with more gross deviations who may have a potential for some improvement, but for whom achievement of normal skills is unlikely or impossible because of other conditions. Few school programs are sufficiently staffed to provide service for all pupils with inadequacies; therefore, selection usually depends largely on subjective decisions about degree of handicap, since it is expected that need is of primary importance.

A second set of conditions affecting case selection includes considerations that are not directly related to oral communication skills per se. Some extraneous determinants obtain in most settings providing speech and hearing service. In any setting where speech and hearing service is not restricted to some specific condition, the greater concern of parents for the oral communication skills of younger children is attested to by the average age of the children for whom service is sought. In the school setting, the same attitude on the part of the parents is also evident, but is compounded by attitudes of teachers, and, in time, of the pupils themselves. As age of the pupils increases, classroom activities become less flexible, and greater emphasis is placed on subject matter. As a general rule, the interest of teachers shifts somewhat from the pupils' total behavior to pupils' proficiency in specific subject matter areas. Again, generally speaking, as age increases, pupils' adaptability to activities or schedules that deviate from regular routine decreases. These conditions tend to influence case selection in the direction of preference for younger children. The preference is practical.

In any setting, case selection undoubtedly reflects individual clinician's areas of competency and personal preference for types of cases. In most schools, clinicians do not have available to them the resource of a team of professionals for review of cases, whereas in most other settings, admission for service is based on the decision of a team that usually includes personnel from other professions. Thus, individual biases and preferences of the clinician influence case selection to a greater degree in schools than in most other settings, except for private practice.

There are still other determinants that are indigenous to the school setting. Case identification is usually accomplished through a combination of screening in some grades and teacher-referral in others. Whether some pupils are even examined depends entirely on the teacher's judgment.

Availability of physical facilities coupled with a schedule encompassing several schools as well as flexibility of the pupil's schedule as determined by the teacher sometimes determine whether particular pupils can be scheduled. The clinician must consider, also, his total caseload; thus, case selection is partially dependent upon the amount of service available. Typically, school speech and hearing programs are staffed to provide a predetermined amount of service. In contrast, classroom instruction is expanded as needed so that service is provided for all children enrolled. Opportunities for receiving service fluctuate yearly with the saturation of speech- and hearing-handicapped pupils in individual schools, so that even were standard, objective criteria available for determining need, uniformity of service for a specified segment of the speech- and hearing-handicapped population would still not obtain, at least not under present conditions in most school districts.

Considering the multiplicity of factors that influence case selection, many of which are highly subjective, the nature of the populations that constitute caseloads in school speech and hearing programs is an especially cogent question. The answer to this question cannot be inferred from policy; it must be determined empirically.

CHAPTER II

METHOD

The Sample

The sample was drawn from school districts in Los Angeles County. Los Angeles County contains over 1,500,000 children between the ages of five and 18 years. Its total population is greater than the population of any one of 42 states in the nation. A nearly complete gamut of socioeconomic, cultural, and ethnic groups is represented in this population. Population density varies from the huge metropolis of Los Angeles City to isolated rural areas.

The Los Angeles City Unified School District and 38 Los Angeles County school districts were included in the project. Participation was based on adoption of the new standard case record. Since clinicians in the Los Angeles City Schools were already using a uniform case record, the new one was merely substituted for the older one. Each of the county districts is a separate administrative unit, so the decision to use the case record depended on the staff of clinicians within each district. Only those districts in which the clinicians unanimously agreed to use the record participated in the study.

The Los Angeles City Unified School District includes both elementary and secondary schools. Of the county districts, 16 were elementary districts, and 22 were combined elementary and secondary districts.

The combined enrollment of these districts at the time the data were collected was 1,067,886 pupils. Of these pupils, 642,875 were enrolled in the Los Angeles City Schools and 425,011 were enrolled in the 38 participating Los Angeles County school districts. Enrollment in the county districts ranged from 2,892 in the Wiseburn School District, which was the smallest of the participating districts, to 33,443 in the Norwalk-La Mirada Unified School district, the largest of this group of districts.

The sample included a total of 212 clinicians--102 in the Los Angeles City Schools and 110 in the 38 county school districts. One district employed nine clinicians, two employed seven, two others had five and six clinicians each. Twenty-three districts employed either two, three, or four clinicians, while just one clinician was employed in each of the 10 remaining districts.

The ratio of clinicians to enrollment was 1:5037 for the entire sample; 1:6302 in the city schools and 1:3864 in the county schools. The range in clinician-to-enrollment ratios was from 1:1401 to 1:12,855 in the county districts.

Of the 18,985 pupils who received speech and hearing service during the 1966-67 school year, 10,874 were in the Los Angeles City Schools, while 8,111 were in the 38 county school districts. These figures represent the number of pupils in caseloads throughout the year, rather than the number of children in caseloads at any one time.

The percentage of pupils in the schools receiving speech and hearing service was 1.78% for the entire sample; 1.69% for the city schools and 1.91% for the county schools. The range for the county schools was from 0.61% to 4.98%.

Data for the Los Angeles City Unified School District and for the combined county schools are shown in Table II.1. Data for each of the county districts are shown in Table II.2.

Caseload Sample

The pupils included in the sample represent the total caseloads of all clinicians during the 1966-67 school year in each of the 39 participating school districts. Thus, for each district, the data represent the complete array of problems presented during this particular school year.

Case-Selection Practices

Only the most general description of case-selection policies and practices in these schools can be given. There are no specific, written guidelines for case selection in any of the school districts in Los Angeles County. However, in various discussions held by clinicians from 1964 to 1966, there was some consensus about various practices. It was suggested that a combination of survey and referral methods be used for case identification, and that predictive tests, such as stimulability and consistency, be used, particularly for assessing younger pupils. It was further recommended that other factors such as severity of disorder, discrepancy between speech-language ability and other abilities, pupil motivation, emotional problems, and so forth be considered in establishing priorities for case selection.

Regulations Affecting Caseloads

Certain regulations applicable throughout California Schools affect caseloads. The maximum caseload is set at 90 by the California State Department of Education. If pupils are seen more frequently than once-a-week, the caseload is expected to be reduced proportionately. Reimbursement for speech and hearing service is restricted to clinical service as opposed to speech improvement lessons conducted in classrooms.

As a general rule, relatively few of the pupils enrolled in special classes such as those for the aurally handicapped, aphasic, deaf and hard-of-hearing, retarded, and so forth are included in the caseloads of school clinicians. One of the reasons is that the classes are taught

TABLE II.1

Total enrollment, number of children receiving speech and hearing services, number of clinicians, ratio of children receiving services to enrollment, and ratio of clinicians to enrollment in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Enrollment and Amount of Service	L.A. City	L.A. County	Combined
Total Enrollment	642,875	425,011	1,067,886
Number Receiving Speech and Hearing Services	10,874	8,111	18,985
Number of Clinicians	102	110	212
Percentage of Enrollment Receiving Service	1.69	1.91	1.78
Ratio of Clinicians to Enrollment	1:6302	1:3864	1:5037

TABLE II.2

Total enrollment, number of children receiving speech and hearing services, number of clinicians, ratio of children receiving services to enrollment, and ratio of clinicians to enrollment in 38 Los Angeles County school districts.

School District	Total Enrollment	Number Receiving Therapy	Number of Clinicians	Percentage of Enrollment Receiving Therapy	Clinicians to Enrollment Ratio
ABC Unified	14295	312	4	2.18	1:3574
Alhambra City	17075	259	4	1.52	1:4269
Arcadia Unified	9990	185	2	1.85	1:4995
Azusa Unified	12855	94	1	0.73	1:12855
Bassett Unified	8054	207	3	2.57	1:2685
Charter Oak Unified	8640	61	2	0.71	1:4320
Compton City	17087	358	4	2.10	1:4272
Covina Valley Unified	18168	206	3	1.13	1:6056
Culver City Unified	7285	132	2	1.81	1:3643
Downey Unified	19920	121	2	0.61	1:9960
East Whittier	12546	263	7	2.10	1:1792
El Rancho Unified	14350	203	5	1.41	1:2870
El Segundo Unified	3266	79	1	2.42	1:3266
Garvey	6111	98	1	1.60	1:6111
Glendale Unified	24451	307	3	1.26	1:8150
Inglewood Unified	13257	325	4	2.45	1:3314
La Canada Unified	5033	89	1	1.77	1:5033
Lancaster	7107	336	4	4.73	1:1777
Lawndale	6910	210	3	2.91	1:2303
Los Nietos	3079	111	1	3.61	1:3079
Lowell Joint	6679	79	2	1.18	1:3336
Lynwood Unified	6574	121	1	1.84	1:6574

TABLE II.2 (continued)

School District	Total Enrollment	Number Receiving Therapy	Number of Clinicians	Percentage of Enrollment Receiving Therapy	Clinicians to Enrollment Ratio
Manhattan Beach	5107	153	2	3.00	1:2554
Monrovia Unified	7756	86	1	1.11	1:7756
Mountain View	5648	113	2	2.00	1:2824
Norwalk-La Mirada Unified	33443	591	7	1.77	1:4778
Palmdale	4203	209	3	4.98	1:1401
Paramount Unified	7990	99	1	1.24	1:7990
Pasadena Unified	31932	618	9	1.94	1:3548
Pomona Unified	21232	508	6	2.39	1:3539
Redondo Beach	9891	227	3	2.30	1:3297
Rowland	11941	420	4	3.52	1:2985
San Gabriel	3803	100	2	2.63	1:1902
Santa Monica Unified	12634	219	3	1.73	1:4211
South Pasadena Unified	3608	58	1	1.61	1:3608
West Covina Unified	14010	280	3	2.00	1:4670
Whittier City	6189	182	2	2.94	1:3063
Wiseburn	2892	92	1	3.18	1:2892
TOTAL	425011	8111	110	1.91	1:3864

by teachers specially trained to educate pupils with particular handicapping conditions. Furthermore, the classes are small. It is assumed that much of the assistance in speech and language development these pupils need can be given by the classroom teacher. The speech and hearing clinician usually serves as a resource person to assist the teacher in diagnosing and planning as special problems arise. Another reason lies in the financial structure underlying special education in California. These classes are financed through excess-cost reimbursement from state rather than local school funds. Excess-cost reimbursement is limited to one type of service per pupil. For example, a district could be reimbursed for providing special-class placement for a retarded pupil, or for providing speech and hearing service for him, but not both. There is a tendency, then, to avoid duplicating specialized service, partly because of the assumption that special-class placement provides all of the services the pupil needs and partly because of regulations about support for special programs.

Another condition that may qualify this sample is the presence of a number of speech and hearing clinics in colleges and universities, national and community agencies, and hospitals as well as private practice. In addition, two state schools are located in this area: the California School for the Deaf at Riverside and the Southern California Diagnostic School for Neurologically Handicapped Children.

The impact of other resources on school caseloads is unknown. Certainly, more service outside of schools is available in the Los Angeles area than in other areas of the state; thus, the sample from the county districts may be less representative of smaller schools than it might have been otherwise.

The Case Record

A copy of the case record used for collecting information about pupils in caseloads is shown in Appendix A. It was developed over a period of several years beginning in 1964. At that time, a group of clinicians and supervisors began a series of meetings for the purpose of developing a standard case record as a means of facilitating efficient transfer of information among clinicians. The standard case record, as it was finally developed, represents the consensus of a large number of experienced school clinicians and supervisors about information that should be available for each pupil in caseloads. As such, it represents numerous compromises and probably deviates from any given clinician's ideal version of a case record. It is intended as a supplement to rather than a replacement for more complete records in other forms.

Numerous drafts of case records were developed, then reviewed and discussed by groups of clinicians throughout the Los Angeles area. Personnel in college and university training programs, clinicians working in agency and hospital clinics and in private practice, and school clinicians in other parts of the state also evaluated various drafts. Finally, one draft was field-tested by 20 clinicians. The form of the case record used for this study incorporated the revisions based on the field test. This case record is even now undergoing revision; it is expected that revisions will continue over a period of several years.

In addition to the usual identification by name, age, sex, address, school, and clinician reporting, the case record includes information related to school and family background, general health, and hearing. In includes results of assessment of spontaneous speech, communicative responsiveness, physical behaviors associated with or related to oral communication, and status of the speech mechanism. The communication disorders are summarized in terms of the expressive disorder, either single or multiple, along with a severity rating. A form for recording articulation test results is located on the back cover of the case record for easy reference. The articulation record is designed to show results of a complete phonetic inventory of sounds as singles as well as 28 blends, including those found in the Templin-Darley 50-Item Screening Test of Articulation. The form is arranged in the following sections:

Part A. Identification

1. Type of Class
2. Grade Level
3. History of Speech and Hearing Therapy
4. Test Results (Achievement and Intelligence)
5. Case Identification

Part B. Family Information

1. Parents in the Home
2. Siblings and Others in the Home
3. Languages Spoken in the Home
4. Speech Problems in the Family

Part C. General Health History

1. Health History
2. Physicians' or Dentists' Diagnoses
3. Medical, Dental, or Other Treatment

Part D. Hearing Information

1. Hearing Status
2. Test Results
3. Amplification Used

Part E. Spontaneous Speech

1. Articulation
2. Dialect
3. Intelligibility
4. Fluency
5. Voice Quality
6. Pitch
7. Loudness
8. Rate
9. Language

Part F. Communicative Responsiveness

1. Responsiveness
2. Eye Contact

Part G. Observed Physical Behaviors

1. Drooling
2. Undesirable Oral Habits
3. Facial Grimaces and Tics
4. Gross Bodily Movements and Mannerisms
5. Hand Usage
6. Foot Usage
7. Eye Usage

Part H. Speech Mechanism

1. Lips
2. Teeth
3. Tongue
4. Hard Palate
5. Soft Palate
6. Nasal Cavities
7. Breathing Mechanism

Part I. Expressive Speech or Language Disorder

1. Single Disorder Only
2. Multiple Expressive Disorders

Part J. Articulation Record

Codes for key-punching were not printed on the form as they gave the record a cluttered appearance. Representing the radical departure from long-established recordkeeping and reporting practices as it did, the record appeared so formidable that adding extraneous matter, such as codes, seemed inadvisable. As the use of the case record becomes established, a retrieval code that can be read directly by the computer will be printed on the form.

The typical initial reaction to the case record has been dismay at its length and apparent complexity. Its basic simplicity and the ease with which it can be completed are evident only after it has been carefully examined. Not only have the original group of school districts continued to use the case record, 22 additional Los Angeles County school districts have adopted it. A revision of the case record with a retrieval code will be field tested during the next school year.

Some features of the record warrant special attention. The classification of speech disorders is based solely on the expressive disorder, thereby precluding inferences based on concomitant conditions that may or may not be causally related to the deviation in communication. For example, a pupil with a cleft palate must be classified according to the speech behavior in need of modification, such as articulation and voice quality, rather than classified as having "cleft palate speech."

The form calls for a color code. Entries made during the first year are to be made with black ink; those for the second year, with red; and those for the third year, with green. Multiple entries made during a single year, and, thus, in the same color, are dated. The color code enables the clinician to see at a glance such changes in status as may have occurred from year to year or within a given year. At the time the record was developed, the color code seemed highly desirable; in practice, however, it has not been popular and will probably be deleted from subsequent records.

The form requires a minimum of writing. Most entries are made by circling or checking the items listed within information categories. While the listing of items requires more space than a series of blanks to be filled in, the lists are necessary to insure uniform nomenclature for data retrieval.

The case record as it now stands has some shortcomings. The sections on language and dialect will undergo extensive revision. Terms describing malocclusion need to be changed. Some aspects of the health history proved not to be particularly useful and need to be revised. In the case of multiple disorders, criteria for determining primary and secondary disorders need to be clarified, as do the severity ratings. Space for recording results of tests such as stimulability and speech-sound discrimination needs to be considered.*

A booklet of instructions for completing the record was prepared. It is included here as Appendix B. A 16 mm film (kinescope) was produced. It illustrates the way in which sections D through I of the case record should be filled out and suggests some examination procedures. The film is available through the Los Angeles County Superintendent of Schools Office.

---

*See Chapter III, Section H, *Some Aspects of the Case Record*, Page 375.

Training in the Use of the Case Record

Instruction booklets were furnished to each participating clinician along with a supply of record forms. At the beginning of the school year, the investigators met with the clinicians in relatively small groups to explain the purpose of the study and to discuss how the forms were to be filled out. The film was shown at the same time, and questions about the case record were answered. Responsibility for the meetings was divided so that the investigator who is supervisor of speech and hearing for the Los Angeles City Schools met with the city school clinicians, and the investigator who is consultant in speech and hearing education for the Los Angeles County Superintendent of Schools Office met with the county clinicians. Both were available at any time subsequently to answer questions and resolve problems as they arose.

Data Processing

The records were sent to a data-collection center in the County Office at the close of the school year. The information was coded during the summer, and the records were returned before school resumed in the fall. It was necessary to transfer the information to code sheets before the data could be key-punched, since the record form itself does not contain key-punch codes for reasons explained previously. The need to handle the data in this way undoubtedly introduced some errors, even though random samples of each coder's daily output were checked for accuracy. Both of these steps added materially to the cost of data retrieval.

Quality Control of the Records

The original plan for the project called for data coding during the course of the school year on a schedule such that records would remain at the data-collection center for no more than a week. Staff time within the districts was not available for reviewing the records before they were forwarded to the data-collection center in the County Office, as this type of reviewing function is not generally provided for in school speech and hearing programs. The circumstances that dictated data coding during the summer, rather than during the school year, were entirely beyond the control of the investigators. Consequently, the data-collection center could not exercise quality control, as the clinicians were no longer available, and incomplete records or those with ambiguous markings could not be returned for clarification or completion. Follow-up during the subsequent school year was impossible due to personnel changes and reassignments.

As it turned out, the number of incomplete records was higher than anticipated. As a consequence, the number of pupils reported in some of the tables does not always reflect the total population. These discrepancies stem from a number of causes.

In the first place, the standard case record itself was an unfamiliar instrument, and the clinicians were in the process of learning to use it. Furthermore, clinicians are not accustomed to the need for rigid adherence to machine language. Though the record is self-explanatory and was accompanied by printed instructions, and though training sessions were conducted for all participants and the principal investigators were always available for resolving problems and answering questions, some parts of the record were misunderstood. Some records were marked in ways that resulted in ambiguities making coding impossible. In some instances, oversight accounts for incomplete data. In other instances, certain kinds of information were not readily available. For various reasons, only voluntary adoption of the record in the county school districts was admissable. Voluntary use implies freedom of choice, which prerogative was sometimes exercised by disregarding some sections of the record, presumably because the information was considered to be unimportant, or the classification system or the nomenclature used were rejected. In short, the records were completed by clinicians whose primary interest was in clinical application rather than by a team of investigators specifically employed and trained to collect information for research purposes. The latter approach obviously could not be used, since the purpose was to find out how school clinicians themselves describe their caseloads.

Speech and Language Evaluation

Much of the descriptive data is based on the subjective judgment of individual clinicians, which is necessarily the case, since objective measures of most aspects of oral communication skill are simply nonexistent. Adequate training devices for developing uniformity of clinician-judgment have yet to be devised. In this respect, the data may be said to have been collected with uncalibrated measuring instruments. Thus, the caseload descriptions contained herein are caseloads as school clinicians describe them, using whatever criteria they commonly use in the decision-making and classifying process.

The justification for collecting data under these circumstances is that the data do have a face validity when collected from large samples of clinicians, since clinicians whose judgments differ radically from the majority have relatively little effect on the composite data. Secondly, there is no other practical way in which to proceed at the present time.

Socioeconomic Status

Socioeconomic status as used in this investigation was based on annual family income. The census tract in which each pupil lived was determined by entering the *Census Tract Street Index of Los Angeles County* (3) and reading out the census tract number. The average family

3

income for that tract was ascertained by entering the *U.S. Censuses of Population and Housing: 1960, Census Tracts, Los Angeles-Long Beach* (14). The socioeconomic status of some pupils could not be determined in this way, since the census does not show income for tracts with fewer than 200 dwellers.

CHAPTER III

RESULTS

These data describe the characteristics of pupils receiving service in school speech and hearing programs. The pupils represent the total caseload of each of the 39 participating school districts during the 1966-67 school year.

Data from the Los Angeles City Unified School District are, perhaps, typical of caseloads of schools in other large metropolitan communities; those from the 38 county districts should be more typical of caseloads of schools in smaller communities. The Los Angeles City Unified School District is one of the largest in the nation. Though the pupil population is as diverse as could be found anywhere, the speech and hearing program is based on a single set of educational and administrative policies. In contrast, the county districts are variable in size, pupil composition, educational policy, and administrative practice. The fact that the 38 county districts were all located in one county does not mean uniformity of policy or practice, as the Los Angeles County Superintendent of Schools Office does not have administrative responsibility for the districts, but functions in a consultative and coordinating capacity. Thus, the speech and hearing programs in these districts represent a cross section of the numerous factors that influence the ways in which programs are conducted, and, therefore, caseload composition.

Certain regulations applicable in schools throughout California qualify the extent to which these figures may be representative of pupil populations in caseloads elsewhere. Briefly, these regulations set the maximum caseload for a clinician at any one time at 90. Relatively few children enrolled in special classes are included in caseloads for reasons explained on page

The results are presented in a series of tables, which are grouped in two sections. The tables in Section A show the distribution of pupils on the major variables included in the study except for those tables pertaining to articulation disorders and they are shown in Section C. The distribution of pupils in the caseloads of the Los Angeles City Unified School District are shown separately from the distribution for the combined caseloads of the 38 Los Angeles County school districts. These distributions have been combined in order to show results for the entire sample. Though distributions for each of the 38 county districts are available, they have not been included here for two reasons. The sheer volume of 38 additional tables for each variable makes reporting them impractical in terms of both space and publication cost. In addition, district size, the number of clinicians employed, and, consequently, the number of pupils included in district caseloads are so dissimilar that comparison of percentages would be meaningless in most instances.

The tables in Sections B, D, E, F, and G show the distribution of pupils for combinations of selected variables. Distributions of pupils in caseloads of the Los Angeles City Schools and those in the combined caseloads of the 38 county school districts are shown in separate tables. In each case, the city data precede the county data for ease in making comparisons. Distributions for the combined samples are not included, since to do so would increase the volume of tables by one-third.

Section C consists of tables showing both the major variables and combinations of selected variables.

The combinations of variables included are highly selective, as the total possible combinations reach staggering proportions. The investigators have selected those combinations that seem to them to have greatest interest or significance for school programs.

Two aspects of the tables require explanation. While the total pupil population in the caseloads was 18,985 (10,874 in the Los Angeles City Schools and 8,111 in the 38 county school districts), the totals in the tables do not always reflect these numbers. Discrepancies have several causes, which are explained in Chapter II on page 20.

Some of the tables contain percentages in parentheses. These percentages represent figures for subdivisions of major categories. They are based on the N for the major category of which they are subdivisions and will add to 100%. Thus, some tables may contain two or more sets of percentages adding to 100%. In all cases, percentages have been rounded to equal 100%.

SECTION A

DISCUSSION

Expressive Speech Disorders

The percentage of pupils in the entire sample with single expressive disorders only was 83.9%, while 16.1% had multiple disorders. Within the group having multiple disorders, 87.8% had two disorders only, and 12.2% had three or more disorders. The percentage of multiple disorders was slightly higher in the city schools (16.7%) than in the county schools (15.3%).

Single disorders were combined with the primary disorder in cases of multiple disorders to show distribution by type of expressive speech disorder, which was as follows: little or no speech, 1.8%; language disorders, 2.4%; articulation disorders, 83.3%; stuttering, 10.4%; and voice disorders, 2.1%. The city and county samples differed primarily in the percentages of pupils with articulation and stuttering disorders. In the city schools, 79.9% of the pupils had articulation disorders compared with 87.9% in the county schools. Stuttering accounted for 14.0% of the caseload in the city schools and 5.5% in the county schools. These differences may represent differences in case selection, as there is little reason to suppose prevalence of these disorders varied appreciably in the populations from which the caseloads were obtained.

Percentages of pupils with little or no speech, language, and voice disorders were strikingly similar for the two samples, differing by only 0.5 percentage points in each category. The similarity in percentages of children said to have little or no speech tends to indicate that this category is a meaningful one. A different result would have indicated that this category, which is not generally found in the literature, was nebulous, and that its usefulness was questionable.

Bingham and others (2, pp. 37-38) reported the distribution of speech disorders in school caseloads based on questionnaire responses of 1,462 clinicians. The classification system differed from the one used in the present study, which limited categories to a description of the speech disorder itself. Some of the Bingham categories were based on concomitant conditions, such as hearing loss, cleft palate, cerebral palsy, and so forth.

In the Bingham sample, articulation disorders accounted for 81% of the caseloads reported. Stuttering and voice disorders accounted for 6.5% and 2.3% respectively. The remaining 10.2% of the problems were distributed over other categories.

Comparison of the percentage of articulation disorders in the Bingham sample and the present sample is misleading, since 10.2% of the pupils in the Bingham sample were included in categories in which articulation or voice disorders are likely to be present. While the city schools' figure of 79.9% articulation problems appears comparable to the 81% reported by Bingham, the similarity is superficial. The latter figure is depressed, as it excludes pupils with hearing loss, cleft palate, cerebral palsy, mental retardation, and other conditions resulting in or associated with articulation disorders. Similarly, the county schools' figure of 87.9% appears to be higher than the percentage in the Bingham sample. In this case, the percentages of articulation problems in the two samples were probably about equal, considering the number of pupils in Bingham's other categories who would be classified as having articulation problems had the categories been restricted to speech disorders per se.

The percentage of pupils with stuttering problems was higher in the present sample than in the Bingham sample--10.4% vs. 6.5% respectively. In the city schools, the percentage was considerably higher, being 14.0%, but was slightly lower in the county schools (5.5%).

The percentages of voice disorders were quite close: 2.1% for the combined sample, 1.9% for the city schools, 2.4% for the county schools, and 2.3% for the Bingham sample. Nonetheless, the present sample probably had a smaller percentage of voice disorders, since voice problems would be present in some of Bingham's other categories.

Single Disorders Only

A large majority (84%) of the pupils in both the city and county schools were classified as having one disorder only. The percentages of pupils having each type of single disorder for the entire sample were as follows: little or no speech, 0.8%; language disorders, C.9%; articulation disorders, 88.9%; stuttering, 8.4%; voice disorders, 1.0%.

The distributions were essentially the same for both the city and county samples, except for articulation and stuttering disorders. The city schools had a lower percentage of articulation disorders and a higher percentage of stuttering disorders than the county schools as seen by 85.5% vs. 93.5%, respectively, for articulation disorders and 11.6% vs. 3.9% for stuttering.

Multiple Expressive Disorders

Approximately 16% of the pupils in both city and county schools had multiple expressive disorders. Articulation disorders occurred in 96.1% of the cases with multiple speech disorders. Stuttering was present in 36.6% of the cases, followed by voice disorders in 38.7%, language disorders in 24.4%, with little or no speech present in 11.6% of the cases. These figures disregard ratings of primary, secondary, or tertiary; thus, most pupils were represented at least twice, while a few were represented three times.

A few differences between the caseloads in the city and county schools were found. In the city schools, articulation disorders ranked first among the multiple disorders; stuttering ranked second; voice disorders were third; language disorders were next, followed by little or no speech. For the county schools, articulation disorders also ranked first, but voice disorders ranked second. Stuttering and language disorders appeared with about equal frequency and tied for the next rank. Little or no speech ranked lowest.

The actual number of cases in which voice and language disorders and little or no speech appeared was much higher among pupils with multiple disorders than among those with single disorders. For the entire sample, there were 1,135 cases of voice disorders combined with other disorders as opposed to only 163 cases of voice disorders as a single disorder. Similarly, there were 716 cases in which language disorders were present as one of the multiple disorders compared with 139 cases in which language disorders appeared as a single disorder. For little or no speech, the figures were 339 compared with 117.

One of the more striking results was the percentage of cases in which voice disorders were rated as the secondary problem. They were regarded as secondary disorders in 68.2% of the cases in which they appeared, but were regarded as primary problems in only 20.0% of these cases. There was a tendency to regard language disorders as secondary problems, though not to the same extent as for voice disorders. Language disorders were rated secondary in 48.6% of the cases in which they appeared, and as primary in 42.6% of the cases.

In contrast, little or no speech was rated as the primary problem in 60.2% of the cases. Articulation disorders and stuttering were usually rated as primary problems when they occurred with other disorders, the figures for these disorders being 56.2% and 57.1%, respectively.

These indicate, then, that voice disorders, language disorders, and little or no speech occur more often with other disorders than as single disorders. Voice disorders are commonly regarded as the secondary rather than the primary problem. They indicate, also, that in nine out of ten cases in which multiple disorders are present, one of the disorders will be articulation.

Characteristics Observed in Spontaneous Speech

Of the pupils making articulation errors in spontaneous speech, 90.2% made consonant errors, while 15.7% made vowel errors. The city and county samples differed in that 87.2% of the pupils in the city as opposed to 94.2% in the county made consonant errors. The percentages of pupils making vowel errors were similar in both samples.

Figures for consistency of errors were essentially the same for the city and county caseloads. Over-all, 76.4% of the pupils made errors consistently: 76.7% in the city schools and 75.8% in the county schools. Apparently, similar criteria were used for making this rather difficult judgment about spontaneous speech.

Only 10.8% of the pupils in the caseloads used other than General American dialect. Percentages for the city and county schools were 12.7% and 8.1%, respectively. There was, however, a marked difference as far as regional and foreign dialects were concerned. More regional dialects were included in the caseload in the city schools than in the county schools: 41.1% as opposed to 29.7%. The converse was true for foreign dialects: 55.2% in the city and 64.6% in the county. (In some instances records were marked without indicating whether the dialect was regional or foreign.) Whether the above differences represent population differences or reflect other kinds of factors operating in case selection cannot be readily ascertained.

Intelligibility was adequate for the most part: 79.5% of the pupils in the combined sample were rated intelligible; 17.8% were rated partly intelligible; and 2.7% were rated unintelligible.

Fluency deviations were observed in 14.5% of the sample. The caseloads in the city schools contained more pupils with fluency difficulties than the county schools, as shown by 18.1% and 9.5%, respectively. Pupils with fluency deviations were not necessarily regarded as stutterers.

Approximately 15% of the pupils in both samples were said to have voice quality deviations. Some differences were observed in the distribution by type of voice quality disorder. About one-fourth of the pupils were classified as nasal--the city figures were slightly higher than the county figures--followed by about one-fifth rated as hoarse. Approximately 16% were breathy, with the percentage in the city slightly higher than in the county. Denasality accounted for about 10% of the population, with various combinations of voice disorders occurring among the remainder.

Pitch deviations occurred in almost identical proportions in the two samples: 8.4% and 8.3% in the city and county, respectively. Loudness deviations were said to exist in about 13% of the cases, and rate deviations in about 15%. Even the distribution by type of rate deviation was quite similar for the two samples. Rate was too rapid in a little over a third of the pupils, and jerky in about two-fifths. The percentage of rapid rate among pupils in the city schools was slightly higher, and of jerky rate, slightly lower than for the pupils in the county schools. Slowness of rate was observed in approximately 18% of the cases in both samples.

Considering the subjectivity with which most of these ratings must be made, it is rather surprising that the two samples produced such similar figures for most of these characteristics.

Language Characteristics in Spontaneous Speech

About 17% of the pupils made inadequate responses in spontaneous speech. Of this group, over two-thirds were regarded as making inadequate responses because of briefness, while about 16% made little or no response at all. Verbal output so excessive that it was a deterrent to effective communication occurred in nearly 15% of the cases. About 15% of the pupils had limited vocabularies, and about 17% had poor grammar.

In all instances, agreement between the city and county data was exceedingly close. Many of the differences were less than one point, and none exceeded four.

Measures of Articulation Skill

The measures of articulation skill were based on a search of all records showing articulation errors. There were 16,875 records on which articulation errors were recorded: 9,468 in the city sample and 7,407 in the county. Not all of the pupils whose records showed errors were classified as articulation cases. Only 15,162 pupils were classified as having an articulation disorder as either a single disorder or the primary disorder in the presence of other disorders. Distribution in the city and county samples was 8,457 and 6,705, respectively. Another 758 pupils in the city and 477 in the county had articulation disorders classified as either the secondary or tertiary disorder in combination with other disorders. Thus, the data include some pupils whose articulation errors were regarded as only a minor part of their communication problems and still others whose articulation errors were insignificant. Records showing any errors were included so that all available data on frequency of misarticulations could be examined.

The mean score for the entire sample on the 50 items included in the Templin-Darley 50-Item Articulation Test was 35.0 with a S.D. of 10.17. The mean score for Templin's (13, p. 19) sample of four-and-a-half-year-olds for sexes and socioeconomic groups combined was 35.8 (S.D. = 11.8). The mean for the city sample was 34.0 (S.D. = 10.33) and 36.2 (S.D. = 9.97) for the county sample. The mean for the city was comparable to the mean of 34.4 for the Templin sample of four-year-olds, while the mean for the county was closer to the mean for her sample of four-and-a-half-year-olds. Templin's mean for five-year-olds was 37.7. Since the mean age for the combined sample was 9-7 years (S.D. = 2.91) and was 10-3 years (S.D. = 3.16) for the city and 8-9 (S.D. = 2.22) for the county, the articulation skill of this group was obviously very poor. Using the median as the measure of central tendency did not alter the results materially, as the medians were 36.1 ($\underline{Q}$ = 6.08) and 37.8 ($\underline{Q}$ = 6.32) for the city and county, respectively.

Phonetic inventory scores were based on 43 sounds--18 vowels and diphthongs and 25 consonants. The scores reflect the number of sounds produced correctly as singles, as opposed to sounds in blends. If the sound had been judged incorrect in any position, it was scored incorrect in computing phonetic inventory scores. This measure was included because the 50-item test does not include vowels and diphthongs except for **/ju/** and the semivowel **/ɝ/**. A number of consonants are also omitted in the 50-item test. The mean phonetic inventory score was 38.1 (S.D. = 4.07). Means for the city and county were similar and were 37.9 (S.D. = 4.17) and 38.3 (S.D. = 3.95), respectively. Medians were very nearly the same as the means: 39.1 (Q = 2.35) and 39.5 (Q = 2.75), respectively.

Consonant inventory scores based on 24 consonants were also computed. The consonant **/hw/** was not included, as most errors on this sound are voicing errors, no longer considered important. The mean for the entire sample was 19.8 (S.D. = 3.34). For the city, the mean was 19.7 (S.D. = 3.41), and 19.9 (S.D. = 3.26) for the county. Medians were 20.7 (Q = 2.11) and 20.9 (Q = 1.98) for the respective samples.

The phonetic inventory scores indicated that, on the average, only five sounds were defective, while the consonant inventory scores indicated that four consonant sounds were defective on the average. In contrast, the 50-item scores were quite low. Obviously, blend errors contributed heavily to the scores. Differences in scoring, also, would result in a discrepancy between inventory scores and 50-item scores. In the 50-item test, some sounds are scored three times and others twice, depending on position in the stimulus words. Thus, sound errors are weighted differentially. In the phonetic and consonant inventories, sounds are given equal weight regardless of misarticulation by position since a sound was scored incorrect if an error occurred in any one or all positions in which it can appear.

Behaviors Associated with Oral Communication

Responsiveness in situations requiring communication was regarded as adequate for most of the pupils. Only 13.6% showed deviations by being unresponsive or slow in responding, relating primarily nonverbally, or making bizarre or irrelevant responses.

Behaviors such as poor eye contact, facial grimaces and tics, as well as gross bodily movements or mannerisms that detract from communicative effectiveness are more often associated with stuttering than with other kinds of speech deviations. As might be expected because of the higher proportion of stuttering in the city caseload, the percentages of pupils showing inadequacies of these kinds were higher in the city than in the county sample. Even so, the percentages were low. Only 11.7% in the city manifested infrequent eye contact vs. 6.5% in the county, while 8.0% in the city vs. 4.0% in the county had facial grimaces and tics. Gross movements and mannerisms were observed in 7.2% of the city pupils vs. 4.3% of the county pupils. For the combined sample, the figures were 9.5%, 6.3%, and 6.0%, respectively.

Undesirable oral habits, such as thumb sucking, nail biting, chewing of objects, were found in 16% of the cases. A higher percentage of the pupils in the city sample than in the county exhibited these behaviors. Drooling was a problem in only 2% of the cases.

Hearing Status

Hearing information was available for only 80% of the city caseload and 66% of the county caseload, or 73% of the combined sample. Hearing testing is usually a function of the school's health department, and is the responsibility of school audiometrists or school nurses. Obviously, channels of communication between health departments and speech and hearing clinicians need to be strengthened.

Ten per cent of the pupils had hearing losses; 34.8% had monaural losses, while 65.2% had binaural losses. More of the pupils in the city schools had monaural losses than in the county schools (39.3% vs. 27.3%, respectively). The presence of a hearing loss does not necessarily account for pupils' being in the caseload.

The difference in these proportions are, perhaps, partly a function of the lack of hearing information on approximately one-third of the pupils in the county caseload; that is, hearing information may have been more readily available for pupils with obvious hearing deficiencies. In both samples, 60% or more of the monaural losses were less than 37 dB (ISO). In the city caseload, 50% of the binaural losses exceeded 36 dB, while only 22.3% of those in the county caseload exceeded this figure.

Speech Mechanism

About one-fifth of the pupils had dental occlusion problems that were judged to interfere with speech production. A little over one-fourth had missing or malpositioned teeth or caries that were felt to interfere with speech.

Difficulties with lip and tongue movement were present in 5% and 15% of the pupils, respectively, while another 5% had nasal obstructions or other conditions of the nasal cavities interfering with speech. Inadequacies of the hard and soft palate were present in about equal proportions of the pupils--a little over 2%. Difficulties with breathing, such as shallow or jerky breathing, mouth breathing, or speaking on inhalation rarely occurred, as only 0.6% of the pupils in the city and 0.1% in the county, or 0.4% over-all, had these kinds of problems.

Health History

Data were retrieved on only those health conditions thought to bear most directly on speech and language development. These data must be interpreted with caution, and should be regarded as suggestive only, for in the case of the health history, the primary interest was in just how much information was readily available to the clinicians through routine school records. That is, the clinicians were asked to fill out the records on the basis of information in the pupils' existing cummulative classroom and health records and such information as they themselves routinely collect, rather than to change current practice in this respect. Obviously, information is not readily available on many of the pupils, as health histories were completed on no more than three-fifths of the pupils in the city caseload and on less than half in the county.

Some of the clinicians may have had no health history for any of the pupils. In this case, no particular bias would be operating to distort the data, and the figures would represent the entire population of pupils in caseloads. It is more likely, however, that health history information was available on only those children with certain kinds of problems--problems that presented unusual difficulties in either the classroom or the therapy situation or both. In this case, it would be expected that information on most of the remainder of the pupils would be negative if the conditions are actually related to speech and language problems. That is, if the clinician has health histories on only a part of his caseload, the histories he does have are likely to be for the group of children with health problems. In that case, the percentages reported here are probably greatly inflated by the bias introduced because of the selective sample.

Nearly 23% of the pupils had histories of frequent colds, while sore throat occurred frequently in about 15% of the pupils. These percentages are considerably smaller than those reported by Eagles and associates (5, p. 129) in their sample of 4,078 children between five and 14 years of age who were selected from the Pittsburgh area. They found that 32.5% of their sample had had three or more colds within the 12 months preceding the time they were tested, and 38.3% had sore throat accompanied by fever within the same period. If it can be assumed that the selective process that resulted in reporting only a portion of the caseload did not produce biased data, the results indicate that frequent colds and sore throat are not associated with poor communication skills, since the incidence of these conditions does not exceed incidence in the general population.

Frequent ear infections occurred in 12% of the pupils. The incidence was lower in the histories of the city pupils (9.8%) than in the histories of the pupils in the county (15.2%). These percentages are comparable to the percentages reported by Eagles (5, p. 129). They defined frequent earaches as five or more and found 10.8% of their sample with this history, while 2.7% had histories of three or more ear discharges. The exact percentage of the population with these symptoms either singly or in combination lies between 10.8% and 13.5%, since some of the children are represented in both symptom groups. Only 50.7% of their population had no history of any ear pathology. Here again, to the extent that it may be assumed that the present data actually do represent the entire caseload, the history of ear pathology is no greater among pupils in caseloads than in the general population.

Nearly 10% of the pupils had histories of high temperatures. Data from the Pittsburgh study are not directly comparable; however, as shown above, the Pittsburgh study did show that fevers along with sore throats occurred in 38.3% of the sample. Since our data represent high temperatures both with and without sore throat, the percentage is quite low relative to the Eagles study.

Serious early illness was reported for nearly 20% of the pupils. The difference between the city and county percentages was large, with the city reporting a higher incidence than the county (23.2% vs. 13.6%, respectively). The significance of this finding is difficult to estimate. The assumption that serious early illness is associated with speech and language difficulties is valid in many cases, but not in all. To be reasonably certain of an association, it is necessary to know whether there were behavioral sequelae to the illnesses. Further, results are available for this item on only 46.8% of the city caseload and for 36.7% of the county caseload. It is possible that the figures are inflated, since they may represent an unduly high proportion of pupils most likely to have communication difficulties produced or exacerbated by early illness. No comparison can be made with the Pittsburgh study, because of the difference in the way inwhich the data on illnesses were reported.

Allergies were reported for approximately 16% of the pupils in the caseload with similar proportions inboth the city and county caseloads.

Incidence of hay fever, eczema, hives, and food allergies were reported separately in the Pittsburgh study (5, p. 130). Presumably these conditions represent allergic reactions. They were present in 12% of the Pittsburgh sample. Asthma was reported for 9.4% of the pupils in the present study, whereas the incidence of asthma in the Pittsburgh study was 2.2%.

The results from this study indicate that health history information is not readily available on many of the children in the school caseload. They indicate also, the need for clarifying the incidence of serious early illness, allergies, and asthma among children with oral communication disorders.

Socioeconomic Status

Socioeconomic status was determined by address and the 1960 U.S. Census report (14) and was classified according to family income as explained on page 20. Income could not be determined for 9.3% of the pupils in the city and 9.1% of the pupils in the county caseload, because income is not reported for census tracts with fewer than 200 dwellers.

Pupils from homes in the upper-middle income group were the most heavily represented in the combined city and county caseload, followed by pupils from homes in the middle income group. The percentages were 29% and 23%, respectively. One-fifth were from homes in the lower-middle income group, while a little over 15% were from homes in the low income bracket. Nearly 13% were from homes in the highest income group.

Marked differences between city and county caseloads obtained. Whereas 24% of the pupils in the city caseload were from the lowest income group, only 4% of the pupils in the county were from the same income group. Similar proportions (one-fifth) were in the lower-middle income group. In contrast with the 42.1% of the city caseload being in the middle and upper-middle groups, 65.5% of the county caseload were in these groups. The caseloads differed also in the percentages from the highest income group, the proportions being 14.5% and 9.8% in the city and county, respectively.

Language Spoken in the Home

About 23% of the pupils on whom information was supplied had bilingual backgrounds. One-fourth of the pupils in the city and one-fifth of the pupils in the county came from homes in which foreign languages were spoken. Spanish was by far the most common of the foreign languages and accounted for about 15% of the pupils. The proportion was slightly higher in the city than in the county. Japanese ranked next with 1.4%. Chinese and German were equally represented by 1.0% each, though the city had a few more pupils than the county with these language backgrounds. French, Hebrew, and Italian were about equally represented. Approximately 0.6% came from each of these language backgrounds. Languages other than those listed accounted for a little over 2% of the sample.

Birth Order and Number of Siblings

About one-fourth of the pupils were the first-born in the family, while nearly one-third were second-born. About 22% were third in the family; 11% were fourth; nearly 10% were fifth or more in the family. Percentages for the city and county caseloads were quite similar with the greatest difference being 26.5% first-born in the city caseload and 23.5% in the county caseload.

Three per cent of the pupils were twins or triplets. These figures are not directly comparable to vital statistics, which show 0.06% multiple births, since the data were not sorted to indicate the number of instances in which only one or both twins were included, nor how many of a given set of triplets were in the caseload.

In the combined sample, 3.8% of the pupils were only children. About 19% had one sibling; 27% had two siblings; approximately 21% had three siblings; and about 13% had four siblings. The remainder (16.4%) had five or more siblings. Some differences obtained between city and county caseloads in the distribution up to five siblings. Thereafter, the differences were negligible.

A somewhat higher percentage of pupils in the city caseload were only children or had just one sibling, and a somewhat smaller percentage had three and four siblings. Considering the differences in distribution by socioeconomic level between the two samples, a higher percentage of children from large families would be expected in the city caseload.

Parents in the Home and Parental Constellations

A little over 95% of the pupils lived with their natural mothers, but only 81% lived with their natural fathers. About 9.5% had no father in the home, the percentage being higher for the city (11.9%) than for the county (6.1%). Since the divorce rate in 1961 was approximately one-fourth of the marriage rate, these figures do not indicate an undue proportion of pupils without fathers.

For the two samples combined, 88% of the pupils lived either with their natural parents or one natural parent and an adoptive or stepparent. The percentage of pupils in these kinds of family constellations was a little smaller in the city than in the county (85.5% vs. 91.3%).

Type of Speech Problems among Relatives

Information about speech problems among relatives was available on less than half of the pupils in the caseload. Of the pupils for whom this information was available, about 40% had relatives with speech problems, which is rather high. However, these percentages may be inflated by the selective nature of the portion of the caseload reported.

More mothers than fathers were said to have speech difficulties in the ratio of 1.1:1. The ratios differed in the city and county samples. The ratio for the city sample was reversed, being one mother for every 1.1 fathers, while in the county it was one father for every 1.3 mothers.

Among the mothers, the major problem was articulation, which accounted for 47.6% of the mothers with speech problems in the city sample and 65.2% of the mothers with speech problems in the county sample.

Stuttering was present in 24.3% of the mothers with speech problems in the city sample compared with 10.7% in the county sample.

Among the fathers with speech problems in the city sample, 42.4% stuttered and 30.9% had articulation problems. Of the fathers with speech problems in the county sample, 25.3% stuttered and 47.0% had articulation problems. A similar trend was noted among other relatives who had speech problems. In the city sample, 37.6% stuttered, while 28.6% had articulation problems. In the county sample, however, only 19.8% stuttered, and 53.9% had articulation problems.

Articulation problems accounted for the large majority of the speech disorders among siblings of pupils in the caseload. In the city sample, stuttering accounted for approximately 10% of the disorders, regardless of number of siblings, and about 4% in the county.

Sex

More males than females were enrolled in the combined caseload in the ratio of two to one. The same proportions obtained for both city and county samples.

Age

The mean age for the combined sample was 9-7 years (S.D. = 2.91 years). The means for the city and county were 10-3 years (S.D. = 3.16 years) and 8-9 years (S.D. = 2.22 years), respectively. The age range in the city caseload was 3 to 21 years, and in the county, 3 to 20 years.

The medians were slightly lower. They were 8-11, 9-6, and 8-3 years for the combined sample and the city and county samples, respectively. The corresponding Qs were 1.76, 2.20, and 1.35.

The city and county samples were quite different in the percentages of older pupils, which was to be expected since 16 of the 38 county districts were elementary districts only. Thus, there were fewer secondary pupils in the county relative to elementary pupils to draw from.

Although 43% of the pupils in the city caseload was 10 years or older, only 23.6% of the county sample was in this age range. In the city caseload, 10.4% came from the age group corresponding to secondary school, while 1.3% of the county sample came from this group. Thus, 6.7% of the combined sample was 15 years or older.

The heaviest concentration of cases in both the city and county caseloads was in the 7- to 9-year group as shown by 31.5% and 39.8%, respectively. About the same proportions were in the 9- to 10-year group in both samples--approximately 14%. Fewer pupils were in the 5- to 7-year group in the city than in the county. The figures were 11.9% and 22.1%, respectively.

Although California school law permits service to physically-handicapped children (speech- and hearing-handicapped children are designated as physically handicapped) from three years on, only three three-year-olds and 45 four-year-olds were included, accounting for 0.2% of the combined caseload. Approximately equal proportions were contained in the city and county caseloads.

As the Bingham (2) study did not report age, no comparison with the earlier study can be made.

Intelligence

Of the pupils for whom intelligence-test results were available (95% of the city sample, 40% of the county sample), two-thirds had IQs of 91 or higher. A little over one-fourth had IQs above 111. Twenty-three per cent fell in the 76-90 range, while 10% had IQs of 75 or below. Thus, the caseload tended to have a higher proportion of retarded pupils than would be found in the population generally. City and county figures were very close for the pupils with IQs of 111 or higher. The city caseload had a somewhat higher proportion of pupils with low ability than the county, with 11.2% as opposed to the county's 7.2% in the 75 or lower group, and 23.7% as opposed to the county's 20.6% in the 76-90 group.

Reading and Arithmetic Achievement

Reading, including reading readiness scores, and arithmetic achievement were reported on those pupils for whom standardized test results were available. Although the proportions varied slightly, a disproportionate number of the pupils were below average in all of these areas. In reading readiness 41.4% were below average; 45.6% were below average in reading achievement; 40.6% were below average in arithmetic fundamentals; 42.1% were below average in arithmetic reasoning. Approximately one-third were in the average group, whereas the expected distribution for average is either 50% or 68%, depending on the statistic preferred. Though the proportions were not as exaggerated as in the case of the below-average group, pupils with above-average achievement were also in rather high proportions.

The percentages in the above-average groups corresponded rather well to the percentage of pupils with high IQs, where high IQ is taken to be 111 or above. However, there were more pupils in the below-average achievement groups than would be predicted from the percentage of pupils in the low IQ groups, if low is taken to be 91 and below.

For the most part, city and county proportions were similar, though a few differences appeared, especially on reading readiness. The city had far more in the below-average group and fewer in the above-average group than the county. The city also had more pupils in the below-average group in reading achievement and arithmetic achievement, though the differences in these areas were not as great as for reading readiness. These results correspond with the higher proportion of pupils with low IQs found in the city.

Lateral Preference

Most of the pupils in the combined caseload were right-handed (85.5%) while 11% were left-handed; 3.5% were ambidextrous. Percentages for the city and county differed by less than 1.0%. Preference for the right foot was less pronounced in that only 63.9% appeared to prefer the right foot; 27.7% preferred the left foot; and 8.4% showed no particular preference for either right or left foot. Eye preference is difficult to determine by informal tests, since usage may be affected by acuity. However, as determined by sighting objects either through a paper tube or by forming a circle with the thumb and index fingers of both hands, 79.1% sighted with the right eye, 13.9% used the left eye; 7.0% alternated between left and right.

Data were available on nearly all of the pupils in the caseload. The excellent return of information on this section of the record was probably the result of the instructional film, which demonstrated ways in which usage could be estimated informally, recognizing, of course, that informal observations do not have the accuracy of neurological examinations. This result suggests the need for more detailed instructions and demonstrations to accompany the case record if it is to be completely filled out.

Grade Level

Grade level cannot be accurately predicted from age; therefore, both age, which was discussed above, and grade level are reported. As also mentioned previously, California school law authorizes service to physically handicapped preschool children. Nonetheless, preschool children made up only 0.5% of the caseload. The discrepancy between this figure and the percentage of pupils under five years of age reported in the discussion on age, probably reflects the number of children in the five-year age group not yet enrolled in school. The majority (56.9%) of the children were enrolled in kindergarten through grade three. Nearly one-fourth were enrolled in grades four through six; approximately 11% were in grades seven through nine, while 5% were in grades 10 through 12. Only 2% were in ungraded classes.

The tabled data are shown in the customary grade level groups; however, the data were recalculated in order to permit comparison with the proportions of pupils in the grade groupings used by Bingham and others (2). Since exact grade level cannot be determined for children in multigraded classrooms, only those pupils for whom grade level could be specified were included in the recalculated data. Thus, the new total on which the following percentages were based was 18,047.

In the Bingham report (2, p. 35), 75% of the pupils in the caseloads of 757 clinicians were in kindergarten, first and second grades compared with 42.0% in the combined caseload in this study. Whereas Bingham found 18% of the pupils in caseloads to be in grades three and four, 28.3% of the present caseload were in these grades. In the Bingham sample, 93% of the pupils were in grades K through four compared with 70.3% in the present sample. The caseloads reported by Bingham contained 2% in the fifth and sixth grades, and another 2% in the seventh and eighth grades compared with 13.5% and 8.5% in these grade groups, respectively, in our sample. More pupils in our sample were in the ninth and tenth grades (4.6% vs. 1%) than were reported in the earlier study.

Even though the concentration was heavy in the primary grades in the Los Angeles area caseload, the concentration was far less than has appeared in earlier reports. Furthermore, a number of county districts were elementary districts only, which necessarily created a concentration in the lower grades.

The city and county caseloads differed considerably in the proportions of pupils in the various grade groups. In the city, only 48.4% of the pupils were in grades K through three compared with 68.3% in the county. About one-fourth in both samples were in grades four through six. A marked difference in the proportion of pupils in grades seven through nine obtained, the percentages being 15.2% and 4.6% for the city and county, respectively. The difference in percentages in ungraded classes was negligible.

Class Placement

Nearly all (94%) of the pupils were in regular classes. Only 5.5% were in special classes, and 0.5% were preschool children. The city's caseload contained more (7.6%) in special classes than the county's caseload (2.7%).

Of the small proportion of pupils in special classes, 59.1% in the city and 47.9% in the county (56.9% for the combined caseload) were in classes for the educable mentally retarded. About equal proportions of those in special classes in both the city and county caseloads were in classes for children with cerebral palsy (16.6%). Another 7.7% were in classes for other kinds of orthopedic handicaps. Over-all, 5.4% were in classes for the aurally handicapped, though the proportions in the city and county differed somewhat (6.3% vs. 1.9%, respectively). While 5.3% of the pupils in the combined caseload were in classes for the educationally handicapped, they were found in much greater proportion in the county than in the city schools. The percentage in this type of special class in the city was 1.9% in contrast with 18.3% in the county schools. The remainder of the pupils in special classes were in classes for the trainable mentally retarded, visually handicapped, and gifted. Only one child, who was in the county caseload, was receiving home instruction. The reasons for so few of the pupils in special classes being included in the caseloads of the clinicians were discussed previously on page

Case Identification

In the city schools, only 8.3% of the caseload came from screening as opposed to 34.1% in the county caseload. By policy, less emphasis is placed on screening in the city schools than in the county schools. In the combined caseload, 19.0% were identified through screening.

Of the children referred, 72.6% were referred by teachers--70.0% of the city caseload and 77.7% of the county caseload. In the city schools, health personnel referred 7.5% of the pupils identified through referral, but only 1.0% were identified by health personnel in the county. In the county, self-referrals and referrals by parents accounted for slightly higher proportions of those referred than in the city. Administrators accounted for only 1.1% of the referrals, and guidance personnel accounted for 1.5%. About 13% of the referrals (14.7% in the city and 9.8% in the county) were from sources not listed on the record, presumably, physicians and caseworkers.

Therapy History

Slightly over half (50.7%) of the pupils were receiving therapy for the first time. The city and county caseloads differed, as 45.5% in the city and 58.0% in the county had no history of previous therapy. Of the pupils who had received therapy previously in school, 56% had had only one year; 21.7% had had two years; and 11.8% had had three years. A little over 10% had received therapy for four or more years.

Differences between the city and county obtained in the percentages of pupils having had therapy for one year (53.3% vs. 61.1%, respectively), as well as for pupils with six or more years of therapy (4.0% vs. 0.9%, respectively).

Measures of Hearing

Consistent with the purpose of determining the kind of information available on pupils in caseloads, the type of hearing information reported was examined. Complete air- and bone-conduction thresholds were available on only 182 pupils in the city and on three of the pupils in the county schools, or a total of 185 pupils. This means that bone-conduction thresholds were not available for 87% of the pupils with hearing losses. Air-conduction thresholds, however, were available for 893 pupils in the city and 667 in the county. These numbers exceed the number of pupils said to have monaural and binaural losses in the respective caseloads. Speech-reception thresholds were reported for only 11 pupils in the city and seven in the county, or a total of 18 pupils. PB scores were reported for only two pupils--both in the city schools.

Of the audiometric data available during the 1966-67 school year, over 99% of the audiograms were based on the ASA, 1951, audiometric zero. The data were converted to ISO, 1964, however, for the purpose of retrieval.

In the city schools, nearly all of the audiometric information was supplied by school audiometrists. In the county schools, three-fourths of the data was supplied by nurses. Speech clinicians did almost no hearing testing in the city schools (0.2% of the records), though they accounted for 14.9% of the records for the county caseload. Records from otologists were rarely available--5.2% of the records in the city and 0.9% of the records in the county schools were from this source.

Measures of Intelligence

In both the city and county caseloads, the information about intelligence came primarily from group tests. In the city schools, the California Test of Mental Maturity (usually the short form) and the Detroit Beginning First-Grade Test of Intelligence were used. The county schools also used the California Test of Mental Maturity as well as the Lorge-Thorndike Intelligence Test.

The Stanford-Binet was used more frequently than other individual tests in both the city and county schools, though to a greater extent in the city than in the county. The Wechsler Intelligence Scale for Children was used to a greater extent in the county schools than in the city. Only 17% of the city caseload and 7% of the county caseload received individual intelligence tests, or a total of 13% of the combined caseload. The Peabody Picture Vocabulary Test was not used extensively. This test was used for only 0.6% of the city pupils and 6.2% of the county pupils for whom test results were reported. Though records were available for most of the pupils in the city caseload, information about intelligence was reported for only 40% of the pupils in the county caseload.

SECTION A

ORGANIZATION OF TABLES

TABLE A.1

Type of expressive speech disorder for children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

	L.A. City		L.A. County		Combined	
Type of Disorder	Number	%	Number	%	Number	%
Single Disorder Only						
Little or No Speech	75	.9	42	.7	117	.8
Language Disorder	79	.9	60	.9	139	.9
Articulation	7537	85.5	6040	93.5	13577	88.9
Stuttering	1027	11.6	253	3.9	1280	8.4
Voice Disorder	95	1.1	68	1.0	163	1.0
TOTAL	8813	100.0	6463	100.0	15276	100.0
Multiple Disorders						
a. Primary						
Little or No Speech	135	7.6	69	5.9	204	7.0
Language Disorder	158	8.9	147	12.6	305	10.4
Articulation	920	52.0	665	57.2	1585	54.0
Stuttering	448	25.3	165	14.2	613	20.9
Voice Disorder	110	6.2	117	10.1	227	7.7
TOTAL	1771	100.0	1163	100.0	2934	100.0
b. Secondary						
Little or No Speech	71	4.0	44	3.8	115	3.9
Language Disorder	190	10.7	158	13.6	348	11.9
Articulation	722	40.8	426	36.6	1148	39.1
Stuttering	263	14.8	144	12.4	407	13.9
Voice Disorder	446	25.2	328	28.2	774	26.4
Not Identified	79	4.5	63	5.4	142	4.8
TOTAL	1771	100.0	1163	100.0	2934	100.0

TABLE A.1 (continued)

Type of Disorder	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
c. Tertiary						
Little or No Speech	15	7.1	5	3.4	20	5.6
Language Disorder	38	18.0	25	17.0	63	17.6
Articulation	36	17.1	51	34.7	87	24.3
Stuttering	29	13.7	25	17.0	54	15.1
Voice Disorder	93	44.1	41	27.9	134	37.4
TOTAL	211	100.0	147	100.0	358	100.0

TABLE A.2

Distribution of single and multiple expressive speech disorders and type of single and primary multiple disorders of children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts. Multiple expressive disorders are classified according to the primary disorder.

Distribution and Type of Disorder	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
Distribution of Single and Multiple Disorders						
Single Disorder Only	8813	83.3	6463	84.7	15276	83.9
Multiple Disorders	1771	16.7	1163	15.3	2934	16.1
Two Disorders Only	1560	(88.1)	1016	(87.4)	2576	(87.8)
Three or More Disorders	211	(11.9)	147	(12.6)	358	(12.2)
TOTAL	10584	100.0	7626	100.0	18210	100.0
Type of Single and Primary Multiple Disorders						
Little or No Speech	210	2.0	111	1.5	321	1.8
Language Disorder	237	2.2	207	2.7	444	2.4
Articulation	8457	79.9	6705	87.9	15162	83.3
Stuttering	1475	14.0	418	5.5	1893	10.4
Voice Disorder	205	1.9	185	2.4	390	2.1
TOTAL	10584	100.0	7626	100.0	18210	100.0

TABLE A.3

Frequency of occurrence of each type of expressive speech disorder as a primary, secondary, or tertiary multiple speech disorder for children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Expressive Speech Disorder	L.A. City		L.A. County		Combined	
	Number	%	Number	%	Number	%
Little or No Speech	221	6.0	118	4.9	339	5.6
Primary	135	(61.1)	69	(58.5)	204	(60.2)
Secondary	71	(32.1)	44	(37.3)	115	(33.9)
Tertiary	15	(6.8)	5	(4.2)	20	(5.9)
Language Disorder	386	10.5	330	13.7	716	11.8
Primary	158	(40.9)	147	(44.5)	305	(42.6)
Secondary	190	(49.2)	158	(47.9)	348	(48.6)
Tertiary	38	(9.9)	25	(7.6)	63	(8.8)
Articulation	1678	45.7	1142	47.4	2820	46.4
Primary	920	(54.9)	665	(58.2)	1585	(56.2)
Secondary	722	(43.0)	426	(37.3)	1148	(40.7)
Tertiary	36	(2.1)	51	(4.5)	87	(3.1)
Stuttering	740	20.1	334	13.8	1074	17.6
Primary	448	(60.5)	165	(49.4)	613	(57.1)
Secondary	263	(35.5)	144	(43.1)	407	(37.9)
Tertiary	29	(4.0)	25	(7.5)	54	(5.0)
Voice Disorder	649	17.7	486	20.2	1135	18.6
Primary	110	(17.0)	117	(24.5)	227	(20.0)
Secondary	446	(68.7)	328	(67.5)	774	(68.2)
Tertiary	93	(14.3)	41	(8.4)	134	(18.6)
TOTAL	3674	100.0	2410	100.0	6084	100.0

TABLE A.4

Spontaneous speech characteristics of children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Characteristic	L.A. City Number	%	L.A. County Number	%	Combined Number	%
Articulation						
a. Vowels						
Normal	8827	83.7	6291	85.0	15118	84.3
Deviant	1713	16.3	1113	15.0	2826	15.7
TOTAL	10540	100.0	7404	100.0	17944	100.0
b. Consonants						
Normal	1357	12.8	451	5.8	1808	9.8
Deviant	9340	87.2	7261	94.2	16601	90.2
TOTAL	10697	100.0	7712	100.0	18409	100.0
c. Errors						
Consistent	7165	76.7	5219	75.8	12384	76.4
Inconsistent	2161	23.3	1668	24.2	3829	23.6
TOTAL	9326	100.0	6887	100.0	16213	100.0
Dialect						
Normal	9330	87.3	7097	91.9	16427	89.2
Deviant	1360	12.7	625	8.1	1985	10.8
Regional	559	(41.1)	186	(29.7)	745	(37.0)
Foreign	751	(55.2)	403	(64.6)	1154	(57.6)
Undefined	50	(3.7)	36	(5.7)	86	(5.4)
TOTAL	10690	100.0	7722	100.0	18412	100.0

TABLE A.4 (continued)

Characteristic	L.A. City		L.A. County		Combined	
	Number	%	Number	%	Number	%
Intelligibility						
Intelligible	8340	77.9	6333	81.8	14673	79.5
Partially Intelligible	2072	19.4	1209	15.6	3281	17.8
Unintelligible	293	2.7	205	2.6	498	2.7
TOTAL	10705	100.0	7747	100.0	18452	100.0
Fluency						
Normal	8800	81.9	7007	90.5	15807	85.5
Nonfluent	1951	18.1	737	9.5	2688	14.5
TOTAL	10751	100.0	7744	100.0	18495	100.0
Voice Quality						
Normal	9142	85.0	6617	85.3	15759	85.1
Deviant	1614	15.0	1153	14.7	2767	14.9
Breathy	288	(17.8)	150	(13.0)	438	(15.8)
Harsh	101	(6.3)	94	(8.2)	195	(7.1)
Hoarse	336	(21.0)	262	(22.7)	598	(21.6)
Nasal	463	(28.6)	245	(21.2)	708	(25.6)
Denasal	149	(9.2)	144	(12.5)	293	(10.6)
Other	76	(4.7)	49	(4.2)	125	(4.5)
Undefined	39	(2.4)	33	(2.9)	72	(2.6)
Combination	162	(10.0)	176	(15.3)	338	(12.2)
TOTAL	10756	100.0	7770	100.0	18526	100.0
Pitch						
Normal	9859	91.6	7113	91.7	16972	91.6
Deviant	901	8.4	660	8.3	1561	8.4
TOTAL	10760	100.0	7773	100.0	18533	100.0
Loudness						
Normal	9205	85.6	6869	88.6	16074	86.6
Deviant	1556	14.4	925	11.4	2481	13.4
TOTAL	10761	100.0	7794	100.0	18555	100.0

TABLE A.4 (continued)

Characteristic	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
Rate						
Normal	9014	83.2	6820	87.9	15834	85.2
Deviant	1716	16.8	942	12.1	2658	14.8
Rapid	606	(35.3)	286	(30.4)	892	(33.5)
Slow	307	(17.9)	166	(17.6)	473	(17.8)
Jerky	597	(34.8)	375	(39.8)	972	(36.6)
Other	33	(1.9)	28	(2.9)	61	(2.3)
Undefined	23	(1.3)	16	(1.8)	39	(1.5)
Combination	150	(8.8)	71	(7.5)	221	(8.3)
TOTAL	10730	100.0	7762	100.0	18492	100.0

TABLE A.5

Response length, vocabulary, and grammar used in spontaneous speech of children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Language Characteristic	L.A. City		L.A. County		Combined	
	Number	%	Number	%	Number	%
Length of Responses						
Acceptable	8792	81.8	6507	84.4	15299	82.9
Inadequate	1957	18.2	1204	15.6	3161	17.1
Little/No Response	320	(16.4)	178	(14.8)	498	(15.8)
Brief Responses	1353	(69.1)	842	(69.9)	2195	(69.4)
Excessive Output	238	(12.2)	150	(12.5)	388	(12.3)
Unspecified	46	(2.3)	34	(2.8)	80	(2.5)
TOTAL	10749	100.0	7711	100.0	18460	100.0
Vocabulary						
Acceptable	8955	83.6	6679	87.5	15634	85.3
Limited	1757	16.4	950	12.5	2707	14.7
TOTAL	10712	100.0	7629	100.0	18341	100.0
Grammar						
Acceptable	8729	82.4	6156	82.9	14885	82.6
Poor	1858	17.6	1270	17.1	3128	17.4
TOTAL	10587	100.0	7426	100.0	18013	100.0

TABLE A.6

Mean and median scores of children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts on the 50 items of the Templin-Darley articulation test, a phonetic inventory of 43 vowel and consonant sounds, and a consonant inventory of 24 sounds.

Type of Test	L.A. City	L.A. County	Combined
Number of Children	9468	7407	16875
Templin-Darley 50-Item Test			
Mean	34.0	36.2	35.0
Standard Deviation	10.33	9.97	10.17
Median	36.1	37.8	
Q	6.08	6.32	
Phonetic Inventory (43 Sounds)			
Mean	37.9	38.3	38.1
Standard Deviation	4.17	3.95	4.07
Median	39.1	39.5	
Q	2.35	2.75	
Consonant Inventory (24 Sounds)			
Mean	19.7	19.9	19.8
Standard Deviation	3.41	3.26	3.34
Median	20.7	20.9	
Q	2.11	1.98	

TABLE A.7

Communicative responsiveness and selected physical behaviors associated with speaking of children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Behavior	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
Responsiveness						
Adequate	9169	85.1	6887	88.3	16056	86.4
Deviant	1605	14.9	914	11.7	2519	13.6
TOTAL	10774	100.0	7801	100.0	18575	100.0
Eye Contact						
Adequate	9443	88.3	7224	93.5	16667	90.5
Infrequent	1255	11.7	499	6.5	1754	9.5
TOTAL	10698	100.0	7723	100.0	18421	100.0
Facial Grimaces and Tics						
None Observed	9695	92.0	7282	96.0	16977	93.7
Present	845	8.0	306	4.0	1151	6.3
TOTAL	10540	100.0	7588	100.0	18128	100.0
Gross Bodily Movements and Mannerisms						
Normal	9693	92.8	7140	95.7	16833	94.0
Deviant	746	7.2	322	4.3	1068	6.0
TOTAL	10439	100.0	7462	100.0	17901	100.0
Undesirable Oral Habits						
None Observed	8725	82.9	6507	85.6	15232	84.0
Present	1801	17.1	1091	14.4	2892	16.0
TOTAL	10526	100.0	7598	100.0	18124	100.0
Drooling						
None Observed	10473	97.9	7598	98.7	18071	98.3
Present	222	2.1	99	1.3	321	1.7
TOTAL	10695	100.0	7697	100.0	18392	100.0

TABLE A.8

Hearing information for children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Hearing Condition	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
Hearing Status						
Normal Hearing	7722	90.0	4812	90.3	12534	90.0
Hearing Loss	865	10.0	517	9.7	1382	10.0
TOTAL	8587	100.0	5329	100.0	13916	100.0
Level of Loss						
Monaural Loss Only	340	39.3	141	27.3	481	34.8
Binaural Loss Only	525	60.7	376	72.7	901	65.2
TOTAL	865	100.0	517	100.0	1382	100.0
a. Average Monaural Loss*						
25 dB or Less	87	25.6	22	15.6	109	22.7
26-36 dB	120	35.3	78	55.3	198	41.2
37-54 dB	78	22.9	25	17.7	103	21.4
55-76 dB	34	10.0	11	7.8	45	9.3
77-94 dB	18	5.3	5	3.6	23	4.8
95 dB or More	3	.9	--	--	3	.6
TOTAL	340	100.0	141	100.0	481	100.0
b. Best Binaural Average*						
25 dB or Less	74	14.1	210	55.9	284	31.5
26-36 dB	191	36.4	82	21.8	273	30.3
37-54 dB	180	34.3	54	14.4	234	26.0
55-76 dB	54	10.3	25	6.6	79	8.8
77-94 dB	15	2.8	3	.8	18	2.0
95 dB or More	11	2.1	2	.5	13	1.4
TOTAL	525	100.0	376	100.0	901	100.0

*Based on average air-conduction thresholds at 500, 1000, and 2000 Hz re ISO, 1964.

TABLE A.9

Adequacy of the speech mechanism for speech production as determined by clinicians' examinations of children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Structure and Function	L.A. City		L.A. County		Combined	
	Number	%	Number	%	Number	%
Lips						
Adequate	10072	93.8	7444	96.2	17516	94.9
Inadequate	658	6.2	291	3.8	949	5.1
TOTAL	10730	100.0	7735	100.0	18465	100.0
Teeth--Occlusion						
Adequate	8277	77.7	5970	78.3	14247	78.0
Inadequate	2371	22.3	1659	21.7	4030	22.0
TOTAL	10648	100.0	7629	100.0	18277	100.0
Teeth--Condition						
Adequate	7825	73.2	5694	74.3	13519	73.7
Inadequate	2855	26.8	1971	25.7	4826	26.3
TOTAL	10680	100.0	7665	100.0	18345	100.0
Tongue						
Adequate	8956	83.6	6639	86.7	15595	84.9
Inadequate	1752	16.4	1022	13.3	2774	15.1
TOTAL	10708	100.0	7661	100.0	18369	100.0
Nasal Cavities						
Adequate	10145	95.1	7223	95.0	17368	94.9
Inadequate	515	4.9	404	5.0	919	5.1
TOTAL	10660	100.0	7627	100.0	18287	100.0

TABLE A.9 (continued)

Structure and Function	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
Hard Palate						
Adequate	10421	97.0	7518	97.9	17939	97.4
Inadequate	320	3.0	160	2.1	480	2.6
TOTAL	10741	100.0	7678	100.0	18419	100.0
Soft Palate						
Adequate	10490	97.4	7549	97.8	18039	97.6
Inadequate	280	2.6	168	2.2	448	2.4
TOTAL	10770	100.0	7717	100.0	18487	100.0
Breathing Function						
Adequate	10298	99.4	7439	99.9	17737	99.6
Inadequate	63	.6	7	.1	70	.4
TOTAL	10361	100.0	7446	100.0	17807	100.0

TABLE A.10

Health histories of children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Health Condition	L.A. City Number	%	L.A. County Number	%	Combined Number	%
Frequent Colds						
Yes	1470	22.7	888	23.3	2358	22.9
No	5001	77.3	2927	76.7	7928	77.1
TOTAL	6471	100.0	3815	100.0	10286	100.0
Frequent Sore Throats						
Yes	942	15.0	513	14.0	1455	14.6
No	5325	85.0	3151	86.0	8476	85.4
TOTAL	6267	100.0	3664	100.0	9931	100.0
Frequent Ear Infections						
Yes	487	9.8	565	15.2	1052	12.0
No	4506	90.2	3155	84.8	7661	88.0
TOTAL	4993	100.0	3720	100.0	8713	100.0
High Temperatures						
Yes	382	9.6	291	9.3	673	9.4
No	3617	90.4	2834	90.7	6451	90.6
TOTAL	3999	100.0	3125	100.0	7124	100.0
Serious Early Illnesses						
Yes	1179	23.2	405	13.6	1584	19.6
No	3908	76.8	2571	86.4	6479	80.4
TOTAL	5087	100.0	2976	100.0	8063	100.0

TABLE A.10 (continued)

Health Condition	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
Allergies						
Yes	865	15.9	550	16.6	1415	16.1
No	4580	84.1	2772	83.4	7352	83.9
TOTAL	5445	100.0	3322	100.0	8767	100.0
Asthma						
Yes	544	9.5	307	9.1	851	9.4
No	5153	90.5	3064	90.9	8217	90.6
TOTAL	5697	100.0	3371	100.0	9068	100.0

TABLE A.11

Socioeconomic status of children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts. Classification is by annual income as determined from address and the 1960 Los Angeles census tract.

Socioeconomic Status	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
Low (Less than $5500)	2414	24.0	299	4.0	2713	15.4
Lower Middle ($5500-$6499)	1965	19.4	1536	20.7	3501	20.0
Middle ($6500-$7499)	1927	19.1	2087	28.2	4014	23.0
Upper Middle ($7500-$8999)	2318	23.0	2766	37.3	5084	29.0
High ($9000 or More)	1468	14.5	727	9.8	2195	12.6
TOTAL	10092	100.0	7415	100.0	17507	100.0

TABLE A.12

Language spoken in the homes of children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Language	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
English Only	7151	74.6	5157	81.7	12308	77.4
Chinese	125	1.3	36	.6	161	1.0
French	77	.8	40	.6	117	.7
German	89	.9	64	1.0	153	1.0
Hebrew	79	.8	17	.3	96	.6
Italian	47	.5	38	.6	85	.5
Japanese	180	1.9	46	.7	226	1.4
Spanish	1612	16.8	802	12.7	2414	15.2
Other	234	2.4	110	1.8	344	2.2
TOTAL	9594	100.0	6310	100.0	15904	100.0

TABLE A.13

Birth order, single and multiple births and number of siblings for children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Birth Order and Number of Siblings	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
Birth Order						
First	2823	26.5	1714	23.5	4537	25.3
Second	3328	31.3	2302	31.5	5630	31.4
Third	2387	22.4	1703	23.4	4090	22.8
Fourth	1098	10.3	898	12.3	1996	11.1
Fifth	491	4.6	386	5.3	877	4.9
Sixth	258	2.4	146	2.0	404	2.2
Seventh	133	1.3	78	1.1	211	1.2
Eighth	61	.6	27	.4	88	.5
Ninth or Greater	68	.6	38	.5	106	.6
TOTAL	10647	100.0	7292	100.0	17939	100.0
Single-Multiple Birth						
Singleton	10167	97.2	6819	96.7	16986	97.0
Twin or Triplet	296	2.8	234	3.3	530	3.0
TOTAL	10463	100.0	7053	100.0	17516	100.0
Number of Siblings						
None	556	5.2	119	1.6	675	3.8
1	2201	20.7	1128	15.5	3329	18.6
2	2856	26.8	1980	27.2	4836	27.0
3	2051	19.3	1774	24.3	3825	21.3
4	1172	11.0	1135	15.6	2307	12.9
5	739	6.9	578	7.9	1317	7.3
6	461	4.3	264	3.6	725	4.0
7	251	2.4	130	1.8	381	2.1
8	151	1.4	81	1.1	232	1.3
9 or More	209	2.0	103	1.4	312	1.7
TOTAL	10647	100.0	7292	100.0	17939	100.0

TABLE A.14

Parents living in the home of children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Parents in the Home	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
Mother						
Natural	10101	94.8	7278	95.8	17379	95.2
Adoptive	101	.9	77	1.0	178	1.0
Stepmother	117	1.1	83	1.1	200	1.1
Foster Mother	54	.5	62	.8	116	.6
Grandmother	126	1.2	48	.6	174	1.0
None	158	1.5	52	.7	210	1.1
TOTAL	10657	100.0	7600	100.0	18257	100.0
Father						
Natural	8189	78.6	6353	85.4	14542	81.4
Adoptive	109	1.0	94	1.3	203	1.2
Stepfather	762	7.3	440	5.9	1202	6.7
Foster Father	42	.4	61	.8	103	.6
Grandfather	79	.8	35	.5	114	.6
None	1244	11.9	453	6.1	1697	9.5
TOTAL	10425	100.0	7436	100.0	17861	100.0

TABLE A.15

Parental constellation of children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Parental Constellation	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
Natural Parents	7910	76.8	6237	84.1	14147	79.9
Adoptive Parents	83	.8	67	.9	150	.8
Grandparents	53	.5	30	.4	83	.5
Foster Parents	38	.4	54	.7	92	.5
No Parents	59	.6	13	.2	72	.4
Natural Mother with:						
Adoptive Father	20	.2	22	.3	42	.2
Stepfather	750	7.3	440	5.9	1190	6.7
Grandfather	23	.2	4	.1	27	.1
No Father	1123	10.9	431	5.8	1554	8.8
Natural Father with:						
Adoptive Mother	7	.1	3	--	10	.1
Stepmother	113	1.1	74	1.0	187	1.1
Grandmother	22	.2	6	.1	28	.2
No Mother	91	.9	39	.5	130	.7
TOTAL	10292	100.0	7420	100.0	17712	100.0

TABLE A.16

Speech problems among the relatives of children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Relation and Type of Problem	L.A. City		L.A. County		Combined	
	Number	%	Number	%	Number	%
Speech Problems among Relatives						
Yes	2215	38.9	1633	42.2	3848	40.3
No	3483	61.1	2237	57.8	5720	59.7
TOTAL	5698	100.0	3870	100.0	9568	100.0
Mother						
Little or No Speech	6	3.2	2	1.8	8	2.6
Language Disorder	14	7.4	6	5.4	20	6.6
Articulation	90	47.6	73	65.2	163	54.2
Stuttering	46	24.3	12	10.7	58	19.3
Voice Disorder	4	2.1	7	6.2	11	3.7
Combination	3	1.6	2	1.8	5	1.7
Unspecified	26	13.8	10	8.9	36	11.9
TOTAL	189	100.0	112	100.0	301	100.0
Father						
Little or No Speech	6	3.1	2	2.4	8	2.9
Language Disorder	16	8.4	6	7.2	22	8.0
Articulation	59	30.9	39	47.0	98	35.8
Stuttering	81	42.4	21	25.3	102	37.2
Voice Disorder	3	1.6	2	2.4	5	1.8
Combination	4	2.1	2	2.4	6	2.2
Unspecified	22	11.5	11	13.3	33	12.1
TOTAL	191	100.0	83	100.0	274	100.0
One Sibling						
Little or No Speech	13	.8	9	.7	22	.7
Language Disorder	46	2.8	11	.9	57	2.0
Articulation	1176	71.9	1030	85.4	2206	77.6
Stuttering	205	12.5	56	4.6	261	9.2
Voice Disorder	19	1.2	13	1.1	32	1.1
Combination	57	3.5	49	4.1	106	3.7
Unspecified	120	7.3	38	3.2	158	5.7
TOTAL	1636	100.0	1206	100.0	2842	100.0

TABLE A.16 (continued)

Relation and Type of Problem	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
Two Siblings						
Little or No Speech	1	.4	2	.9	3	.6
Language Disorder	10	4.0	3	1.3	13	2.7
Articulation	171	68.7	172	76.2	343	72.2
Stuttering	24	9.6	10	4.4	34	7.2
Voice Disorder	3	1.2	1	.4	4	.8
Combination	25	10.1	29	12.8	54	11.4
Unspecified	15	6.0	9	4.0	24	5.1
TOTAL	249	100.0	226	100.0	475	100.0
Three or More Siblings						
Little or No Speech	2	2.6	4	5.5	6	4.0
Language Disorder	6	7.8	2	2.7	8	5.3
Articulation	41	53.2	47	64.4	88	58.7
Stuttering	8	10.4	1	1.4	9	6.0
Voice Disorder	--	--	--	--	--	--
Combination	11	14.3	14	19.2	25	16.7
Unspecified	9	11.7	5	6.8	14	9.3
TOTAL	77	100.0	73	100.0	150	100.0
Other Relatives						
Little or No Speech	2	1.3	5	6.7	7	3.0
Language Disorder	10	6.4	3	3.9	13	5.6
Articulation	45	28.6	41	53.9	86	36.9
Stuttering	59	37.6	15	19.8	74	31.7
Voice Disorder	5	3.2	--	--	5	2.2
Combination	5	3.2	3	3.9	8	3.4
Unspecified	31	19.7	9	11.8	40	17.2
TOTAL	157	100.0	76	100.0	233	100.0

TABLE A.17

Number of males and females among children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Sex	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
Males	7219	67.7	5212	66.0	12431	67.0
Females	3447	32.3	2682	34.0	6129	33.0
TOTAL	10666	100.0	7894	100.0	18560	100.0

TABLE A.18

Ages of children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Age in Years	L.A. City Number	%	L.A. County Number	%	Combined Number	%
3	2	--	1	--	3	--
4	25	.2	20	.3	45	.2
5	207	2.0	456	5.8	663	3.6
6	1053	9.9	1284	16.3	2337	12.6
7	1660	15.6	1664	21.2	3324	18.0
8	1688	15.9	1459	18.6	3147	17.0
9	1429	13.4	1112	14.2	2541	13.7
10	1062	10.0	754	9.6	1816	9.8
11	739	6.9	463	5.9	1202	6.5
12	508	4.8	277	3.5	785	4.2
13	617	5.8	154	2.0	771	4.2
14	538	5.1	101	1.3	639	3.5
15	366	3.4	40	.5	406	2.2
16	333	3.1	24	.3	357	1.9
17	262	2.5	27	.3	289	1.6
18	131	1.2	10	.1	141	.8
19	22	.2	7	.1	29	.2
20	3	--	--	--	3	--
TOTAL	10645	100.0	7853	100.0	18498	100.0

TABLE A.19

Results of tests of intelligence for children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Intelligence Quotients	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
75 or Less	1163	11.2	233	7.2	1396	10.3
76 - 90	2459	23.7	665	20.6	3124	23.0
91 - 110	4124	39.8	1472	45.6	5596	41.2
111 - 130	2175	21.0	707	21.9	2882	21.2
131 or More	439	4.3	152	4.7	591	4.3
TOTAL	10360	100.0	3229	100.0	13589	100.0

TABLE A.20

Results from standardized reading and arithmetic tests for children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Type of Test	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
Reading						
a. Readiness						
Below Average	1071	47.5	762	35.1	1833	41.4
Average	769	34.0	743	34.2	1512	34.1
Above Average	418	18.5	666	30.7	1084	24.5
TOTAL	2258	100.0	2171	100.0	4429	100.0
b. Achievement						
Below Average	2505	48.4	1403	41.4	3908	45.6
Average	1703	32.9	1144	33.8	2847	33.3
Above Average	968	18.7	841	24.8	1809	21.1
TOTAL	5176	100.0	3388	100.0	8564	100.0
Arithmetic						
a. Fundamentals						
Below Average	1776	43.2	868	36.0	2644	40.6
Average	1424	34.7	996	41.3	2420	37.1
Above Average	909	22.1	548	22.7	1457	22.3
TOTAL	4109	100.0	2412	100.0	6521	100.0
b. Reasoning						
Below Average	1739	44.5	789	37.6	2528	42.1
Average	1253	32.0	788	37.6	2041	34.0
Above Average	920	23.5	519	24.8	1439	23.9
TOTAL	3912	100.0	2096	100.0	6008	100.0

TABLE A.21

Hand, foot, and eye usage of children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Usage	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
Hand Usage						
Right	9002	85.0	6180	86.2	15182	85.5
Left	1192	11.3	762	10.7	1954	11.0
Ambidextrous	398	3.7	224	3.1	622	3.5
TOTAL	10592	100.0	7166	100.0	17758	100.0
Foot Usage						
Right	6595	63.2	4339	65.0	10934	63.9
Left	2912	27.9	1835	27.5	4747	27.7
Mixed	934	8.9	501	7.5	1435	8.4
TOTAL	10441	100.0	6675	100.0	17116	100.0
Eye Usage						
Right	8310	78.9	5585	79.5	13895	79.1
Left	1502	14.3	931	13.3	2433	13.9
Mixed	724	6.8	507	7.2	1231	7.0
TOTAL	10536	100.0	7023	100.0	17559	100.0

TABLE A.22

Grade level of children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

	L.A. City		L.A. County		Combined	
Grade Level	Number	%	Number	%	Number	%
Preschool	46	.4	46	.6	92	.5
K	313	2.9	556	7.0	869	4.7
1	1507	14.0	1717	21.8	3224	17.4
2	1749	16.3	1729	22.0	3478	18.7
3	1617	15.1	1360	17.3	2977	16.0
Multigrade K-3	8	.1	16	.2	24	.1
Subtotal K-3	5194	48.4	5378	68.3	10572	56.9
4	1223	11.4	903	11.5	2126	11.4
5	913	8.5	596	7.6	1509	8.1
6	573	5.3	362	4.6	935	5.0
Multigrade 4-6	6	.1	38	.5	44	.3
Subtotal 4-6	2715	25.3	1899	24.2	4614	24.8
7	622	5.8	173	2.2	795	4.3
8	610	5.7	136	1.7	746	4.1
9	396	3.7	47	.6	443	2.4
Multigrade 7-9	2	--	8	.1	10	--
Subtotal 7-9	1630	15.2	364	4.6	1994	10.8
10	357	3.3	28	.4	385	2.0
11	301	2.8	27	.3	328	1.8
12	205	1.9	27	.3	232	1.2
Multigrade 10-12	3	--	--	--	3	--
Subtotal 10-12	866	8.0	82	1.0	948	5.0
Ungraded-Lower	128	1.2	63	.8	191	1.0
Ungraded-Middle	93	.9	23	.3	116	.6
Ungraded-Upper	65	.6	16	.2	81	.4
Subtotal Ungraded	286	2.7	102	1.3	388	2.0
TOTAL	10737	100.0	7871	100.0	18608	100.0

TABLE A.23

Preschool, regular or special class placement of children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Type of Class	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
Preschool	46	.4	46	.6	92	.5
Regular Classes	9807	92.0	7594	96.7	17401	94.0
Special Classes	806	7.6	213	2.7	1019	5.5
Aurally Handicapped	51	(6.3)	4	(1.9)	55	(5.4)
Cerebral Palsy	136	(16.9)	33	(15.5)	169	(16.6)
Other Orthopedically Handicapped	59	(7.3)	19	(8.9)	78	(7.7)
Educable Mentally Retarded	478	(59.3)	102	(47.9)	580	(56.9)
Trainable Mentally Retarded	18	(2.2)	2	(.9)	20	(2.0)
Educationally Handicapped	15	(1.9)	39	(18.3)	54	(5.3)
Visually Handicapped	28	(3.5)	2	(.9)	30	(2.9)
Gifted	21	(2.6)	11	(5.2)	32	(3.1)
Individual Instruction Home	--	(--)	1	(.5)	1	(.1)
Individual Instruction Institution	--	(--)	--	(--)	--	(--)
TOTAL	10659	100.0	7853	100.0	18512	100.0

TABLE A.24

Source of identification of children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Source of Identification	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
Speech Screening	878	8.3	2566	34.1	3444	19.0
Referral	9732	91.7	4948	65.9	14680	81.0
Teacher	6811	(70.0)	3847	(77.7)	10658	(72.6)
Parents	352	(3.6)	221	(4.5)	573	(3.9)
Self	169	(1.7)	205	(4.1)	374	(2.5)
Administrator	104	(1.1)	53	(1.1)	157	(1.1)
Guidance Personnel	132	(1.4)	90	(1.8)	222	(1.5)
Health Personnel	732	(7.5)	48	(1.0)	780	(5.3)
Other	1432	(14.7)	484	(9.8)	1916	(13.1)
TOTAL	10610	100.0	7514	100.0	18124	100.0

TABLE A.25

Speech therapy history for children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Therapy History	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
No Previous Therapy	4628	45.5	4223	58.0	8851	50.7
Previous Therapy in School	5551	54.5	3055	42.0	8606	49.3
1 Year	2960	(53.3)	1865	(61.1)	4825	(56.0)
2 Years	1197	(21.6)	666	(21.8)	1863	(21.7)
3 Years	676	(12.3)	336	(11.0)	1012	(11.8)
4 Years	329	(5.8)	123	(4.0)	452	(5.2)
5 Years	169	(3.0)	37	(1.2)	206	(2.4)
6 or More Years	220	(4.0)	28	(.9)	248	(2.9)
TOTAL	10179	100.0	7278	100.0	17457	100.0

TABLE A.26

Types of hearing tests, calibration used, and source of test information for children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Hearing Test Information	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
Types of Tests						
Screening Only	6493	85.4	3293	82.9	9786	84.5
A/C and B/C Thresholds	182	2.4	3	.1	185	1.6
A/C Thresholds Only	893	11.8	667	16.8	1560	13.5
B/C Thresholds Only	18	.2	--	--	18	.2
Speech Reception	11	.2	7	.2	18	.2
PB	2	--	--	--	2	--
TOTAL	7599	100.0	3970	100.0	11569	100.0
Calibration						
ISO	12	.5	7	.7	19	.6
ASA	2195	99.5	1020	99.3	3215	99.4
TOTAL	2207	100.0	1027	100.0	3234	100.0
Source of Test						
Audiometrist	1382	92.1	129	8.3	1511	49.6
Nurse	6	.4	1156	74.6	1162	38.1
Otologist	78	5.2	14	.9	92	3.0
Speech Clinician	3	.2	231	14.9	234	7.7
Audiology Clinic	29	2.0	18	1.2	47	1.5
Other	2	.1	1	.1	3	.1
TOTAL	1500	100.0	1549	100.0	3049	100.0

TABLE A.27

Intelligence tests used in testing children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Tests Used	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
WISC	323	3.1	245	7.3	568	4.1
Binet	1538	14.8	324	9.7	1862	13.5
Peabody	62	.6	209	6.2	271	2.0
Other	8193	78.8	2445	72.9	10638	77.4
Not Identified	277	2.7	132	3.9	409	3.0
TOTAL	10393	100.0	3355	100.0	13748	100.0

SECTION B

DISCUSSION

Expressive Speech Disorders

For the most part, the following discussion of expressive speech disorders is based on the composite data from the Los Angeles City and County caseloads. In a few instances, particularly when age was a factor, the discussion is based on the city caseload because of the greater concentration of older pupils. Occasionally, some comparisons could not be made because of the small number of pupils in the categories, which resulted from dividing the population by two factors with several attributes for each.

Intelligibility

The majority (81% to 85%) of the pupils with single expressive speech disorders were intelligible regardless of type of disorder. The pupils having little or no speech had the most problems with intelligibility, as this group had the highest proportion of unintelligible speakers relative to the other disorders. About equal numbers were partially intelligible and unintelligible. Pupils with language disorders also had intelligibility problems, though more of these pupils were partially intelligible than were unintelligible. Intelligibility problems rarely occurred when either voice disorders or stuttering was the problem. None of the pupils with voice disorders was unintelligible. Only two pupils out of the entire group of 1,250 who stuttered were unintelligible. Less than 10% in either group were partially intelligible.

On the whole, pupils with multiple expressive speech disorders had more difficulty with intelligibility than pupils with single disorders. About 59% were intelligible. Though the percentage of unintelligibility was quite low--less than 10%--the proportion was much larger than for single disorders. The proportion of partially intelligible speakers was greater also, as it was nearly double the proportion of partially intelligible speakers among those with single disorders.

When voice disorders were combined with either little or no speech or language disorders, intelligibility was relatively good. When little or no speech was combined with any of the other disorders, intelligibility was poor. However, the number of cases was very small. The same was true for language disorders combined with disorders other than voice. The combinations of articulation with either stuttering or voice disorders, or the combination of stuttering and voice disorders resulted in reasonably good intelligibility.

When the intelligible, partially intelligible, and unintelligible groups were examined separately, the highest proportion of pupils in each group had articulation disorders either as a single disorder or in combination with other disorders. This result is due, of course, to the very high percentage of articulation disorders in the population.

Response Length

Response length was inadequate for about 14% of the pupils with single disorders. Pupils with little or no speech rarely had adequate response length, while a little over one-third of those with language disorders also made inadequate responses. From 13% to 17% of the pupils with other types of disorders made inadequate responses. Usually the complaint was briefness, though a few instances of excessive verbal output were observed among the pupils, particularly those with articulation and stuttering disorders.

Pupils with multiple disorders were more often judged as making inadequate responses than pupils with single disorders. Only 63% made adequate responses. Nearly all of the pupils with the combination of little or no speech and language disorders and the combination of language disorders and articulation disorders made inadequate responses. More of the pupils with the combination of articulation with either stuttering or voice disorders or the combination of stuttering and voice disorders made adequate responses than pupils with other combinations of disorders.

Among the group of 381 pupils said to have excessive verbal output, 28 were classified as having little or no speech combined with articulation disorders, and one had little or no speech as a single disorder. These cases were about evenly divided between the city and county caseloads. Possibly the explanation for this datum is that the term "verbal" has been misapplied. These are probably cases in which the output of sound per se is excessive but has no communicative function.

Grammar

Most of the pupils with single disorders had acceptable grammar (about 86%). Approximately one-third of those said to have language disorders and a little less than one-third of those with little or no speech had poor grammar. Less than 15% of the pupils with articulation disorders and less than 10% of those with stuttering and voice problems had grammatical difficulty.

Pupils with multiple speech disorders had far more difficulty with grammar than pupils with single disorders. Only 61% had acceptable grammar. Nearly all of the pupils with little or no speech combined with disorders other than voice had poor grammar. Pupils with the combination of language and articulation disorders also had poor grammar. Though the proportions varied, about one-fourth of the pupils with each of the other combinations of disorders had poor grammar.

Vocabulary

Eleven per cent of the pupils with single disorders had limited vocabularies. More pupils with little or no speech or language disorders had limited vocabularies than pupils with other kinds of problems. Less than 10% of the pupils with stuttering and voice disorders had limited vocabularies, while slightly over 10% of the pupils who had articulation disorders were classified as having this kind of deficiency.

Nearly one-third of the pupils with multiple disorders had difficulty with vocabulary. Pupils with the same combination of disorders for which poor grammar obtained also had limited vocabularies.

Sex Ratio

In general, there were two males for every female with single expressive speech disorders. The greatest difference between sexes obtained for stuttering for which the ratio was four males for every female. The sex ratio for both language and articulation disorders was two males for every female. About equal proportions of males and females had little or no speech and voice disorders.

The ratio of males to females was only slightly higher for multiple speech disorders than for single disorders, as there were 2.5 males for every female in this group. The ratio of males to females for the various combinations of disorders was variable. Somewhat higher proportions of females produced the combination of language and articulation disorders, and language and voice disorders than other combinations; nonetheless, the proportion of males in all of the multiple speech disorders categories was consistently higher.

Age

Because of the difference in age between the city and county caseloads, the city sample is more representative of distributions that might be found when a substantial number of junior and senior high school pupils are included. Because of the number of elementary districts only in the county sample, the county data are more representative of programs concentrated in elementary schools. Therefore, the age distributions among the various disorders are discussed separately. For this analysis, data were retrieved by age groups of two years each.

In the older sample, little or no speech was found mainly in the groups from 5 through 10 years, and again among the 13- and 14-year-olds. The concentration of language and articulation disorders was found among the 7- and 8-year-olds, though a relatively high proportion of articulation disorders was also found among the 9- and 10-year-olds. The largest proportion of stuttering cases came from among the 13- and 14-year-olds, though relatively high proportions came from among the 9- through 12-year group. Half of the voice cases were from the 13- through 16-year group.

In general, little interaction between age and single versus multiple disorders was observed. Slightly lower proportions of pupils with multiple disorders came from the younger groups, and slightly higher proportions came from the pupils 13 years or older.

In the county sample, representing a generally younger population, most of the pupils having single disorders of little or no speech and articulation disorders were in the 5- through 8-year group. Language disorders came from the 5- through 10-year group, though the 9- and 10-year-olds contributed a smaller proportion than the younger pupils. The highest proportion of stuttering cases came from the 7- through 10-year group, while most of the voice disorders were 9- through 12-year-olds.

In this sample, the proportion of pupils in the 5- and 6-year group having multiple disorders was relatively higher than for single disorders.

Examination of the distribution of disorders within each age group separately showed that the proportions of little or no speech and language disorders decreased sharply after four years and remained fairly constant thereafter. The proportion of articulation disorders decreased steadily with age, while the proportion of stuttering increased steadily. The proportion of voice disorders also increased with age, though not to the same extent as stuttering.

Among multiple disorders, the proportion of little or no speech combined with articulation disorders decreased sharply at five years of age, but remained fairly constant thereafter through the 13- through 14-year group before decreasing. Proportions of articulation disorders combined with stuttering increased with age rather sharply through the 17- through 18-year group. Articulation combined with voice disorders also increased with age. A slight increase in voice disorders combined with stuttering was observed in the 13- through 16-year group.

Academic Achievement

Considering both samples, a little over 40% of the pupils with single disorders had below average achievement in reading and a little less than 40% had below average achievement in arithmetic fundamentals and reasoning. Slightly more than one-third were average, except for arithmetic fundamentals, in which nearly 40% were average. One-fourth to one-fifth were above average, a few more being above average in arithmetic reasoning than in the other areas, though the difference was slight. Smaller proportions of pupils with voice and articulation disorders had below average achievement in all of these areas in comparison with pupils with other single disorders.

A higher proportion of pupils with multiple disorders had below average achievement and a smaller proportion had above average achievement. Among these pupils, the proportion with below average reading achievement was a little larger than the proportion below average in arithmetic.

Lateral Preference

Though lateral preference has, at best, only a tenuous relation to oral communication difficulty, the data are noteworthy in that nearly identical percentages obtained in both the city and county samples. Considering the relatively poorer performance of pupils with multiple speech disorders, a somewhat higher proportion of mixed hand preference might be expected among this group if poor speech and mixed laterality stem from the same underlying condition as has been postulated by some speech pathologists.

While a consistently higher proportion of pupils with multiple disorders manifested mixed hand, foot, or eye preference and a consistently lower percentage showed right side preference than pupils with single disorders, the difference was slight--on the order of a difference of about two points. In both groups, however, the percentage having mixed preference was small, being less than 10%. The proportions in the two groups manifesting left preference was nearly identical.

A consistently smaller proportion of pupils having little or no speech or language disorders as single disorders showed right side preference than pupils with other disorders. No consistent pattern emerged among pupils with the various combinations of disorders.

Previous Therapy

On the whole, differences between number of years of previous therapy for pupils with single disorders and those with multiple disorders were slight. The proportion of pupils with articulation as a single disorder having extended therapy was small in comparison with other disorders. Differences in the proportions of pupils with language, stuttering, and voice disorders remaining in the caseload for two years or more were small, except that a relatively higher proportion of pupils with voice disorders had had two years of therapy and the difference between the proportion having had two and three years of therapy was greater for this group. The number of cases with little or no speech was too small for meaningful comparisons.

Among the group with multiple disorders, there was a tendency for pupils with articulation combined with other disorders to remain in therapy longer than pupils with articulation as a single disorder. The number of cases in other categories of multiple disorders was too small for comparisons.

SECTION B

ORGANIZATION OF TABLES

Expressive Speech Disorders

TABLE B.1

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by intelligibility rating within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

	Intelligibility							
Expressive Speech Disorder	Intelligible		Partially Intelligible		Unintelligible		Total	
	Number	%	Number	%	Number	%	Number	%
Single Disorder								
Little or No Speech	35	53.0	16	24.3	15	22.7	66	100.0
Language Disorder	48	64.0	21	28.0	6	8.0	75	100.0
Articulation	5911	79.3	1406	18.9	135	1.8	7452	100.0
Stuttering	967	95.5	44	4.3	2	.2	1013	100.0
Voice Disorder	89	92.7	7	7.3	--	--	96	100.0
TOTAL	7050	81.0	1494	17.2	158	1.8	8702	100.0
Multiple Disorders								
L./No Speech-Lang.	3	14.2	9	42.9	9	42.9	21	100.0
L./No Speech-Artic.	100	35.3	152	53.7	31	11.0	283	100.0
L./No Speech-Stut.	10	52.6	8	42.1	1	5.3	19	100.0
L./No Speech-Voice	5	71.4	2	28.6	--	--	7	100.0
Lang.-Artic.	41	26.1	72	45.9	44	28.0	157	100.0
Lang.-Stut.	5	55.6	3	33.3	1	11.1	9	100.0
Lang.-Voice	12	70.6	2	11.8	3	17.6	17	100.0
Artic.-Stut.	458	75.1	133	21.8	19	3.1	610	100.0
Artic.-Voice	310	64.1	155	32.0	19	3.9	484	100.0
Stut.-Voice	35	97.2	1	2.8	--	--	36	100.0
TOTAL	979	59.6	537	32.7	127	7.7	1643	100.0

TABLE B.2

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by intelligibility rating within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Intelligibility							
	Intelligible		Partially Intelligible		Unintelligible		Total	
	Number	%	Number	%	Number	%	Number	%
Single Disorder								
Little or No Speech	22	61.1	9	25.0	5	13.9	36	100.0
Language Disorder	41	74.5	11	20.0	3	5.5	55	100.0
Articulation	5110	86.0	723	12.2	110	1.8	5943	100.0
Stuttering	223	94.1	14	5.9	--	--	237	100.0
Voice Disorder	61	91.0	6	9.0	--	--	67	100.0
TOTAL	5457	86.1	763	12.0	118	1.9	6338	100.0
Multiple Disorders								
L./No Speech-Lang.	1	6.7	8	53.3	6	40.0	15	100.0
L./No Speech-Artic.	97	38.5	132	52.4	23	9.1	252	100.0
L./No Speech-Stut.	5	50.0	5	50.0	--	--	10	100.0
L./No Speech-Voice	3	75.0	1	25.0	--	--	4	100.0
Lang.-Artic.	27	34.6	31	39.8	20	25.6	78	100.0
Lang.-Stut.	2	100.0	--	--	--	--	2	100.0
Lang.-Voice	20	62.5	8	25.0	4	12.5	32	100.0
Artic.-Stut.	171	66.3	80	31.0	7	2.7	258	100.0
Artic.-Voice	268	68.9	102	26.2	19	4.9	389	100.0
Stut.-Voice	18	75.0	6	25.0	--	--	24	100.0
TOTAL	612	57.5	373	35.1	79	7.4	1064	100.0

TABLE B.3

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by single and multiple expressive speech disorders separately within groups rated as intelligible, partially intelligible, and unintelligible. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Intelligibility							
	Intelligible		Partially Intelligible		Unintelligible		Total	
	Number	%	Number	%	Number	%	Number	%
Single Disorder								
Little or No Speech	35	.5	16	1.1	15	9.5	66	.8
Language Disorder	48	.7	21	1.4	6	3.8	75	.9
Articulation	5911	83.8	1406	94.1	135	85.4	7452	85.6
Stuttering	967	13.7	44	2.9	2	1.3	1013	11.6
Voice Disorder	89	1.3	7	.5	--	--	96	1.1
TOTAL	7050	100.0	1494	100.0	158	100.0	8702	100.0
Multiple Disorders								
L./No Speech-Lang.	3	.3	9	1.7	9	7.1	21	1.3
L./No Speech-Artic.	100	10.2	152	28.3	31	24.4	283	17.2
L./No Speech-Stut.	10	1.0	8	1.5	1	.8	19	1.2
L./No Speech-Voice	5	.5	2	.4	--	--	7	.4
Lang.-Artic.	41	4.2	72	13.4	44	34.6	157	9.6
Lang.-Stut.	5	.5	3	.5	1	.8	9	.5
Lang.-Voice	12	1.2	2	.4	3	2.3	17	1.0
Artic.-Stut.	458	46.8	133	24.8	19	15.0	610	37.1
Artic.-Voice	310	31.7	155	28.8	19	15.0	484	29.5
Stut.-Voice	35	3.6	1	.2	--	--	36	2.2
TOTAL	979	100.0	537	100.0	127	100.0	1643	100.0

TABLE B.4

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by single and multiple expressive speech disorders separately within groups rated as intelligible, partially intelligible, and unintelligible. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Intelligibility: Intelligible Number	%	Partially Intelligible Number	%	Unintelligible Number	%	Total Number	%
Single Disorder								
Little or No Speech	22	.4	9	1.2	5	4.2	36	.6
Language Disorder	41	.8	11	1.4	3	2.6	55	.9
Articulation	5110	93.6	723	94.8	110	93.2	5943	93.8
Stuttering	223	4.1	14	1.8	--	--	237	3.7
Voice Disorder	61	1.1	6	.8	--	--	67	1.0
TOTAL	5457	100.0	763	100.0	118	100.0	6338	100.0
Multiple Disorders								
L./No Speech-Lang.	1	.2	8	2.1	6	7.6	15	1.4
L./No Speech-Artic.	97	15.9	132	35.4	23	29.1	252	23.7
L./No Speech-Stut.	5	.8	5	1.3	--	--	10	.9
L./No Speech-Voice	3	.5	1	.3	--	--	4	.4
Lang.-Artic.	27	4.4	31	8.3	20	25.3	78	7.3
Lang.-Stut.	2	.3	--	--	--	--	2	.2
Lang.-Voice	20	3.3	8	2.1	4	5.1	32	3.0
Artic.-Stut.	171	27.9	80	21.5	7	8.9	258	24.2
Artic.-Voice	268	43.8	102	27.4	19	24.0	389	36.6
Stut.-Voice	18	2.9	6	1.6	--	--	24	2.3
TOTAL	612	100.0	373	100.0	79	100.0	1064	100.0

TABLE B.5

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by categories of response length within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder. (This table is completed on the succeeding page.)

	Response Length							
Expressive	Acceptable		Inadequate		Little or No Response		Brief	
Speech Disorder	Number	%	Number	%	Number	%	Number	%
Single Disorder								
Little or No Speech	11	16.4	56	83.6	28	(50.0)	25	(44.6)
Language Disorder	51	67.1	25	32.9	6	(24.0)	17	(68.0)
Articulation	6433	86.2	1026	13.8	109	(10.6)	755	(73.6)
Stuttering	871	84.8	156	15.2	22	(14.1)	105	(67.3)
Voice Disorder	80	83.3	16	16.7	1	(6.2)	14	(87.5)
TOTAL	7446	85.3	1279	14.7	166	(13.0)	916	(71.6)
Multiple Disorders								
L./No Speech-Lang.	1	4.8	20	95.2	13	(65.0)	7	(35.0)
L./No Speech-Artic.	115	40.5	169	59.5	33	(19.5)	116	(68.6)
L./No Speech-Stut.	10	50.0	10	50.0	4	(40.0)	6	(60.0)
L./No Speech-Voice	5	62.5	3	37.5	--	(--)	3	(100.0)
Lang.-Artic.	14	8.8	146	91.2	65	(44.5)	75	(51.4)
Lang.-Stut.	3	30.0	7	70.0	2	(28.6)	5	(71.4)
Lang.-Voice	7	58.8	10	41.2	3	(30.0)	6	(60.0)
Artic.-Stut.	483	77.8	138	22.2	17	(12.3)	91	(66.0)
Artic.-Voice	373	76.9	112	23.1	6	(5.3)	85	(75.9)
Stut.-Voice	27	75.0	9	25.0	2	(22.2)	4	(44.5)
TOTAL	1038	62.5	624	37.5	145	(23.2)	398	(63.8)

4

TABLE B.5 (continued)

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by categories of response length within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Response Length: Excessive Number	%	Other Number	%	Total Number	%
Single Disorder						
Little or No Speech	1	(1.8)	2	(3.6)	67	100.0
Language Disorder	2	(8.0)	--	(--)	76	100.0
Articulation	142	(13.8)	20	(2.0)	7459	100.0
Stuttering	26	(16.7)	3	(1.9)	1027	100.0
Voice Disorder	1	(6.3)	--	(--)	96	100.0
TOTAL	172	(13.4)	25	(2.0)	8725	100.0
Multiple Disorders						
L./No Speech-Lang.	--	(--)	--	(--)	21	100.0
L./No Speech-Artic.	14	(8.3)	6	(3.6)	284	100.0
L./No Speech-Stut.	--	(--)	--	(--)	20	100.0
L./No Speech-Voice	--	(--)	--	(--)	8	100.0
Lang.-Artic.	1	(.7)	5	(3.4)	160	100.0
Lang.-Stut.	--	(--)	--	(--)	10	100.0
Lang.-Voice	--	(--)	1	(10.0)	17	100.0
Artic.-Stut.	26	(18.8)	4	(2.9)	621	100.0
Artic.-Voice	18	(16.1)	3	(2.7)	485	100.0
Stut.-Voice	3	(33.3)	--	(--)	36	100.0
TOTAL	62	(9.9)	19	(3.1)	1662	100.0

TABLE B.6

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by categories of response length within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder. (This table is completed on the succeeding page.)

Expressive Speech Disorder	Response Length							
	Acceptable		Inadequate		Little or No Response		Brief	
	Number	%	Number	%	Number	%	Number	%
Single Disorder								
Little or No Speech	3	7.3	38	92.7	19	(50.0)	18	(47.4)
Language Disorder	35	59.3	24	40.7	3	(12.5)	18	(75.0)
Articulation	5264	89.1	645	10.9	59	(9.2)	491	(76.1)
Stuttering	208	87.8	29	12.2	3	(10.3)	14	(48.3)
Voice Disorder	55	82.1	12	17.9	--	(--)	7	(58.3)
TOTAL	5565	88.2	748	11.8	84	(11.2)	548	(73.3)
Multiple Disorders								
L./No Speech-Lang.	2	14.3	12	85.7	8	(66.7)	3	(25.0)
L./No Speech-Artic.	124	48.4	132	51.6	14	(10.6)	96	(72.7)
L./No Speech-Stut.	6	66.7	3	33.3	1	(33.3)	1	(33.3)
L./No Speech-Voice	3	75.0	1	25.0	--	(--)	1	(100.0)
Lang.-Artic.	4	5.1	74	94.9	35	(47.4)	38	(51.3)
Lang.-Stut.	1	50.0	1	50.0	--	(--)	1	(100.0)
Lang.-Voice	17	53.1	15	46.9	5	(33.3)	9	(60.0)
Artic.-Stut.	192	75.6	62	24.4	9	(14.5)	40	(64.5)
Artic.-Voice	305	78.8	82	21.2	10	(12.2)	55	(67.1)
Stut.-Voice	15	62.5	9	37.5	--	(--)	4	(44.4)
TOTAL	669	63.1	391	36.9	82	(21.0)	248	(63.4)

TABLE B.6 (continued)

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by categories of response length within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Response Length: Excessive Number	Response Length: Excessive %	Response Length: Other Number	Response Length: Other %	Total Number	Total %
Single Disorder						
Little or No Speech	--	(--)	1	(2.6)	41	100.0
Language Disorder	3	(12.5)	--	(--)	59	100.0
Articulation	82	(12.7)	13	(2.0)	5909	100.0
Stuttering	10	(34.5)	2	(6.9)	237	100.0
Voice Disorder	5	(41.7)	--	(--)	67	100.0
TOTAL	100	(13.4)	16	(2.1)	6313	100.0
Multiple Disorders						
L./No Speech-Lang.	--	(--)	1	(8.3)	14	100.0
L./No Speech-Artic.	14	(10.6)	8	(6.1)	256	100.0
L./No Speech-Stut.	--	(--)	1	(33.4)	9	100.0
L./No Speech-Voice	--	(--)	--	(--)	4	100.0
Lang.-Artic.	--	(--)	1	(1.3)	78	100.0
Lang.-Stut.	--	(--)	--	(--)	2	100.0
Lang.-Voice	1	(6.7)	--	(--)	32	100.0
Artic.-Stut.	12	(19.4)	1	(1.6)	254	100.0
Artic.-Voice	16	(19.5)	1	(1.2)	387	100.0
Stut.-Voice	4	(44.4)	1	(11.2)	24	100.0
TOTAL	47	(12.0)	14	(3.6)	1060	100.0

TABLE B.7

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by single and multiple expressive speech disorders separately within categories of length of response. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder. (This table is completed on the succeeding page.)

Expressive Speech Disorder	Response Length							
	Acceptable		Inadequate		Little or No Response		Brief	
	Number	%	Number	%	Number	%	Number	%
Single Disorder								
Little or No Speech	11	.1	56	4.4	28	16.9	25	2.7
Language Disorder	51	.7	25	2.0	6	3.6	17	1.9
Articulation	6433	86.4	1026	80.2	109	65.7	755	82.4
Stuttering	871	11.7	156	12.2	22	13.2	105	11.5
Voice Disorder	80	1.1	16	1.2	1	.6	14	1.5
TOTAL	7446	100.0	1279	100.0	166	100.0	916	100.0
Multiple Disorders								
L./No Speech-Lang.	1	.1	20	3.2	13	9.0	7	1.8
L./No Speech-Artic.	115	11.1	169	27.1	33	22.7	116	29.1
L./No Speech-Stut.	10	1.0	10	1.6	4	2.8	6	1.5
L./No Speech-Voice	5	.5	3	.5	--	--	3	.7
Lang.-Artic.	14	1.3	146	23.4	65	44.8	75	18.8
Lang.-Stut.	3	.3	7	1.1	2	1.4	5	1.3
Lang.-Voice	7	.7	10	1.6	3	2.1	6	1.5
Artic.-Stut.	483	46.5	138	22.1	17	11.7	91	22.9
Artic.-Voice	373	35.9	112	18.0	6	4.1	85	21.4
Stut.-Voice	27	2.6	9	1.4	2	1.4	4	1.0
TOTAL	1038	100.0	624	100.0	145	100.0	398	100.0

TABLE B.7 (continued)

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by single and multiple expressive speech disorders separately within categories of length of response. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Response Length					
	Excessive		Other		Total	
	Number	%	Number	%	Number	%
Single Disorder						
Little or No Speech	1	.6	2	8.0	67	.7
Language Disorder	2	1.2	--	--	76	.9
Articulation	142	82.5	20	80.0	7459	85.5
Stuttering	26	15.1	3	12.0	1027	11.8
Voice Disorder	1	.6	--	--	96	1.1
TOTAL	172	100.0	25	100.0	8725	100.0
Multiple Disorders						
L./No Speech-Lang.	--	--	--	--	21	1.2
L./No Speech-Artic.	14	22.6	6	31.6	284	17.1
L./No Speech-Stut.	--	--	--	--	20	1.2
L./No Speech-Voice	--	--	--	--	8	.5
Lang.-Artic.	1	1.6	5	26.3	160	9.6
Lang.-Stut.	--	--	--	--	10	.6
Lang.-Voice	--	--	1	5.3	17	1.0
Artic.-Stut.	26	41.9	4	21.0	621	37.4
Artic.-Voice	18	29.0	3	15.8	485	29.2
Stut.-Voice	3	4.9	--	--	36	2.2
TOTAL	62	100.0	19	100.0	1662	100.0

TABLE B.8

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by single and multiple expressive speech disorders separately within categories of length of response. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder. (This table is completed on the succeeding page.)

Expressive Speech Disorder	Response Length							
	Acceptable		Inadequate		Little or No Response		Brief	
	Number	%	Number	%	Number	%	Number	%
Single Disorder								
Little or No Speech	3	.1	38	5.1	19	22.6	18	3.3
Language Disorder	35	.6	24	3.2	3	3.6	18	3.3
Articulation	5264	94.6	645	86.2	59	70.2	491	89.6
Stuttering	208	3.7	29	3.9	3	3.6	14	2.5
Voice Disorder	55	1.0	12	1.6	--	--	7	1.3
TOTAL	5565	100.0	748	100.0	84	100.0	548	100.0
Multiple Disorders								
L./No Speech-Lang.	2	.3	12	3.1	8	9.7	3	1.2
L./No Speech-Artic.	124	18.5	132	33.8	14	17.1	96	38.7
L./No Speech-Stut.	6	.9	3	.8	1	1.2	1	.4
L./No Speech-Voice	3	.5	1	.2	--	--	1	.4
Lang.-Artic.	4	.6	74	18.9	35	42.7	38	15.3
Lang.-Stut.	1	.2	1	.2	--	--	1	.4
Lang.-Voice	17	2.5	15	3.8	5	6.1	9	3.7
Artic.-Stut.	192	28.7	62	15.9	9	11.0	40	16.1
Artic.-Voice	305	45.6	82	21.0	10	12.2	55	22.2
Stut.-Voice	15	2.2	9	2.3	--	--	4	1.6
TOTAL	669	100.0	391	100.0	82	100.0	248	100.0

TABLE B.8 (continued)

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by single and multiple expressive speech disorders separately within categories of length of response. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Response Length: Excessive Number	%	Other Number	%	Total Number	%
Single Disorder						
Little or No Speech	--	--	1	6.3	41	.6
Language Disorder	3	3.0	--	--	59	.9
Articulation	82	82.0	13	81.2	5909	93.6
Stuttering	10	10.0	2	12.5	237	3.8
Voice Disorder	5	5.0	--	--	67	1.1
TOTAL	100	100.0	16	100.0	6313	100.0
Multiple Disorders						
L./No Speech-Lang.	--	--	1	7.1	14	1.3
L./No Speech-Artic.	14	29.8	8	57.4	256	24.1
L./No Speech-Stut.	--	--	1	7.1	9	.8
L./No Speech-Voice	--	--	--	--	4	.4
Lang.-Artic.	--	--	1	7.1	78	7.4
Lang.-Stut.	--	--	--	--	2	.2
Lang.-Voice	1	2.1	--	--	32	3.0
Artic.-Stut.	12	25.5	1	7.1	254	24.0
Artic.-Voice	16	34.1	1	7.1	387	36.5
Stut.-Voice	4	8.5	1	7.1	24	2.3
TOTAL	47	100.0	14	100.0	1060	100.0

TABLE B.9

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by acceptability of grammar usage and vocabulary within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive	Grammar						Vocabulary					
	Acceptable		Poor		Total		Acceptable		Limited		Total	
Speech Disorder	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Single Disorder												
Little or No Speech	45	67.2	22	32.8	67	100.0	35	47.3	39	52.7	74	100.0
Language Disorder	46	66.7	23	33.3	69	100.0	46	59.7	31	40.3	77	100.0
Articulation	6315	85.3	1086	14.7	7401	100.0	6525	87.3	950	12.7	7475	100.0
Stuttering	919	90.9	92	9.1	1011	100.0	945	92.6	75	7.4	1020	100.0
Voice Disorder	86	91.5	8	8.5	94	100.0	85	89.5	10	10.5	95	100.0
TOTAL	7411	85.8	1231	14.2	8642	100.0	7636	87.4	1105	12.6	8741	100.0
Multiple Disorders												
L./No Speech-Lang.	1	5.6	17	94.4	18	100.0	--	--	20	100.0	20	100.0
L./No Speech-Artic.	73	26.0	208	74.0	281	100.0	75	26.4	209	73.6	284	100.0
L./No Speech-Stut.	10	52.6	9	47.4	19	100.0	9	45.0	11	55.0	20	100.0
L./No Speech-Voice	6	75.0	2	25.0	8	100.0	6	75.0	2	25.0	8	100.0
Lang.-Artic.	58	39.2	90	60.8	148	100.0	43	28.7	107	71.3	150	100.0
Lang.-Stut.	7	70.0	3	30.0	10	100.0	4	40.0	6	60.0	10	100.0
Lang.-Voice	13	86.7	2	13.3	15	100.0	13	76.5	4	23.5	17	100.0
Artic.-Stut.	473	77.0	141	23.0	614	100.0	489	78.7	132	21.3	621	100.0
Artic.-Voice	381	79.0	101	21.0	482	100.0	376	77.8	107	22.2	483	100.0
Stut.-Voice	29	85.3	5	14.7	34	100.0	32	91.4	3	8.6	35	100.0
TOTAL	1051	64.5	578	35.5	1629	100.0	1047	63.5	601	36.5	1648	100.0

TABLE B.10

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by acceptability of grammar usage and vocabulary within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

	Grammar						Vocabulary					
Expressive Speech Disorder	Acceptable		Poor		Total		Acceptable		Limited		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Single Disorder												
Little or No Speech	27	75.0	9	25.0	36	100.0	22	57.9	16	42.1	38	100.0
Language Disorder	38	66.7	19	33.3	57	100.0	36	61.0	23	39.0	59	100.0
Articulation	4990	87.3	724	12.7	5714	100.0	5379	91.7	490	8.3	5869	100.0
Stuttering	210	92.9	16	7.1	226	100.0	226	96.2	9	3.8	235	100.0
Voice Disorder	62	92.5	5	7.5	67	100.0	62	92.5	5	7.5	67	100.0
TOTAL	5327	87.3	773	12.7	6100	100.0	5725	91.5	543	8.5	6268	100.0
Multiple Disorders												
L./No Speech-Lang.	--	--	14	100.0	14	100.0	--	--	14	100.0	14	100.0
L./No Speech-Artic.	55	22.6	188	77.4	243	100.0	90	35.7	162	64.3	252	100.0
L./No Speech-Stut.	3	33.3	6	66.7	9	100.0	2	22.2	7	77.8	9	100.0
L./No Speech-Voice	2	50.0	2	50.0	4	100.0	1	25.0	3	75.0	4	100.0
Lang.-Artic	18	26.1	51	73.9	69	100.0	14	19.4	58	80.6	72	100.0
Lang.-Stut.	2	100.0	--	--	2	100.0	2	100.0	--	--	2	100.0
Lang.-Voice	16	53.3	14	46.7	30	100.0	23	71.9	9	28.1	32	100.0
Artic.-Stut.	178	72.4	68	27.6	246	100.0	208	82.2	45	17.8	253	100.0
Artic.-Voice	290	76.5	89	23.5	379	100.0	323	84.1	61	15.9	384	100.0
Stut.-Voice	19	79.2	5	20.8	24	100.0	21	87.5	3	12.5	24	100.0
TOTAL	583	57.2	437	42.8	1020	100.0	684	65.4	362	34.6	1046	100.0

TABLE B.11

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by single and multiple expressive speech disorders separately within categories of grammar usage and vocabulary acceptability. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive	Grammar						Vocabulary					
	Acceptable		Poor		Total		Acceptable		Limited		Total	
Speech Disorder	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Single Disorder												
Little or No Speech	45	.6	22	1.8	67	.8	35	.5	39	3.5	74	.8
Language Disorder	46	.6	23	1.9	69	.8	46	.6	31	2.8	77	.9
Articulation	6315	85.2	1086	88.2	7401	85.6	6525	85.4	950	86.0	7475	85.5
Stuttering	919	12.4	92	7.5	1011	11.7	945	12.4	75	6.8	1020	11.7
Voice Disorder	86	1.2	8	.6	94	1.1	85	1.1	10	.9	95	1.1
TOTAL	7411	100.0	1231	100.0	8642	100.0	7636	100.0	1105	100.0	8741	100.0
Multiple Disorders												
L./No Speech-Lang.	1	.1	17	2.9	18	1.1	--	--	20	3.3	20	1.2
L./No Speech-Artic.	73	6.9	208	36.0	281	17.2	75	7.2	209	34.8	284	17.2
L./No Speech-Stut.	10	1.0	9	1.6	19	1.2	9	.9	11	1.8	20	1.2
L./No Speech-Voice	6	.6	2	.3	8	.5	6	.6	2	.3	8	.5
Lang.-Artic.	58	5.5	90	15.6	148	9.1	43	4.1	107	17.8	150	9.1
Lang.-Stut.	7	.7	3	.5	10	.6	4	.4	6	1.0	10	.6
Lang.-Voice	13	1.2	2	.3	15	.9	13	1.2	4	.7	17	1.0
Artic.-Stut.	473	45.0	141	24.4	614	37.7	489	46.7	132	22.0	621	37.7
Artic.-Voice	381	36.2	101	17.5	482	29.6	376	35.9	107	17.8	483	29.3
Stut.-Voice	29	2.8	5	.9	34	2.1	32	3.0	3	.5	35	2.2
TOTAL	1051	100.0	578	100.0	1629	100.0	1047	100.0	601	100.0	1648	100.0

TABLE B.12

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by single and multiple expressive speech disorders separately within categories of grammar usage and vocabulary acceptability. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive	Grammar						Vocabulary					
	Acceptable		Poor		Total		Acceptable		Limited		Total	
Speech Disorder	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Single Disorder												
Little or No Speech	27	.5	9	1.2	36	.6	22	.4	16	3.0	38	.6
Language Disorder	38	.7	19	2.4	57	.9	36	.6	23	4.2	59	.9
Articulation	4990	93.7	724	93.7	5714	93.7	5379	94.0	490	90.2	5869	93.6
Stuttering	210	3.9	16	2.1	226	3.7	226	3.9	9	1.7	235	3.8
Voice Disorder	62	1.2	5	.6	67	1.1	62	1.1	5	.9	67	1.1
TOTAL	5327	100.0	773	100.0	6100	100.0	5725	100.0	543	100.0	6268	100.0
Multiple Disorders												
L./No Speech-Lang.	--	--	14	3.2	14	1.4	--	--	14	3.9	14	1.3
L./No Speech-Artic.	55	9.4	188	43.0	243	23.8	90	13.2	162	44.8	252	24.1
L./No Speech-Stut.	3	.5	6	1.4	9	.9	2	.3	7	1.9	9	.9
L./No Speech-Voice	2	.3	2	.4	4	.4	1	.1	3	.8	4	.4
Lang.-Artic.	18	3.1	51	11.7	69	6.8	14	2.0	58	16.0	72	6.9
Lang.-Stut.	2	.3	--	--	2	.2	2	.3	--	--	2	.2
Lang.-Voice	16	2.8	14	3.2	30	2.9	23	3.4	9	2.5	32	3.0
Artic.-Stut.	178	30.5	68	15.6	246	24.1	208	30.4	45	12.4	253	24.2
Artic.-Voice	290	49.8	89	20.4	379	37.2	323	47.2	61	16.9	384	36.7
Stut.-Voice	19	3.3	5	1.1	24	2.3	21	3.1	3	.8	24	2.3
TOTAL	583	100.0	437	100.0	1020	100.0	684	100.0	362	100.0	1046	100.0

TABLE B.13

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by sex within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

	Sex					
Expressive Speech Disorder	Males		Females		Total	
	Number	%	Number	%	Number	%
Single Disorders						
Little or No Speech	31	45.6	37	54.4	68	100.0
Language Disorder	52	65.8	27	34.2	79	100.0
Articulation	4927	66.2	2513	33.8	7440	100.0
Stuttering	800	78.7	217	21.3	1017	100.0
Voice Disorder	49	51.0	47	49.0	96	100.0
TOTAL	5859	67.3	2841	32.7	8700	100.0
Multiple Disorders						
L./No Speech-Lang.	16	76.2	5	23.8	21	100.0
L./No Speech-Artic.	189	66.5	95	33.5	284	100.0
L./No Speech-Stut.	17	85.0	3	15.0	20	100.0
L./No Speech-Voice	5	71.4	2	28.6	7	100.0
Lang.-Artic.	93	58.1	67	41.9	160	100.0
Lang.-Stut.	10	100.0	--	--	10	100.0
Lang.-Voice	10	58.8	7	41.2	17	100.0
Artic.-Stut.	487	78.3	135	21.7	622	100.0
Artic.-Voice	302	62.8	179	37.2	481	100.0
Stut.-Voice	29	78.4	8	21.6	37	100.0
TOTAL	1158	69.8	501	30.2	1659	100.0

TABLE B.14

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by sex within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Sex					
	Males		Females		Total	
	Number	%	Number	%	Number	%
Single Disorder						
Little or No Speech	26	59.1	18	40.9	44	100.0
Language Disorder	37	61.7	23	38.3	60	100.0
Articulation	3919	64.8	2127	35.2	6046	100.0
Stuttering	202	80.2	50	19.8	252	100.0
Voice Disorder	35	50.0	35	50.0	70	100.0
TOTAL	4219	65.2	2253	34.8	6472	100.0
Multiple Disorders						
L./No Speech-Lang.	8	53.3	7	46.7	15	100.0
L./No Speech-Artic.	174	66.9	86	33.1	260	100.0
L./No Speech-Stut.	9	90.0	1	10.0	10	100.0
L./No Speech-Voice	4	80.0	1	20.0	5	100.0
Lang.-Artic.	52	65.0	28	35.0	80	100.0
Lang.-Stut.	1	50.0	1	50.0	2	100.0
Lang.-Voice	20	62.5	12	37.5	32	100.0
Artic.-Stut.	226	85.0	40	15.0	266	100.0
Artic.-Voice	268	67.8	127	32.2	395	100.0
Stut.-Voice	18	75.0	6	25.0	24	100.0
TOTAL	780	71.6	309	28.4	1089	100.0

TABLE B.15

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by single and multiple expressive speech disorders for males and females. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Sex					
	Males		Females		Total	
	Number	%	Number	%	Number	%
Single Disorders						
Little or No Speech	31	.5	37	1.3	68	.8
Language Disorder	52	.9	27	.9	79	.9
Articulation	4927	84.1	2513	88.5	7440	85.5
Stuttering	800	13.7	217	7.6	1017	11.7
Voice Disorder	49	.8	47	1.7	96	1.1
TOTAL	5859	100.0	2841	100.0	8700	100.0
Multiple Disorders						
L./No Speech-Lang.	16	1.4	5	1.0	21	1.3
L./No Speech-Artic.	189	16.3	95	19.0	284	17.1
L./No Speech-Stut.	17	1.5	3	.6	20	1.2
L./No Speech-Voice	5	.4	2	.4	7	.4
Lang.-Artic.	93	8.0	67	13.4	160	9.7
Lang.-Stut.	10	.9	--	--	10	.6
Lang.-Voice	10	.9	7	1.4	17	1.0
Artic.-Stut.	487	42.0	135	26.9	622	37.5
Artic.-Voice	302	26.1	179	35.7	481	29.0
Stut.-Voice	29	2.5	8	1.6	37	2.2
TOTAL	1158	100.0	501	100.0	1659	100.0

TABLE B.16

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by single and multiple expressive speech disorders for males and females. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

	Sex					
Expressive	Males		Females		Total	
Speech Disorder	Number	%	Number	%	Number	%
Single Disorder						
Little or No Speech	26	.6	18	.8	44	.7
Language Disorder	37	.9	23	1.0	60	.9
Articulation	3919	92.9	2127	94.4	6046	93.4
Stuttering	202	4.8	50	2.2	252	3.9
Voice Disorder	35	.8	35	1.6	70	1.1
TOTAL	4219	100.0	2253	100.0	6472	100.0
Multiple Disorders						
L./No Speech-Lang.	8	1.0	7	2.3	15	1.4
L./No Speech-Artic.	174	22.3	86	27.8	260	23.9
L./No Speech-Stut.	9	1.1	1	.3	10	.9
L./No Speech-Voice	4	.5	1	.3	5	.5
Lang.-Artic.	52	6.7	28	9.1	80	7.3
Lang.-Stut.	1	.1	1	.3	2	.2
Lang.-Voice	20	2.6	12	3.9	32	2.9
Artic.-Stut.	226	29.0	40	13.0	266	24.4
Artic.-Voice	268	34.4	127	41.1	395	36.3
Stut.-Voice	18	2.3	6	1.9	24	2.2
TOTAL	780	100.0	309	100.0	1089	100.0

TABLE B.17

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by age groups within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder. (This table is completed on the succeeding page.)

	Age Groups in Years									
	3 - 4		5 - 6		7 - 8		9 - 10		11 - 12	
Expressive Speech Disorder	Number	%	Number	%	Number	%	Number	%	Number	%
Single Disorder										
Little or No Speech	5	7.4	14	20.5	11	16.2	12	17.6	5	7.4
Language Disorder	2	2.5	10	12.7	23	29.1	8	10.1	8	10.1
Articulation	6	.1	968	13.2	2624	35.8	1860	25.4	773	10.5
Stuttering	1	.1	33	3.3	139	13.8	178	17.7	180	17.8
Voice Disorder	--	--	4	4.4	6	6.5	10	10.9	14	15.2
TOTAL	14	.2	1029	12.0	2803	32.7	2068	24.1	980	11.4
Multiple Disorders										
L./No Speech-Lang.	--	--	7	33.3	6	28.5	3	14.3	1	4.8
L./No Speech-Artic.	6	2.1	39	13.8	85	30.0	56	19.8	34	12.0
L./No Speech-Stut.	--	--	--	--	6	30.0	4	20.0	2	10.0
L./No Speech-Voice	--	--	--	--	2	28.6	1	14.3	--	--
Lang.-Artic.	5	3.1	38	23.8	61	38.1	23	14.4	9	5.6
Lang.-Stut.	--	--	1	10.0	3	30.0	1	10.0	1	10.0
Lang.-Voice	--	--	1	5.9	4	23.5	5	29.3	1	5.9
Artic.-Stut.	2	.3	54	8.7	150	24.2	122	19.7	91	14.7
Artic.-Voice	--	--	44	9.2	124	25.9	105	22.0	58	12.1
Stut.-Voice	--	--	2	5.6	6	16.7	4	11.1	4	11.1
TOTAL	13	.8	186	11.3	447	27.1	324	19.6	201	12.2

TABLE B.17 (continued)

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by age groups within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Age Groups in Years 13 - 14 Number	%	15 - 16 Number	%	17 - 18 Number	%	19 - 20 Number	%	Total Number	%
Single Disorder										
Little or No Speech	11	16.2	6	8.8	4	5.9	--	--	68	100.0
Language Disorder	10	12.7	6	7.6	9	11.4	3	3.8	79	100.0
Articulation	602	8.2	334	4.6	157	2.1	8	.1	7332	100.0
Stuttering	233	23.1	144	14.3	96	9.5	4	.4	1008	100.0
Voice Disorder	27	29.3	20	21.7	10	10.9	1	1.1	92	100.0
TOTAL	883	10.3	510	5.9	276	3.2	16	.2	8579	100.0
Multiple Disorders										
L./No Speech-Lang.	2	9.5	1	4.8	1	4.8	--	--	21	100.0
L./No Speech-Artic.	37	13.1	13	4.6	11	3.9	2	.7	283	100.0
L./No Speech-Stut.	3	15.0	4	20.0	1	5.0	--	--	20	100.0
L./No Speech-Voice	1	14.3	3	42.8	--	--	--	--	7	100.0
Lang.-Artic.	13	8.1	6	3.8	5	3.1	--	--	160	100.0
Lang.-Stut.	2	20.0	1	10.0	1	10.0	--	--	10	100.0
Lang.-Voice	1	5.9	1	5.9	2	11.8	2	11.8	17	100.0
Artic.-Stut.	95	15.4	64	10.3	40	6.5	1	.2	619	100.0
Artic.-Voice	68	14.2	48	10.1	26	5.4	5	1.1	478	100.0
Stut.-Voice	11	30.5	7	19.4	2	5.6	--	--	36	100.0
TOTAL	233	14.1	148	8.9	89	5.4	10	.6	1651	100.0

TABLE B.18

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by age groups within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder. (This table is completed on the succeeding page.)

Expressive Speech Disorder	Age Groups in Years 3 - 4 Number	%	5 - 6 Number	%	7 - 8 Number	%	9 - 10 Number	%	11 - 12 Number	%
Single Disorder										
Little or No Speech	2	5.1	18	46.2	14	35.9	3	7.7	2	5.1
Language Disorder	--	--	16	28.1	15	26.3	13	22.8	8	14.0
Articulation	15	.2	1284	21.7	2489	42.0	1416	23.9	527	8.9
Stuttering	--	--	19	7.9	70	28.9	62	25.6	35	14.5
Voice Disorder	--	--	7	10.3	14	20.6	27	39.7	10	14.7
TOTAL	17	.3	1344	21.2	2602	41.1	1521	24.0	582	9.2
Multiple Disorders										
L./No Speech-Lang.	1	7.1	8	57.2	3	21.5	1	7.1	1	7.1
L./No Speech-Artic.	--	--	75	29.8	99	39.3	46	18.2	21	8.3
L./No Speech-Stut.	1	10.0	1	10.0	4	40.0	1	10.0	2	20.0
L./No Speech-Voice	--	--	--	--	1	20.0	2	40.0	1	20.0
Lang.-Artic.	1	1.3	41	51.9	26	32.9	8	10.1	1	1.3
Lang.-Stut.	--	--	--	--	1	50.0	1	50.0	--	--
Lang.-Voice	--	--	5	16.1	7	22.6	9	29.0	7	22.6
Artic.-Stut.	--	--	59	22.7	103	39.6	64	24.6	22	8.5
Artic.-Voice	--	--	99	25.5	147	37.9	92	23.7	33	8.5
Stut.-Voice	--	--	7	29.2	7	29.2	6	25.0	2	8.3
TOTAL	3	.3	295	27.7	398	37.4	230	21.6	90	8.4

TABLE B.18 (continued)

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by age groups within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

	Age Groups in Years									
Expressive	13 - 14		15 - 16		17 - 18		19 - 20		Total	
Speech Disorder	Number	%	Number	%	Number	%	Number	%	Number	%
Single Disorder										
Little or No Speech	--	--	--	--	--	--	--	--	39	100.0
Language Disorder	4	7.0	1	1.8	--	--	--	--	57	100.0
Articulation	160	2.7	21	.4	11	.2	1	--	5924	100.0
Stuttering	41	16.9	10	4.1	4	1.7	1	.4	242	100.0
Voice Disorder	7	10.3	2	2.9	1	1.5	--	--	68	100.0
TOTAL	212	3.4	34	.5	16	.3	2	--	6330	100.0
Multiple Disorders										
L./No Speech-Lang.	--	--	--	--	--	--	--	--	14	100.0
L./No Speech-Artic.	8	3.2	1	.4	2	.8	--	--	252	100.0
L./No Speech-Stut.	1	10.0	--	--	--	--	--	--	10	100.0
L./No Speech-Voice	1	20.0	--	--	--	--	--	--	5	100.0
Lang.-Artic.	2	2.5	--	--	--	--	--	--	79	100.0
Lang.-Stut.	--	--	--	--	--	--	--	--	2	100.0
Lang.-Voice	3	9.7	--	--	--	--	--	--	31	100.0
Artic.-Stut.	8	3.1	4	1.5	--	--	--	--	260	100.0
Artic.-Voice	11	2.8	5	1.3	--	--	1	.3	388	100.0
Stut.-Voice	2	8.3	--	--	--	--	--	--	24	100.0
TOTAL	36	3.4	10	.9	2	.2	1	.1	1065	100.0

TABLE B.19

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by single and multiple expressive speech disorders separately within age groups. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder. (This table is completed on the succeeding page.)

Expressive Speech Disorder	Age Groups in Years									
	3 - 4		5 - 6		7 - 8		9 - 10		11 - 12	
	Number	%	Number	%	Number	%	Number	%	Number	%
Single Disorder										
Little or No Speech	5	35.7	14	1.3	11	.4	12	.6	5	.5
Language Disorder	2	14.3	10	1.0	23	.8	8	.4	8	.8
Articulation	6	42.9	968	94.1	2624	93.6	1860	89.9	773	78.9
Stuttering	1	7.1	33	3.2	139	5.0	178	8.6	180	18.4
Voice Disorder	--	--	4	.4	6	.2	10	.5	14	1.4
TOTAL	14	100.0	1029	100.0	2803	100.0	2068	100.0	980	100.0
Multiple Disorders										
L./No Speech-Lang.	--	--	7	3.8	6	1.3	3	.9	1	.5
L./No Speech-Artic.	6	46.1	39	21.0	85	19.0	56	17.3	34	16.9
L./No Speech-Stut.	--	--	--	--	6	1.3	4	1.2	2	1.0
L./No Speech-Voice	--	--	--	--	2	.4	1	.3	--	--
Lang.-Artic.	5	38.5	38	20.4	61	13.7	23	7.1	9	4.5
Lang.-Stut.	--	--	1	.5	3	.7	1	.3	1	.5
Lang.-Voice	--	--	1	.5	4	.9	5	1.6	1	.5
Artic.-Stut.	2	15.4	54	29.0	150	33.6	122	37.7	91	45.3
Artic.-Voice	--	--	44	23.7	124	27.8	105	32.4	58	28.8
Stut.-Voice	--	--	2	1.1	6	1.3	4	1.2	4	2.0
TOTAL	13	100.0	186	100.0	447	100.0	324	100.0	201	100.0

TABLE B.19 (continued)

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by single and multiple expressive speech disorders separately within age groups. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Age Groups in Years 13 - 14 Number	%	15 - 16 Number	%	17 - 18 Number	%	19 - 20 Number	%	Total Number	%
Single Disorder										
Little or No Speech	11	1.2	6	1.2	4	1.4	--	--	68	.8
Language Disorder	10	1.1	6	1.2	9	3.3	3	18.7	79	.9
Articulation	602	68.2	334	65.5	157	56.9	8	50.0	7332	85.5
Stuttering	233	26.4	144	28.2	96	34.8	4	25.0	1008	11.7
Voice Disorder	27	3.1	20	3.9	10	3.6	1	6.3	92	1.1
TOTAL	883	100.0	510	100.0	276	100.0	16	100.0	8579	100.0
Multiple Disorders										
L./No Speech-Lang.	2	.8	1	.7	1	1.1	--	--	21	1.3
L./No Speech-Artic.	37	15.9	13	8.8	11	12.4	2	20.0	283	17.1
L./No Speech-Stut.	3	1.3	4	2.7	1	1.1	--	--	20	1.2
L./No Speech-Voice	1	.4	3	2.0	--	--	--	--	7	.4
Lang.-Artic.	13	5.6	6	4.1	5	5.6	--	--	160	9.7
Lang.-Stut.	2	.8	1	.7	1	1.1	--	--	10	.6
Lang.-Voice	1	.4	1	.7	2	2.3	2	20.0	17	1.0
Artic.-Stut.	95	40.8	64	43.2	40	44.9	1	10.0	619	37.5
Artic.-Voice	68	29.3	48	32.4	26	29.2	5	50.0	478	29.0
Stut.-Voice	11	4.7	7	4.7	2	2.3	--	--	36	2.2
TOTAL	233	100.0	148	100.0	89	100.0	10	100.0	1651	100.0

TABLE B.20

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by single and multiple expressive speech disorders separately within age groups. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder. (This table is completed on the succeeding page.)

	Age Groups in Years									
Expressive Speech Disorder	3 - 4		5 - 6		7 - 8		9 - 10		11 - 12	
	Number	%	Number	%	Number	%	Number	%	Number	%
Single Disorder										
Little or No Speech	2	11.8	18	1.4	14	.5	3	.2	2	.3
Language Disorder	--	--	16	1.2	15	.6	13	.8	8	1.4
Articulation	15	88.2	1284	95.5	2489	95.7	1416	93.1	527	90.6
Stuttering	--	--	19	1.4	70	2.7	62	4.1	35	6.0
Voice Disorder	--	--	7	.5	14	.5	27	1.8	10	1.7
TOTAL	17	100.0	1344	100.0	2602	100.0	1521	100.0	582	100.0
Multiple Disorders										
L./No Speech-Lang.	1	33.4	8	2.7	3	.8	1	.4	1	1.1
L./No Speech-Artic.	--	--	75	25.4	99	24.9	46	20.0	21	23.3
L./No Speech-Stut.	1	33.3	1	.3	4	1.0	1	.4	2	2.2
L./No Speech-Voice	--	--	--	--	1	.2	2	.9	1	1.1
Lang.-Artic.	1	33.3	41	13.9	26	6.5	8	3.5	1	1.1
Lang.-Stut.	--	--	--	--	1	.2	1	.4	--	--
Lang.-Voice	--	--	5	1.7	7	1.8	9	3.9	7	7.8
Artic.-Stut.	--	--	59	20.0	103	25.9	64	27.9	22	24.5
Artic.-Voice	--	--	99	33.6	147	36.9	92	40.0	33	36.7
Stut.-Voice	--	--	7	2.4	7	1.8	6	2.6	2	2.2
TOTAL	3	100.0	295	100.0	398	100.0	230	100.0	90	100.0

TABLE B.20 (continued)

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by single and multiple expressive speech disorders separately within age groups. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

	Age Groups in Years									
Expressive	13 - 14		15 - 16		17 - 18		19 - 20		Total	
Speech Disorder	Number	%	Number	%	Number	%	Number	%	Number	%
Single Disorder										
Little or No Speech	--	--	--	--	--	--	--	--	39	.6
Language Disorder	4	1.9	1	2.9	--	--	--	--	57	.9
Articulation	160	75.5	21	61.8	11	68.7	1	50.0	5924	93.6
Stuttering	41	19.3	10	29.4	4	25.0	1	50.0	242	3.8
Voice Disorder	7	3.3	2	5.9	1	6.3	--	--	68	1.1
TOTAL	212	100.0	34	100.0	16	100.0	2	100.0	6330	100.0
Multiple Disorders										
L./No Speech-Lang.	--	--	--	--	--	--	--	--	14	1.3
L./No Speech-Artic.	8	22.2	1	10.0	2	100.0	--	--	252	23.7
L./No Speech-Stut.	1	2.8	--	--	--	--	--	--	10	1.0
L./No Speech-Voice	1	2.8	--	--	--	--	--	--	5	.5
Lang.-Artic.	2	5.6	--	--	--	--	--	--	79	7.3
Lang.-Stut.	--	--	--	--	--	--	--	--	2	.2
Lang.-Voice	3	8.3	--	--	--	--	--	--	31	2.9
Artic.-Stut.	8	22.2	4	40.0	--	--	--	--	260	24.4
Artic.-Voice	11	30.5	5	50.0	--	--	1	100.0	388	36.4
Stut.-Voice	2	5.6	--	--	--	--	--	--	24	2.3
TOTAL	36	100.0	10	100.0	2	100.0	1	100.0	1065	100.0

TABLE B.21

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by below average, average, and above average reading achievement groups within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

	Reading Achievement							
Expressive Speech Disorder	Below Average Number	Below Average %	Average Number	Average %	Above Average Number	Above Average %	Total Number	Total %
Single Disorder								
Little or No Speech	20	69.0	7	24.1	2	6.9	29	100.0
Language Disorder	18	56.2	11	34.4	3	9.4	32	100.0
Articulation	1614	45.6	1190	33.6	739	20.8	3543	100.0
Stuttering	258	50.7	179	35.2	72	14.1	509	100.0
Voice Disorder	20	32.3	26	41.9	16	25.8	62	100.0
TOTAL	1930	46.2	1413	33.9	832	19.9	4175	100.0
Multiple Disorders								
L./No Speech-Lang.	3	100.0	--	--	--	--	3	100.0
L./No Speech-Artic.	71	76.3	16	17.2	6	6.5	93	100.0
L./No Speech-Stut.	7	87.5	--	--	1	12.5	8	100.0
L./No Speech-Voice	5	71.4	2	28.6	--	--	7	100.0
Lang.-Artic.	41	67.2	13	21.3	7	11.5	61	100.0
Lang.-Stut.	4	57.1	2	28.6	1	14.3	7	100.0
Lang.-Voice	2	33.3	3	50.0	1	16.7	6	100.0
Artic.-Stut.	208	63.2	88	26.8	33	10.0	329	100.0
Artic.-Voice	137	50.2	88	32.2	48	17.6	273	100.0
Stut.-Voice	14	66.7	5	23.8	2	9.5	21	100.0
TOTAL	492	60.9	217	26.9	99	12.2	808	100.0

TABLE B.22

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by below average, average, and above average reading achievement groups within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Reading Achievement Below Average Number	%	Average Number	%	Above Average Number	%	Total Number	%
Single Disorder								
Little or No Speech	6	85.7	1	14.3	--	--	7	100.0
Language Disorder	10	55.5	5	27.8	3	16.7	18	100.0
Articulation	996	39.3	893	35.2	646	25.5	2535	100.0
Stuttering	36	29.0	39	31.5	49	39.5	124	100.0
Voice Disorder	16	37.2	8	18.6	19	44.2	43	100.0
TOTAL	1064	39.0	946	34.7	717	26.3	2727	100.0
Multiple Disorders								
L./No Speech-Lang.	3	75.0	1	25.0	--	--	4	100.0
L./No Speech-Artic.	81	77.1	19	18.1	5	4.8	105	100.0
L./No Speech-Stut.	5	100.0	--	--	--	--	5	100.0
L./No Speech-Voice	3	75.0	1	25.0	--	--	4	100.0
Lang.-Artic.	16	72.7	6	27.3	--	--	22	100.0
Lang.-Stut.	1	50.0	--	--	1	50.0	2	100.0
Lang.-Voice	6	40.0	2	13.3	7	46.7	15	100.0
Artic.-Stut.	60	47.6	45	35.7	21	16.7	126	100.0
Artic.-Voice	88	45.8	62	32.3	42	21.9	192	100.0
Stut.-Voice	6	42.9	7	50.0	1	7.1	14	100.0
TOTAL	269	55.0	143	29.2	77	15.8	489	100.0

TABLE B.23

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by single and multiple expressive speech disorders separately within below average, average, and above average reading achievement groups. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Reading Achievement							
	Below Average		Average		Above Average		Total	
	Number	%	Number	%	Number	%	Number	%
Single Disorder								
Little or No Speech	20	1.0	7	.5	2	.2	29	.7
Language Disorder	18	.9	11	.8	3	.4	32	.8
Articulation	1614	83.7	1190	84.2	739	88.8	3543	84.8
Stuttering	258	13.4	179	12.7	72	8.7	509	12.2
Voice Disorder	20	1.0	26	1.8	16	1.9	62	1.5
TOTAL	1930	100.0	1413	100.0	832	100.0	4175	100.0
Multiple Disorders								
L./No Speech-Lang.	3	.6	--	--	--	--	3	.4
L./No Speech-Artic.	71	14.4	16	7.3	6	6.1	93	11.5
L./No Speech-Stut.	7	1.4	--	--	1	1.0	8	1.0
L./No Speech-Voice	5	1.0	2	.9	--	--	7	.9
Lang.-Artic.	41	8.3	13	6.0	7	7.1	61	7.5
Lang.-Stut.	4	.8	2	.9	1	1.0	7	.9
Lang.-Voice	2	.4	3	1.4	1	1.0	6	.7
Artic.-Stut.	208	42.3	88	40.6	33	33.3	329	40.7
Artic.-Voice	137	27.9	88	40.6	48	48.5	273	33.8
Stut.-Voice	14	2.9	5	2.3	2	2.0	21	2.6
TOTAL	492	100.0	217	100.0	99	100.0	808	100.0

TABLE B.24

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by single and multiple expressive speech disorders separately within below average, average, and above average reading achievement groups. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Reading Achievement							
	Below Average		Average		Above Average		Total	
	Number	%	Number	%	Number	%	Number	%
Single Disorder								
Little or No Speech	6	.6	1	.1	--	--	7	.2
Language Disorder	10	.9	5	.5	3	.4	18	.7
Articulation	996	93.6	893	94.4	646	90.1	2535	93.0
Stuttering	36	3.4	39	4.1	49	6.8	124	4.5
Voice Disorder	16	1.5	8	.9	19	2.7	43	1.6
TOTAL	1064	100.0	946	100.0	717	100.0	2727	100.0
Multiple Disorders								
L./No Speech-Lang.	3	1.1	1	.7	--	--	4	.8
L./No Speech-Artic.	81	30.1	19	13.3	5	6.5	105	21.5
L./No Speech-Stut.	5	1.9	--	--	--	--	5	1.0
L./No Speech-Voice	3	1.1	1	.7	--	--	4	.8
Lang.-Artic.	16	6.0	6	4.2	--	--	22	4.5
Lang.-Stut.	1	.4	--	--	1	1.3	2	.4
Lang.-Voice	6	2.2	2	1.4	7	9.1	15	3.1
Artic.-Stut.	60	22.3	45	31.5	21	27.3	126	25.8
Artic.-Voice	88	32.7	62	43.3	42	54.5	192	39.3
Stut.-Voice	6	2.2	7	4.9	1	1.3	14	2.8
TCTAL	269	100.0	143	100.0	77	100.0	489	100.0

TABLE B.25

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by below average, average, and above average achievement in arithmetic fundamentals within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Arithmetic Fundamentals Achievement Below Average Number	 %	 Average Number	 %	 Above Average Number	 %	Total Number	 %
Single Disorder								
Little or No Speech	15	55.6	7	25.9	5	18.5	27	100.0
Language Disorder	8	50.0	4	25.0	4	25.0	16	100.0
Articulation	1063	39.5	985	36.6	645	23.9	2693	100.0
Stuttering	230	49.4	161	34.5	75	16.1	466	100.0
Voice Disorder	20	36.4	18	32.7	17	30.9	55	100.0
TOTAL	1336	41.0	1175	36.1	746	22.9	3257	100.0
Multiple Disorders								
L./No Speech-Lang.	2	100.0	--	--	--	--	2	100.0
L./No Speech-Artic.	50	69.5	16	22.2	6	8.3	72	100.0
L./No Speech-Stut.	6	85.7	--	--	1	14.3	7	100.0
L./No Speech-Voice	3	60.0	1	20.0	1	20.0	5	100.0
Lang.-Artic.	24	54.5	12	27.3	8	18.2	44	100.0
Lang.-Stut.	4	57.1	2	28.6	1	14.3	7	100.0
Lang.-Voice	2	33.3	--	--	4	66.7	6	100.0
Artic.-Stut.	159	53.6	88	29.6	50	16.8	297	100.0
Artic.-Voice	109	47.8	68	29.8	51	22.4	228	100.0
Stut.-Voice	14	66.7	6	28.6	1	4.7	21	100.0
TOTAL	373	54.1	193	28.0	123	17.9	689	100.0

TABLE B.26

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by below average, average, and above average achievement in arithmetic fundamentals within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Arithmetic Fundamentals Achievement							
	Below Average		Average		Above Average		Total	
	Number	%	Number	%	Number	%	Number	%
Single Disorder								
Little or No Speech	6	75.0	2	25.0	--	--	8	100.0
Language Disorder	6	42.9	6	42.9	2	14.2	14	100.0
Articulation	573	33.4	727	42.4	414	24.2	1714	100.0
Stuttering	31	30.7	41	40.6	29	28.7	101	100.0
Voice Disorder	8	22.8	17	48.6	10	28.6	35	100.0
TOTAL	624	33.3	793	42.4	455	24.3	1872	100.0
Multiple Disorders								
L./No Speech-Lang.	3	60.0	2	40.0	--	--	5	100.0
L./No Speech-Artic.	61	68.5	24	27.0	4	4.5	89	100.0
L./No Speech-Stut.	3	100.0	--	--	--	--	3	100.0
L./No Speech-Voice	1	33.3	2	66.7	--	--	3	100.0
Lang.-Artic.	14	63.6	7	31.8	1	4.6	22	100.0
Lang.-Stut.	1	50.0	--	--	1	50.0	2	100.0
Lang.-Voice	5	33.3	8	53.4	2	13.3	15	100.0
Artic.-Stut.	33	35.5	36	38.7	24	25.8	93	100.0
Artic.-Voice	64	42.9	53	35.6	32	21.5	149	100.0
Stut.-Voice	3	30.0	5	50.0	2	20.0	10	100.0
TOTAL	188	48.1	137	35.0	66	16.9	391	100.0

TABLE B.27

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by single and multiple expressive speech disorders separately within below average, average, and above average arithmetic fundamentals achievement groups. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Arithmetic Fundamentals Achievement: Below Average Number	%	Average Number	%	Above Average Number	%	Total Number	%
Single Disorder								
Little or No Speech	15	1.1	7	.6	5	.7	27	.8
Language Disorder	8	.6	4	.3	4	.5	16	.5
Articulation	1063	79.6	985	83.8	645	86.5	2693	82.7
Stuttering	230	17.2	161	13.7	75	10.0	466	14.3
Voice Disorder	20	1.5	18	1.6	17	2.3	55	1.7
TOTAL	1336	100.0	1175	100.0	746	100.0	3257	100.0
Multiple Disorders								
L./No Speech-Lang.	2	.5	--	--	--	--	2	.3
L./No Speech-Artic.	50	13.4	16	8.3	6	4.9	72	10.5
L./No Speech-Stut.	6	1.6	--	--	1	.8	7	1.0
L./No Speech-Voice	3	.8	1	.5	1	.8	5	.7
Lang.-Artic.	24	6.5	12	6.2	8	6.5	44	6.4
Lang.-Stut.	4	1.1	2	1.0	1	.8	7	1.0
Lang.-Voice	2	.5	--	--	4	3.2	6	.9
Artic.-Stut.	159	42.6	88	45.6	50	40.7	297	43.1
Artic.-Voice	109	29.2	68	35.3	51	41.5	228	33.1
Stut.-Voice	14	3.8	6	3.1	1	.8	21	3.0
TOTAL	373	100.0	193	100.0	123	100.0	689	100.0

TABLE B.28

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by single and multiple expressive speech disorders separately within below average, average, and above average arithmetic fundamentals achievement groups. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Arithmetic Fundamentals Achievement							
	Below Average		Average		Above Average		Total	
	Number	%	Number	%	Number	%	Number	%
Single Disorder								
Little or No Speech	6	1.0	2	.2	--	--	8	.4
Language Disorder	6	1.0	6	.8	2	.4	14	.7
Articulation	573	91.8	727	91.7	414	91.0	1714	91.6
Stuttering	31	4.9	41	5.2	29	6.4	101	5.4
Voice Disorder	8	1.3	17	2.1	10	2.2	35	1.9
TOTAL	624	100.0	793	100.0	455	100.0	1872	100.0
Multiple Disorders								
L./No Speech-Lang.	3	1.6	2	1.5	--	--	5	1.3
L./No Speech-Artic.	61	32.4	24	17.5	4	6.1	89	22.8
L./No Speech-Stut.	3	1.6	--	--	--	--	3	.8
L./No Speech-Voice	1	.5	2	1.5	--	--	3	.8
Lang.-Artic.	14	7.5	7	5.1	1	1.5	22	5.6
Lang.-Stut.	1	.5	--	--	1	1.5	2	.5
Lang.-Voice	5	2.7	8	5.8	2	3.0	15	3.8
Artic.-Stut.	33	17.6	36	26.3	24	36.4	93	23.8
Artic.-Voice	64	34.0	53	38.7	32	48.5	149	38.1
Stut.-Voice	3	1.6	5	3.6	2	3.0	10	2.5
TOTAL	188	100.0	137	100.0	66	100.0	391	100.0

TABLE B.29

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by arithmetic reasoning achievement within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Arithmetic Reasoning Achievement							
	Below Average		Average		Above Average		Total	
	Number	%	Number	%	Number	%	Number	%
Single Disorder								
Little or No Speech	16	61.5	6	23.1	4	15.4	26	100.0
Language Disorder	11	57.9	7	36.8	1	5.3	19	100.0
Articulation	1022	40.4	859	33.9	649	25.7	2530	100.0
Stuttering	229	49.8	145	31.5	86	18.7	460	100.0
Voice Disorder	18	33.3	16	29.6	20	37.1	54	100.0
TOTAL	1296	42.0	1033	33.4	760	24.6	3089	100.0
Multiple Disorders								
L./No Speech-Lang.	2	100.0	--	--	--	--	2	100.0
L./No Speech-Artic.	55	75.3	10	13.7	8	11.0	73	100.0
L./No Speech-Stut.	5	83.3	--	--	1	16.7	6	100.0
L./No Speech-Voice	3	75.0	--	--	1	25.0	4	100.0
Lang.-Artic.	27	61.4	13	29.5	4	9.1	44	100.0
Lang.-Stut.	4	57.1	2	28.6	1	14.3	7	100.0
Lang.-Voice	2	33.3	2	33.3	2	33.4	6	100.0
Artic.-Stut.	155	54.8	79	27.9	49	17.3	283	100.0
Artic.-Voice	109	48.9	67	30.0	47	21.1	223	100.0
Stut.-Voice	14	66.7	6	28.6	1	4.7	21	100.0
TOTAL	376	56.2	179	26.8	114	17.0	669	100.0

TABLE B.30

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by arithmetic reasoning achievement within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Arithmetic Reasoning Achievement							
	Below Average		Average		Above Average		Total	
	Number	%	Number	%	Number	%	Number	%
Single Disorder								
Little or No Speech	5	62.5	3	37.5	--	--	8	100.0
Language Disorder	6	60.0	2	20.0	2	20.0	10	100.0
Articulation	520	35.4	561	38.2	387	26.4	1468	100.0
Stuttering	27	30.3	32	36.0	30	33.7	89	100.0
Voice Disorder	9	26.5	15	44.1	10	29.4	34	100.0
TOTAL	567	35.2	613	38.1	429	26.7	1609	100.0
Multiple Disorders								
L./No Speech-Lang.	2	50.0	2	50.0	--	--	4	100.0
L./No Speech-Artic.	56	68.3	20	24.4	6	7.3	82	100.0
L./No Speech-Stut.	3	100.0	--	--	--	--	3	100.0
L./No Speech-Voice	2	66.7	1	33.3	--	--	3	100.0
Lang.-Artic.	12	70.6	5	29.4	--	--	17	100.0
Lang.-Stut.	1	50.0	--	--	1	50.0	2	100.0
Lang.-Voice	5	33.3	6	40.0	4	26.7	15	100.0
Artic.-Stut.	32	37.2	34	39.5	20	23.3	86	100.0
Artic.-Voice	62	45.3	47	34.3	28	20.4	137	100.0
Stut.-Voice	2	25.0	5	62.5	1	12.5	8	100.0
TOTAL	177	49.6	120	33.6	60	16.8	357	100.0

TABLE B.31

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by single and multiple expressive speech disorders separately within below average, average, and above average arithmetic reasoning achievement groups. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

	Arithmetic Reasoning Achievement							
Expressive	Below Average		Average		Above Average		Total	
Speech Disorder	Number	%	Number	%	Number	%	Number	%
Single Disorder								
Little or No Speech	16	1.2	6	.6	4	.5	26	.9
Language Disorder	11	.8	7	.7	1	.2	19	.6
Articulation	1022	78.9	859	83.2	649	85.4	2530	81.9
Stuttering	229	17.7	145	14.0	86	11.3	460	14.9
Voice Disorder	18	1.4	16	1.5	20	2.6	54	1.7
TOTAL	1296	100.0	1033	100.0	760	100.0	3089	100.0
Multiple Disorders								
L./No Speech-Lang.	2	.5	--	--	--	--	2	.3
L./No Speech-Artic.	55	14.6	10	5.6	8	7.0	73	10.9
L./No Speech-Stut.	5	1.4	--	--	1	.9	6	.9
L./No Speech-Voice	3	.8	--	--	1	.9	4	.6
Lang.-Artic.	27	7.2	13	7.3	4	3.5	44	6.6
Lang.-Stut.	4	1.1	2	1.1	1	.9	7	1.0
Lang.-Voice	2	.5	2	1.1	2	1.7	6	.9
Artic.-Stut.	155	41.2	79	44.1	49	43.0	283	42.3
Artic.-Voice	109	29.0	67	37.4	47	41.2	223	33.4
Stut.-Voice	14	3.7	6	3.4	1	.9	21	3.1
TOTAL	376	100.0	179	100.0	114	100.0	669	100.0

TABLE B.32

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by single and multiple expressive speech disorders separately within below average, average, and above average arithmetic reasoning achievement groups. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Arithmetic Reasoning Achievement Below Average Number	%	Average Number	%	Above Average Number	%	Total Number	%
Single Disorder								
Little or No Speech	5	.9	3	.5	--	--	8	.5
Language Disorder	6	1.0	2	.3	2	.5	10	.6
Articulation	520	91.7	561	91.5	387	90.2	1468	91.2
Stuttering	27	4.8	32	5.2	30	7.0	89	5.6
Voice Disorder	9	1.6	15	2.5	10	2.3	34	2.1
TOTAL	567	100.0	613	100.0	429	100.0	1609	100.0
Multiple Disorders								
L./No Speech-Lang.	2	1.1	2	1.7	--	--	4	1.1
L./No Speech-Artic.	56	31.7	20	16.7	6	10.0	82	23.0
L./No Speech-Stut.	3	1.7	--	--	--	--	3	.8
L./No Speech-Voice	2	1.1	1	.8	--	--	3	.8
Lang.-Artic.	12	6.8	5	4.1	--	--	17	4.8
Lang.-Stut.	1	.6	--	--	1	1.7	2	.6
Lang.-Voice	5	2.8	6	5.0	4	6.6	15	4.2
Artic.-Stut.	32	18.1	34	28.3	20	33.3	86	24.1
Artic.-Voice	62	35.0	47	39.2	28	46.7	137	38.4
Stut.-Voice	2	1.1	5	4.2	1	1.7	8	2.2
TOTAL	177	100.0	120	100.0	60	100.0	357	100.0

TABLE B.33

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by right, left, and mixed hand usage within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Hand Usage							
	Right		Left		Mixed		Total	
	Number	%	Number	%	Number	%	Number	%
Single Disorder								
Little or No Speech	49	75.4	13	20.0	3	4.6	65	100.0
Language Disorder	54	70.1	18	23.4	5	6.5	77	100.0
Articulation	6348	86.3	799	10.9	209	5.7	7356	100.0
Stuttering	839	83.2	112	11.1	57	5.7	1008	100.0
Voice Disorder	85	91.4	6	6.5	2	2.1	93	100.0
TOTAL	7375	85.8	948	11.0	276	3.2	8599	100.0
Multiple Disorders								
L./No Speech-Lang.	17	85.0	1	5.0	2	10.0	20	100.0
L./No Speech-Artic.	227	81.7	37	13.3	14	5.0	278	100.0
L./No Speech-Stut.	17	89.4	1	5.3	1	5.3	19	100.0
L./No Speech-Voice	5	62.5	2	25.0	1	12.5	8	100.0
Lang.-Artic.	119	76.3	26	16.7	11	7.0	156	100.0
Lang.-Stut.	8	80.0	1	10.0	1	10.0	10	100.0
Lang.-Voice	10	58.8	3	17.7	4	23.5	17	100.0
Artic.-Stut.	497	80.5	72	11.7	48	7.8	617	100.0
Artic.-Voice	410	85.2	45	9.4	26	5.4	481	100.0
Stut.-Voice	30	83.3	2	5.6	4	11.1	36	100.0
TOTAL	1340	81.6	190	11.6	112	6.8	1642	100.0

TABLE B.34

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by right, left, and mixed hand usage within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Hand Usage Right Number	%	Left Number	%	Mixed Number	%	Total Number	%
Single Disorder								
Little or No Speech	28	80.0	5	14.3	2	5.7	35	100.0
Language Disorder	44	84.6	7	13.5	1	1.9	52	100.0
Articulation	4791	86.5	594	10.7	152	2.8	5537	100.0
Stuttering	189	85.1	23	10.4	10	4.5	222	100.0
Voice Disorder	59	96.8	1	1.6	1	1.6	61	100.0
TOTAL	5111	86.5	630	10.7	166	2.8	5907	100.0
Multiple Disorders								
L./No Speech-Lang.	8	100.0	--	--	--	--	8	100.0
L./No Speech-Artic.	183	83.2	24	10.9	13	5.9	220	100.0
L./No Speech-Stut.	9	100.0	--	--	--	--	9	100.0
L./No Speech-Voice	2	50.0	1	25.0	1	25.0	4	100.0
Lang.-Artic.	47	85.5	6	10.9	2	3.6	55	100.0
Lang.-Stut.	2	100.0	--	--	--	--	2	100.0
Lang.-Voice	27	90.0	3	10.0	--	--	30	100.0
Artic.-Stut.	204	83.6	31	12.7	9	3.7	244	100.0
Artic.-Voice	294	83.1	40	11.3	20	5.6	354	100.0
Stut.-Voice	19	79.2	3	12.5	2	8.3	24	100.0
TOTAL	795	83.7	108	11.4	47	4.9	950	100.0

TABLE B.35

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by single and multiple expressive speech disorders separately within right, left, and mixed hand usage groups. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

	Hand Usage							
Expressive	Right		Left		Mixed		Total	
Speech Disorder	Number	%	Number	%	Number	%	Number	%
Single Disorder								
Little or No Speech	49	.7	13	1.4	3	1.1	65	.8
Language Disorder	54	.7	18	1.9	5	1.8	77	.9
Articulation	6348	86.1	799	84.3	209	75.7	7356	85.5
Stuttering	839	11.4	112	11.8	57	20.7	1008	11.7
Voice Disorder	85	1.1	6	.6	2	.7	93	1.1
TOTAL	7375	100.0	948	100.0	276	100.0	8599	100.0
Multiple Disorders								
L./No Speech-Lang.	17	1.3	1	.5	2	1.8	20	1.2
L./No Speech-Artic.	227	16.9	37	19.5	14	12.5	278	16.9
L./No Speech-Stut.	17	1.3	1	.5	1	.9	19	1.2
L./No Speech-Voice	5	.4	2	1.0	1	.9	8	.5
Lang.-Artic.	119	8.9	26	13.8	11	9.8	156	9.5
Lang.-Stut.	8	.6	1	.5	1	.9	10	.6
Lang.-Voice	10	.7	3	1.6	4	3.6	17	1.0
Artic.-Stut.	497	37.1	72	37.9	48	42.8	617	37.6
Artic.-Voice	410	30.6	45	23.7	26	23.2	481	29.3
Stut.-Voice	30	2.2	2	1.0	4	3.6	36	2.2
TOTAL	1340	100.0	190	100.0	112	100.0	1642	100.0

TABLE B.36

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by single and multiple expressive speech disorders separately within right, left, and mixed hand usage groups. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Hand Usage Right Number	%	Left Number	%	Mixed Number	%	Total Number	%
Single Disorder								
Little or No Speech	28	.5	5	.8	2	1.2	35	.6
Language Disorder	44	.9	7	1.1	1	.6	52	.9
Articulation	4791	93.7	594	94.3	152	91.6	5537	93.7
Stuttering	189	3.7	23	3.6	10	6.0	222	3.8
Voice Disorder	59	1.2	1	.2	1	.6	61	1.0
TOTAL	5111	100.0	630	100.0	166	100.0	5907	100.0
Multiple Disorders								
L./No Speech-Lang.	8	1.0	--	--	--	--	8	.8
L./No Speech-Artic.	183	23.0	24	22.2	13	27.7	220	23.2
L./No Speech-Stut.	9	1.1	--	--	--	--	9	.9
L./No Speech-Voice	2	.3	1	.9	1	2.1	4	.4
Lang.-Artic.	47	5.9	6	5.6	2	4.3	55	5.8
Lang.-Stut.	2	.3	--	--	--	--	2	.2
Lang.-Voice	27	3.4	3	2.8	--	--	30	3.2
Artic.-Stut.	204	25.6	31	28.7	9	19.1	244	25.7
Artic.-Voice	294	37.0	40	37.0	20	42.5	354	37.3
Stut.-Voice	19	2.4	3	2.8	2	4.3	24	2.5
TOTAL	795	100.0	108	100.0	47	100.0	950	100.0

TABLE B.37

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by right, left, and mixed foot usage within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive	Foot Usage							
	Right		Left		Mixed		Total	
Speech Disorder	Number	%	Number	%	Number	%	Number	%
Single Disorder								
Little or No Speech	49	68.0	19	26.4	4	5.6	72	100.0
Language Disorder	55	73.3	12	16.0	8	10.7	75	100.0
Articulation	5879	79.9	1003	13.6	479	6.5	7361	100.0
Stuttering	766	77.6	156	15.8	65	6.6	987	100.0
Voice Disorder	68	74.7	18	19.8	5	5.5	91	100.0
TOTAL	6817	79.4	1208	14.1	561	6.5	8586	100.0
Multiple Disorders								
L./No Speech-Lang.	13	65.0	5	25.0	2	10.0	20	100.0
L./No Speech-Artic.	197	71.6	55	20.0	23	8.4	275	100.0
L./No Speech-Stut.	11	57.9	5	26.3	3	15.8	19	100.0
L./No Speech-Voice	4	57.1	1	14.3	2	28.6	7	100.0
Lang.-Artic.	109	70.3	30	19.4	16	10.3	155	100.0
Lang.-Stut.	6	60.0	2	20.0	2	20.0	10	100.0
Lang.-Voice	8	47.1	3	17.6	6	35.3	17	100.0
Artic.-Stut.	478	78.2	82	13.4	51	8.4	611	100.0
Artic.-Voice	391	81.4	55	11.5	34	7.1	480	100.0
Stut.-Voice	32	91.4	1	2.9	2	5.7	35	100.0
TOTAL	1249	76.7	239	14.7	141	8.6	1629	100.0

TABLE B.38

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by right, left, and mixed foot usage within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Foot Usage							
	Right		Left		Mixed		Total	
	Number	%	Number	%	Number	%	Number	%
Single Disorder								
Little or No Speech	28	75.7	2	5.4	7	18.9	37	100.0
Language Disorder	41	80.4	8	15.7	2	3.9	51	100.0
Articulation	4339	79.7	735	13.5	371	6.8	5445	100.0
Stuttering	166	78.7	25	11.8	20	9.5	211	100.0
Voice Disorder	53	85.5	7	11.3	2	3.2	62	100.0
TOTAL	4627	79.7	777	13.4	402	6.9	5806	100.0
Multiple Disorders								
L./No Speech-Lang.	4	100.0	--	--	--	--	4	100.0
L./No Speech-Artic.	168	81.2	21	10.1	18	8.7	207	100.0
L./No Speech-Stut.	9	100.0	--	--	--	--	9	100.0
L./No Speech-Voice	2	50.0	1	25.0	1	25.0	4	100.0
Lang.-Artic.	37	68.5	12	22.2	5	9.3	54	100.0
Lang.-Stut.	--	--	1	50.0	1	50.0	2	100.0
Lang.-Voice	20	66.7	7	23.3	3	10.0	30	100.0
Artic.-Stut.	180	76.6	39	16.6	16	6.8	235	100.0
Artic.-Voice	269	76.6	48	13.7	34	9.7	351	100.0
Stut.-Voice	15	62.5	7	29.2	2	8.3	24	100.0
TOTAL	704	76.5	136	14.8	80	8.7	920	100.0

TABLE B.39

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by single and multiple expressive speech disorders separately within groups with right, left, and mixed foot usage. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Foot Usage						Total	
	Right		Left		Mixed			
	Number	%	Number	%	Number	%	Number	%
Single Disorder								
Little or No Speech	49	.7	19	1.6	4	.7	72	.8
Language Disorder	55	.8	12	1.0	8	1.4	75	.9
Articulation	5879	86.3	1003	83.0	479	85.4	7361	85.7
Stuttering	766	11.2	156	12.9	65	11.6	987	11.5
Voice Disorder	68	1.0	18	1.5	5	.9	91	1.1
TOTAL	6817	100.0	1208	100.0	561	100.0	8586	100.0
Multiple Disorders								
L./No Speech-Lang.	13	1.0	5	2.1	2	1.4	20	1.2
L./No Speech-Artic.	197	15.8	55	23.0	23	16.3	275	16.9
L./No Speech-Stut.	11	.9	5	2.1	3	2.1	19	1.2
L./No Speech-Voice	4	.3	1	.4	2	1.4	7	.4
Lang.-Artic.	109	8.7	30	12.6	16	11.4	155	9.6
Lang.-Stut.	6	.5	2	.8	2	1.4	10	.6
Lang.-Voice	8	.6	3	1.3	6	4.3	17	1.0
Artic.-Stut.	478	38.3	82	34.3	51	36.2	611	37.5
Artic.-Voice	391	31.3	55	23.0	34	24.1	480	29.5
Stut.-Voice	32	2.6	1	.4	2	1.4	35	2.1
TOTAL	1249	100.0	239	100.0	141	100.0	1629	100.0

TABLE B.40

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by single and multiple expressive speech disorders separately within groups with right, left, and mixed foot usage. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Foot Usage Right Number	%	Left Number	%	Mixed Number	%	Total Number	%
Single Disorder								
Little or No Speech	28	.6	2	.3	7	1.7	37	.6
Language Disorder	41	.9	8	1.0	2	.5	51	.9
Articulation	4339	93.8	735	94.6	371	92.3	5445	93.8
Stuttering	166	3.6	25	3.2	20	5.0	211	3.6
Voice Disorder	53	1.1	7	.9	2	.5	62	1.1
TOTAL	4627	100.0	777	100.0	402	100.0	5806	100.0
Multiple Disorders								
L./No Speech-Lang.	4	.6	--	--	--	--	4	.4
L./No Speech-Artic.	168	23.9	21	15.4	18	22.5	207	22.5
L./No Speech-Stut.	9	1.3	--	--	--	--	9	1.0
L./No Speech-Voice	2	.3	1	.7	1	1.2	4	.4
Lang.-Artic.	37	5.2	12	8.8	5	6.3	54	5.9
Lang.-Stut.	--	--	1	.7	1	1.2	2	.2
Lang.-Voice	20	2.8	7	5.2	3	3.8	30	3.2
Artic.-Stut.	180	25.6	39	28.7	16	20.0	235	25.6
Artic.-Voice	269	38.2	48	35.3	34	42.5	351	38.2
Stut.-Voice	15	2.1	7	5.2	2	2.5	24	2.6
TOTAL	704	100.0	136	100.0	80	100.0	920	100.0

TABLE B.41

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by groups having right, left, and mixed eye usage within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Eye Usage: Right Number	Right %	Left Number	Left %	Mixed Number	Mixed %	Total Number	Total %
Single Disorder								
Little or No Speech	37	52.9	24	34.3	9	12.8	70	100.0
Language Disorder	44	57.9	20	26.3	12	15.8	76	100.0
Articulation	4698	64.5	1987	27.3	600	8.2	7285	100.0
Stuttering	605	61.3	263	26.7	118	12.0	986	100.0
Voice Disorder	54	61.4	21	23.8	13	14.8	88	100.0
TOTAL	5438	64.0	2315	27.2	752	8.8	8505	100.0
Multiple Disorders								
L./No Speech-Lang.	9	45.0	8	40.0	3	15.0	20	100.0
L./No Speech-Artic.	167	61.4	81	29.8	24	8.8	272	100.0
L./No Speech-Stut.	13	68.4	3	15.8	3	15.8	19	100.0
L./No Speech-Voice	4	57.1	2	28.6	1	14.3	7	100.0
Lang.-Artic.	85	54.5	59	37.8	12	7.7	156	100.0
Lang.-Stut.	6	60.0	4	40.0	--	--	10	100.0
Lang.-Voice	7	41.2	5	29.4	5	29.4	17	100.0
Artic.-Stut.	364	59.8	172	28.2	73	12.0	609	100.0
Artic.-Voice	284	59.3	153	31.9	42	8.8	479	100.0
Stut.-Voice	24	68.6	8	22.8	3	8.6	35	100.0
TOTAL	963	59.3	495	30.5	166	10.2	1624	100.0

TABLE B.42

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by groups having right, left, and mixed eye usage within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Eye Usage Right Number	%	Left Number	%	Mixed Number	%	Total Number	%
Single Disorder								
Little or No Speech	24	66.7	8	22.2	4	11.1	36	100.0
Language Disorder	30	62.5	14	29.2	4	8.3	48	100.0
Articulation	3365	65.3	1413	27.4	374	7.3	5152	100.0
Stuttering	140	68.6	50	24.5	14	6.9	204	100.0
Voice Disorder	47	78.3	9	15.0	4	6.7	60	100.0
TOTAL	3606	65.6	1494	27.1	400	7.3	5500	100.0
Multiple Disorders								
L./No Speech-Lang.	2	50.0	2	50.0	--	--	4	100.0
L./No Speech-Artic.	127	62.3	59	28.9	18	8.8	204	100.0
L./No Speech-Stut.	6	66.7	1	11.1	2	22.2	9	100.0
L./No Speech-Voice	2	50.0	2	50.0	--	--	4	100.0
Lang.-Artic.	34	65.4	14	26.9	4	7.7	52	100.0
Lang.-Stut.	1	100.0	--	--	--	--	1	100.0
Lang.-Voice	10	33.3	4	13.3	16	53.4	30	100.0
Artic.-Stut.	148	67.9	51	23.4	19	8.7	218	100.0
Artic.-Voice	210	61.4	109	31.9	23	6.7	342	100.0
Stut.-Voice	18	75.0	5	20.8	1	4.2	24	100.0
TOTAL	558	62.8	247	27.8	83	9.4	888	100.0

TABLE B.43

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by single and multiple expressive speech disorders separately within groups having right, left, and mixed eye usage. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive Speech Disorder	Eye Usage							
	Right		Left		Mixed		Total	
	Number	%	Number	%	Number	%	Number	%
Single Disorder								
Little or No Speech	37	.7	24	1.0	9	1.2	70	.8
Language Disorder	44	.8	20	.9	12	1.6	76	.9
Articulation	4698	86.4	1987	85.8	600	79.8	7285	85.7
Stuttering	605	11.1	263	11.4	118	15.7	986	11.6
Voice Disorder	54	1.0	21	.9	13	1.7	88	1.0
TOTAL	5438	100.0	2315	100.0	752	100.0	8505	100.0
Multiple Disorders								
L./No Speech-Lang.	9	.9	8	1.6	3	1.8	20	1.2
L./No Speech-Artic.	167	17.4	81	16.4	24	14.5	272	16.8
L./No Speech-Stut.	13	1.4	3	.6	3	1.8	19	1.2
L./No Speech-Voice	4	.4	2	.4	1	.6	7	.4
Lang.-Artic.	85	8.8	59	11.9	12	7.2	156	9.6
Lang.-Stut.	6	.6	4	.8	--	--	10	.6
Lang.-Voice	7	.7	5	1.0	5	3.0	17	1.0
Artic.-Stut.	364	37.8	172	34.8	73	44.0	609	37.5
Artic.-Voice	284	29.5	153	30.9	42	25.3	479	29.5
Stut.-Voice	24	2.5	8	1.6	3	1.8	35	2.2
TOTAL	963	100.0	495	100.0	166	100.0	1624	100.0

TABLE B.44

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by single and multiple expressive speech disorders separately within groups having right, left, and mixed eye usage. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

Expressive	Eye Usage							
	Right		Left		Mixed		Total	
Speech Disorder	Number	%	Number	%	Number	%	Number	%
Single Disorder								
Little or No Speech	24	.7	8	.5	4	1.0	36	.6
Language Disorder	30	.8	14	.9	4	1.0	48	.9
Articulation	3365	93.3	1413	94.6	374	93.5	5152	93.7
Stuttering	140	3.9	50	3.4	14	3.5	204	3.7
Voice Disorder	47	1.3	9	.6	4	1.0	60	1.1
TOTAL	3606	100.0	1494	100.0	400	100.0	5500	100.0
Multiple Disorders								
L./No Speech-Lang.	2	.4	2	.8	--	--	4	.5
L./No Speech-Artic.	127	22.7	59	23.9	18	21.7	204	23.0
L./No Speech-Stut.	6	1.1	1	.4	2	2.4	9	1.0
L./No Speech-Voice	2	.4	2	.8	--	--	4	.5
Lang.-Artic.	34	6.1	14	5.7	4	4.8	52	5.8
Lang.-Stut.	1	.2	--	--	--	--	1	.1
Lang.-Voice	10	1.8	4	1.6	16	19.3	30	3.4
Artic.-Stut.	148	26.5	51	20.7	19	22.9	218	24.5
Artic.-Voice	210	37.6	109	44.1	23	27.7	342	38.5
Stut.-Voice	18	3.2	5	2.0	1	1.2	24	2.7
TOTAL	558	100.0	247	100.0	83	100.0	888	100.0

TABLE B.45

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by years of previous therapy in school within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

	Previous Therapy in School											
Expressive	1 Year		2 Years		3 Years		4 Years		5 or More Years		Total	
Speech Disorder	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Single Disorder												
Little or No Speech	20	74.1	2	7.4	1	3.7	2	7.4	2	7.4	27	100.0
Language Disorder	16	42.1	9	23.7	4	10.5	4	10.5	5	13.2	38	100.0
Articulation	2061	55.9	784	21.3	444	12.0	191	5.2	207	5.6	3687	100.0
Stuttering	277	45.7	132	21.8	72	11.9	50	8.2	75	12.4	606	100.0
Voice Disorder	21	41.2	15	29.4	5	9.8	4	7.8	6	11.8	51	100.0
TOTAL	2395	54.3	942	21.3	526	12.0	251	5.7	295	6.7	4409	100.0
Multiple Disorders												
L./No Speech-Lang.	4	57.1	1	14.3	--	--	--	--	2	28.6	7	100.0
L./No Speech-Artic.	77	56.2	21	15.3	22	16.1	5	3.6	12	8.8	137	100.0
L./No Speech-Stut.	3	37.5	4	50.0	1	12.5	--	--	--	--	8	100.0
L./No Speech-Voice	1	50.0	1	50.0	--	--	--	--	--	--	2	100.0
Lang.-Artic.	34	53.2	7	10.9	7	10.9	8	12.5	8	12.5	64	100.0
Lang.-Stut.	3	50.0	2	33.3	1	16.7	--	--	--	--	6	100.0
Lang.-Voice	5	55.6	3	33.3	--	--	--	--	1	11.1	9	100.0
Artic.-Stut.	181	47.3	94	24.6	47	12.3	30	7.9	30	7.9	382	100.0
Artic.-Voice	138	45.3	75	24.6	44	14.4	23	7.5	25	8.2	305	100.0
Stut.-Voice	9	49.9	7	38.9	1	5.6	--	--	1	5.6	18	100.0
TOTAL	455	48.5	215	22.9	123	13.1	66	7.1	79	8.4	938	100.0

TABLE B.46

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by years of previous therapy in school within types of single and multiple expressive speech disorders. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

	Previous Therapy in School											
Expressive Speech Disorder	1 Year Number	%	2 Years Number	%	3 Years Number	%	4 Years Number	%	5 or More Years Number	%	Total Number	%
Single Disorder												
Little or No Speech	4	57.1	2	28.6	1	14.3	--	--	--	--	7	100.0
Language Disorder	14	58.3	4	16.7	2	8.3	3	12.5	1	4.2	24	100.0
Articulation	1402	62.0	495	21.9	245	10.8	80	3.5	41	1.8	2263	100.0
Stuttering	72	60.5	24	20.2	14	11.8	6	5.0	3	2.5	119	100.0
Voice Disorder	12	57.1	3	14.3	4	19.0	1	4.8	1	4.8	21	100.0
TOTAL	1504	61.8	528	21.7	266	10.9	90	3.7	46	1.9	2434	100.0
Multiple Disorders												
L./No Speech-Lang.	1	25.0	2	50.0	--	--	1	25.0	--	--	4	100.0
L./No Speech-Artic.	65	68.4	16	16.8	9	9.5	4	4.2	1	1.1	95	100.0
L./No Speech-Stut.	1	20.0	1	20.0	3	60.0	--	--	--	--	5	100.0
L./No Speech-Voice	2	66.7	--	--	1	33.3	--	--	--	--	3	100.0
Lang.-Artic.	16	88.9	2	11.1	--	--	--	--	--	--	18	100.0
Lang.-Stut.	--	--	--	--	--	--	--	--	--	--	--	--
Lang.-Voice	5	26.3	3	15.8	7	36.8	3	15.8	1	5.3	19	100.0
Artic.-Stut.	68	57.1	33	27.7	9	7.6	7	5.9	2	1.7	119	100.0
Artic.-Voice	98	58.7	36	21.5	21	12.6	11	6.6	1	.6	167	100.0
Stut.-Voice	8	66.7	4	33.3	--	--	--	--	--	--	12	100.0
TOTAL	264	59.7	97	22.0	50	11.3	26	5.9	5	1.1	442	100.0

TABLE B.47

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by single and multiple expressive speech disorders separately within years of previous therapy in school. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

	Previous Therapy in School											
Expressive Speech Disorder	1 Year Number	1 Year %	2 Years Number	2 Years %	3 Years Number	3 Years %	4 Years Number	4 Years %	5 or More Years Number	5 or More Years %	Total Number	Total %
Single Disorder												
Little or No Speech	20	.8	2	.2	1	.2	2	.8	2	.7	27	.6
Language Disorder	16	.7	9	1.0	4	.8	4	1.6	5	1.7	38	.9
Articulation	2061	86.0	784	83.2	444	84.4	191	76.1	207	70.2	3687	83.6
Stuttering	277	11.6	132	14.0	72	13.7	50	19.9	75	25.4	606	13.8
Voice Disorder	21	.9	15	1.6	5	.9	4	1.6	6	2.0	51	1.1
TOTAL	2395	100.0	942	100.0	526	100.0	251	100.0	295	100.0	4409	100.0
Multiple Disorders												
L./No Speech-Lang.	4	.9	1	.5	--	--	--	--	2	2.5	7	.8
L./No Speech-Artic.	77	16.8	21	9.8	22	17.9	5	7.6	12	15.2	137	14.6
L./No Speech-Stut.	3	.7	4	1.9	1	.8	--	--	--	--	8	.9
L./No Speech-Voice	1	.2	1	.5	--	--	--	--	--	--	2	.2
Lang.-Artic.	34	7.5	7	3.2	7	5.7	8	12.1	8	10.1	64	6.8
Lang.-Stut.	3	.7	2	.9	1	.8	--	--	--	--	6	.6
Lang.-Voice	5	1.1	3	1.4	--	--	--	--	1	1.3	9	1.0
Artic.-Stut.	181	39.8	94	43.7	47	38.2	30	45.5	30	38.0	382	40.7
Artic.-Voice	138	30.3	75	34.9	44	35.8	23	34.8	25	31.6	305	32.5
Stut.-Voice	9	2.0	7	3.2	1	.8	--	--	1	1.3	18	1.9
TOTAL	455	100.0	215	100.0	123	100.0	66	100.0	79	100.0	938	100.0

TABLE B.48

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by single and multiple expressive speech disorders separately within years of previous therapy in school. Single disorders are little or no speech, and language, articulation, stuttering, and voice disorders. Multiple disorders include combinations of primary and secondary disorders only; the disorder named first is not necessarily the primary disorder.

	Previous Therapy in School											
Expressive	1 Year		2 Years		3 Years		4 Years		5 or More Years		Total	
Speech Disorder	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Single Disorder												
Little or No Speech	4	.3	2	.4	1	.4	--	--	--	--	7	.3
Language Disorder	14	.9	4	.8	2	.7	3	3.3	1	2.2	24	1.0
Articulation	1402	93.2	495	93.7	245	92.1	80	88.9	41	89.1	2263	93.0
Stuttering	72	4.8	24	4.5	14	5.3	6	6.7	3	6.5	119	4.9
Voice Disorder	12	.8	3	.6	4	1.5	1	1.1	1	2.2	21	.8
TOTAL	1504	100.0	528	100.0	266	100.0	90	100.0	46	100.0	2434	100.0
Multiple Disorders												
L./No Speech-Lang.	1	.4	2	2.1	--	--	1	3.9	--	--	4	.9
L./No Speech-Artic.	65	24.6	16	16.5	9	18.0	4	15.4	1	20.0	95	21.5
L./No Speech-Stut.	1	.4	1	1.0	3	6.0	--	--	--	--	5	1.1
L./No Speech-Voice	2	.8	--	--	1	2.0	--	--	--	--	3	.7
Lang.-Artic.	16	6.1	2	2.1	--	--	--	--	--	--	18	4.1
Lang.-Stut.	--	--	--	--	--	--	--	--	--	--	--	--
Lang.-Voice	5	1.9	3	3.1	7	14.0	3	11.5	1	20.0	19	4.3
Artic.-Stut.	68	25.7	33	34.0	9	18.0	7	26.9	2	40.0	119	26.9
Artic.-Voice	98	37.1	36	37.1	21	42.0	11	42.3	1	20.0	167	37.8
Stut.-Voice	8	3.0	4	4.1	--	--	--	--	--	--	12	2.7
TOTAL	264	100.0	97	100.0	50	100.0	26	100.0	5	100.0	442	100.0

SECTION C

DISCUSSION

Articulation, Stuttering, and Voice Disorders

Articulation, stuttering, and voice disorders as single disorders and in combination with other disorders were examined in relation to selected variables or conditions usually associated with them to determine whether the distribution of the variables within the different disorders groups were similar. The total number of pupils with little or no speech or language disorders was too small to make this kind of comparison feasible, so these disorders were considered only in combination with the major disorders. Even for some categories of the major disorders, the number of pupils was very small. For the most part, the categories with small Ns represent the infrequent occurrence of the disorder; however, considerable variation in population size is evident in the tables, since only those records supplying information in both of the categories under consideration could be used.

The preponderance of articulation disorders in the caseload caused the majority of pupils having any particular attribute to have articulation disorders, except in the case of stuttering. Therefore, the emphasis was on the comparison of proportions within disorders groups rather than within groups having particular attributes.

Articulation Disorders

Articulation Errors. Higher proportions of pupils having articulation disorders combined with little or no speech, language, or voice disorders than pupils with articulation disorders as a single disorder produced vowel errors. The proportions of pupils in these groups who produced vowel errors were 38%, 37.1%, and 29.3%, respectively, vs. 14.5%. The proportion of pupils with the combination of articulation disorders and stuttering who produced vowel errors was high, also, relative to the pupils with articulation disorders only (20.5% vs. 14.5%).

The consonant errors made by a little over one-fourth of the pupils with articulation as a single disorder only were substitutions; a little less than one-fourth produced distortions, while 46% made combinations of errors including omissions, distortions, substitutions, and additions. Much higher proportions of pupils with articulation combined with little or no speech or with language disorders produced combinations of articulation errors. The proportion of pupils with articulation disorders combined with voice disorders who produced combinations of articulation errors was relatively high, also, though it was considerably smaller than for the other two groups. Whereas, consistently more pupils with articulation disorders only or in combination with other disorders produced substitution errors than distortion errors, more pupils with the combination of articulation and voice disorders produced distortion errors.

More of the pupils with articulation disorders as a single disorder produced consistent errors than pupils having articulation disorders combined with other disorders. The difference in proportions of pupils with inconsistent errors was particularly marked for pupils with articulation disorders and little or no speech.

Two curious results appeared. The first was that quite similar proportions (2.4% and 1.8%) of the city and county pupils classified as having articulation disorders had normal consonant articulation. Yet Table C.5 shows no instances of vowel only, blend only, or vowel and blend only misarticulations. It follows that all pupils with articulation disorders might be expected to make consonant errors. Although a higher proportion of pupils with the combination of stuttering disorders were so classified, when compared with the proportions in other groups, the large majority of the pupils classified as having normal consonant articulation had articulation disorders as a single disorder. Apparently these 341 pupils produced some kind of poor articulation, such as slurring, in spontaneous speech that could not be readily classified in the usual manner.

The second result was that an even larger number of pupils--541 in all, or 3.4%--were said to have deviant articulation, but were classified as having deviations other than omissions, distortions, substitutions, additions, or combinations thereof. Here again, the proportions of pupils in the two samples were similar, being 2.9% and 4.2%. A slightly higher proportion of pupils with the combination of articulation and language disorders were classified as having "other" kinds of consonant errors relative to the proportions in other groups; nonetheless, pupils with articulation disorders as single disorders made up nearly 80% of this group. These results suggest the need for further exploration of the descriptive system used for articulation errors.

Error Combinations. The combination of consonant and consonant-blend errors occurred most frequently. A little over half of the pupils made this combination of errors. About one-fourth of the pupils made errors on vowels, consonants, and blends. Approximately 15% of the pupils made consonant errors only, with neither vowels nor blends involved.

Vowel errors nearly always appeared in combination with consonant and blend errors. Only 2.1% of the pupils produced vowel and consonant errors without also producing blend errors. There were no instances of vowel errors only or blend errors only. Since, according to Templin (13, p. 51), three of the triple blends and four of the double blends included here are among the last sounds to develop, it is rather surprising to find no instances whatsoever of the occurrence of blend errors only.

Some discrepancies between city and county figures were apparent. Less than 10% of the city pupils, but over 20% of the county pupils had consonant errors only. Exactly 30.0% of the city pupils, but only

22.4% of the county pupils fell in the vowel-consonant-blend error category. Thus, the pupils in the city caseload produced far more blend errors than pupils in the county. The reason for this difference is a matter of speculation, especially since it is a common clinical experience to find children with articulatory difficulties producing many blend errors.

Vowel and Diphthong Errors. Data on vowel and diphthong errors were retrieved by the number of instances of occurrence rather than by pupils.

Of the 18 vowels and diphthongs tested, /ɝ/ and /ɚ/ accounted for 34.9% and 21.8% of the errors, respectively. Disregarding stress, they accounted for 56.7% of the errors, while /ju/ accounted for 13.2%. The remaining sounds contributed from 1.3% to 3.6% of the errors with /ɛ/, /ɪ/, /æ/, and /ɔ/ being the only sounds in this group on which the percentage of errors was over 2%.

Differences between city and county figures were negligible.

Consonant Errors. Consonant errors were also retrieved by the number of instances of occurrence rather than by pupils.

There were 174,729 instances of consonant errors for consonants produced as singles, rather than in blends, produced by 16,875 pupils. In the city schools, 9,468 pupils produced 99,859 consonant errors for a mean of 10.55 errors per pupil. In the county, 7,407 pupils produced 74,870 consonant errors, or an average of 10.11 errors per pupil.

In this and subsequent discussions of consonant errors, /hw/ has been disregarded, as errors on this sound are usually voicing errors, and the distinction between /hw/ and /w/ is generally regarded as unimportant.

The two most difficult sounds were /s/ and /z/. They accounted for 15.5% and 13.6%, respectively, of all articulation errors made on the consonants. Next in difficulty were /θ/ and /r/, which accounted for 9.7% and 9.5% of the errors. Other difficult sounds included /ʃ/, /tʃ/, and /ð/. They accounted for 8.5%, 7.4%, and 7.0%, respectively. Only 4.7% of the errors occurred on /dʒ/, 3.9% on /l/, 3.7% on /v/, and 3.2% on /ʒ/. The remaining 13 sounds accounted for from 0.3% to 1.5% each. Percentages for the city and county samples were identical for five sounds, and differed by only a few tenths of a per cent for 15 of them. Differences for the remaining four sounds did not exceed 2.0% in any case.

These results are in good agreement generally with a number of earlier studies, though some differences in order and percentage of errors obtain. However, the earlier studies were made on "normal" populations, whereas, the data on articulation errors in this study are from a population composed of pupils with oral communication disorders most of which were articulation. Further, the pupils in this study covered a wider age range than the subjects in most other studies. The logical assumption is that differences between study populations account for the variations in results. Table III.1 contains the consonants found by a number of investigators to have the highest percentages of errors. They are shown in rank order whenever possible, with the sound ranking highest in errors shown first. The sounds taken from studies by Davis (4), Templin (12), and Wellman (17) are those that are the last to develop. The exact ordering by percentage of errors could not be determined.

Snow (10) published results of a study of 438 first grade children. She obtained two responses for each sound in each position in which it can occur. Her total of 6,959 errors represents a mean of 16.88 errors per child. Since each of her subjects was scored twice for each sound, the mean number of errors needs to be halved in order to make her results comparable to those of our study. Thus, her group with a median age of 7-2 years averaged 8.44 errors per child, while the pupils in our study had a mean age of 9-7 years (S.D. = 2.91 years) and averaged 10.11 errors per pupil.

Though Snow did not report her data in terms of percentages, the data were published in sufficient detail that percentages could be determined (10, p. 289). Distributions in both studies were such that they could be separated into two groups of sounds; thus, 12 sounds in Snow's distribution and 11 sounds in our distribution could be grouped as having relatively high percentages of errors. The remaining sounds had low percentages of errors with extremely small differences among them. The actual rank orders within the group of more difficult sounds varied between the two studies. The 12 consonants ranking highest in errors in the Snow study included the top 11 in the present study. The range in percentage of errors for these sounds ranged from 2.5% to 15.7% for Snow's 12 sounds, and from 3.2% to 15.5% for our 11 sounds. The only sound not common to both studies groups was /ŋ/, which ranked eleventh in Snow's study, but was eighteenth in our study.

Pendergast and others (7) published results of articulation tests given to 15,255 first grade children. Her data were reported in terms of the percentage of children making errors on specific sounds. While the rank order of sounds based on the percentage of children misarticulating them can be compared with the rank order of sounds found in the two studies discussed above, the percentages per se are not comparable. In Pendergast's study the percentages were based on the number of children, while in the other two studies the percentages were based on the total number of errors. Further, in the Pendergast study, blend errors were included with the consonant errors and the percentage of children misarticulating /ð/ was based on medial /ð/ only. Nonetheless,

TABLE III.1

Consonants (singles) most frequently misarticulated as reported by eight investigators along with consonants appearing last in developmental sequence according to three investigators. Sounds are shown in rank order with the most frequently misarticulated sound shown first. Consonants shown under Templin, Wellman, and Davis are in approximate rank order only, with the latest developing sounds shown first.

Coates and Herbert (3 - 21 Years)	s	z	θ	r	ʃ	tʃ	ɝ	dʒ	l	v	ʒ	-
Snow (10) (1st Grade)	ʒ	θ	z	ð	s	ʃ	tʃ	v	dʒ	r	ŋ	l
Pendergast (7) (1st Grade)	s	θ	z	ð	r	v	ʃ	l	tʃ	dʒ	-	-
Roe and Milisen (8) (1st Grade)	dʒ	z	d	g	θ	ð	v	s	t	b	tʃ	-
Roe and Milisen (8) (Grades 1, 3, 5, 7)	θ	s	t	ð	z	dʒ	tʃ	r	v	k	d	-
Bass (1) (Beginning Kindergarten)	θ	ð	ʒ	v	ʃ	r	-	-	-	-	-	-
Van Riper (Children)	s	z	θ	ð	r	ʒ	l	tʃ	dʒ	ʃ	f	-
Hall (6) (Children)	s	z	ʃ	tʃ	dʒ	ʒ	θ	r	-	-	-	-
Sayler (9) (Grades 7 - 12)	z	v	tʃ	ŋ	ð	f	s	θ	g	l	b	t
Hall (6) (College Freshman)	s	z	dʒ	ʃ	tʃ	ʒ	-	-	-	-	-	-
Templin (12) (6.0 and 7.0 Years)	θ	ð	ʒ	v	z	dʒ	l	t	-	-	-	-
Wellman (17) (5 and 6 Years)	dʒ	s	ʃ	tʃ	v	ð	r	θ	ʒ	z	t	-
Davis (4) (6.5 and 8.0 Years)	s	z	r	ð	θ	l	ʒ	ʃ	-	-	-	-

the 10 sounds she found to be most difficult were the same 10 found in both Snow's study and in our study to be difficult, though the order was different. In addition, /ʒ/ ranked highest among Snow's difficult sounds, but lowest in our group. Pendergast reported no data on this sound.

Roe and Milisen (8, p. 42) found a somewhat different group of sounds to be difficult for first grade children, as /d/, /g/, /t/, and /b/ were among the 10 sounds with the most frequent errors. None of these sounds was reported as difficult by other investigators, though both Templin (12, p. 51) and Wellman (17, p. 101) showed medial /t/ as appearing late in the developmental sequence even though initial and final /t/ developed early.

The Roe and Milisen data for alternate grades from one through seven were more in accord with the results of other studies. For composite population, the 10 most difficult sounds included /t/ and /k/, but not /l/ and /ʃ/. Otherwise, the sounds with high percentages of errors were common to most other listings. Roe and Milisen were the only investigators who reported relatively high percentages of errors on /d/ and /k/. Except for the above mentioned studies on developmental order, /t/ appeared among the sounds with high percentages of errors only in the older populations studied by Sayler (9, p. 206) and Hall (6, p. 725).

Bass (1) studied the articulation skills of 113 children at the beginning and end of kindergarten. Of the four kindergarten classes in the sample, two were in schools with concentrations of families of low socioeconomic status. She found that there were only six sounds that 90% or more of the children beginning kindergarten (mean age = 5-4 years) did not produce correctly. They were all included in the group of sounds found difficult in this study. By the end of the school year (mean age = 6-0 years), there were only two sounds that 90% or more did not articulate correctly: /θ/ and /ʒ/. While /θ/ ranked third in difficulty in our sample, /ʒ/ was lowest in our group of difficult sounds.

The only difference between the sounds found in the present study to give the most difficulty and those listed by Van Riper (15, p. 152) in his 1947 text was that he included /f/. More recently, Van Riper (16, 1963, p. 219) merely states that /r/, /s/, /l/, and /th/ are the most commonly defective sounds. Hall (6, p. 725) found eight sounds to be difficult, disregarding /hw/. They were the same as those found here.

Sayler's (9, p. 206) population was composed of pupils in grades seven through twelve. Her list of sounds with high percentages of errors did not include /r/, /ʃ/, /dʒ/, or /ʒ/. It did include /ŋ/, as did Snow's list; /f/, which was cited by Van Riper (1947); and /t/, which ranked twelfth, but was cited as third highest in difficulty by Roe and Milisen.

Hall (6, p. 725) found six sounds were frequently misarticulated by college Freshmen. These sounds were the same as those identified as difficult for our population, but did not include /r/, /l/, and /v/.

A ranking of sounds is difficult to determine from the Templin (12, 1957, p. 51) data, as she showed development by position. According to her data, three sounds were not correctly produced by 75% of the children in any position until age six. These were /θ/, /ð/, and /ʒ/. Initial and final /z/ and /v/ did not develop until six, though in the medial position they were present at three-and-a-half years and four years, respectively. Two final sounds, /l/ and /dʒ/, were not present until six, though they appeared in initial position at four years. Medial /t/ was an anomaly in that it was not present until six years, though it was present in initial and final positions at age three. Of the sounds found difficult in our study, /s/, /r/, /ʃ/, and /tʃ/ were not included in her groupings of sounds that develop late. Even more striking was the comparison of our group of six sounds ranking highest. Only two were common to her group of late-developing sounds: /θ/ and /z/. The other sounds--/s/, /r/, /ʃ/, and /tʃ/--were developed by four-and-a-half years, according to her findings.

In contrast, our group of difficult sounds agreed well with Wellman and associates' (17, p. 101) groupings by age, though the order was slightly different. Among the sounds not developed until five years, only /t/ was not listed among the sounds we found difficult. The /l/ was twelfth in her list as it was in Snow's rank order.

Davis (4) found eight sounds not present until at least six-and-a-half years. The significant difference here is that /v/ was not included among late-developing sounds in her data. Apparently she did not test for /tʃ/ and /dʒ/. Furthermore, she showed /s/ and /z/ as present at five-and-a-half years, then dropping out to reappear at eight years. She attributed this reversal to the period of losing anterior deciduous teeth. None of the other investigations produced such a result. Further, as a result of a study of articulation and dental abnormalities, Snow (11, p. 211) concluded ". . . defective incisor teeth usually do not interfere with correct articulation of the 'dental' sounds studied."

Though a number of the same sounds were identified by all studies as being frequently misarticulated, the differences among the studies are such that it would be hazardous to postulate an order of difficulty other than in the most general way. Comparison of the rankings of sounds with high percentages of errors from the seven studies that include younger children in the study population shows that a consonant common to all of them appears only when sounds ranking seventh are included. At this level, /θ/ is found in all lists. The only other sound common to all lists is /r/, which is ranked tenth in one of the studies.

In order to find other commonalities, at least one of the seven studies has to be eliminated. All studies except Hall's (6, p. 725) include /θ/ among the three sounds ranking highest in frequency of errors, and /ð/ among the seven highest ranking sounds. Eliminating Bass's (1) data, /s/ and /z/ are among the five highest ranking sounds and /tʃ/ and /dʒ/ are among the nine highest ranking sounds. With the Roe and Milisen (8) data eliminated, /ʃ/ is among the ten highest ranking sounds. Thus, the group of sounds that emerge as those always having a high percentage or errors are /θ/ and /r/, though the highest rank assigned to /r/ in any list was fourth. Another group of sounds agreed on by other investigators as being difficult are /s/, /z/, /ð/, /tʃ/, /dʒ/, and /ʃ/. The only list that includes all of these sounds among the eight with the highest proportion of errors is the present one.

These findings differ from what might be predicted on the basis of Templin's (12, p. 51) developmental data, as this listing does not include /ʒ/, /v/, /t/, and /l/, none of which is developed until six or seven years of age according to her criterion. In contrast, the list includes /r/, which is developed by four years, /s/, /ʃ/, and /tʃ/, which are developed by four-and-a-half years.

Davis's (4) order of development corresponds somewhat better, though she does not show development for /tʃ/ and /dʒ/. Nonetheless, she shows /ʒ/ and /l/ as not developing until six-and-a-half years, yet these two sounds do not consistently receive high error ratings.

Wellman's (17, p. 101) group of 10 sounds shown to develop late include /v/ and /ʒ/, which are not included in the composite list from the seven studies. The other eight sounds are the same, though the order, as inferred from the age at which 75% of the children produce them correctly, is entirely different.

There are numerous reasons why results from the various investigations of frequency of articulation errors differ. Even so, the commonalities that do exist indicate no more than a general relation between the developmental order of consonants as it is currently established and frequency of misarticulation. Certainly, the relation does not appear strong enough for prediction.

Types of Consonant Errors. Over half (56.3%) of the errors were substitutions. Distortions accounted for nearly one-third (31.5%) of the errors, while omissions accounted for approximately one-eighth (12.2%).

For all sounds combined, a few more substitution errors were made in the initial position than in the medial or final positions. About one-third were found in the medial position, while a little less than one-third were made in the final position.

Distortion errors occurred a little more frequently in the medial position; the remainder were about evenly divided between initial and final positions. Medial position accounted for a little over one-third of the distortions errors, with slightly over 30% occurring in the other two positions.

The majority of omission errors were found in the final position (58.7%). Approximately one-third occurred in medial position, while less than 10% were found in the initial position.

City and county figures were all but identical, except for a small discrepancy on omission errors. The city figures were higher on the percentage of omission errors made in the final position and lower on the percentage of omission errors in the medial position than the county figures. The city figures were 62.2% for final and 30.2% for medial, while the county figures were 52.9% for final and 36.5% for medial. Considering the nearly identical figures for position of substitution and distortion errors, this discrepancy is rather large.

As far as location of misarticulations was concerned, errors were rather evenly distributed over initial (32.2%), medial (34.4%), and final (33.4%) positions in words. Substitutions constituted the large majority of the errors in initial position. Very few initial errors were omissions; nearly one-third of them were distortions.

Errors on the so-called medial sounds were also primarily substitutions (55.3%), while one-third were distortion errors. More omission errors occurred in the medial than in the initial position (11.5% vs. 3.3%, respectively).

Errors in the final position were also largely substitutions (48.0%), though to a lesser degree than for the other positions. Distortion errors constituted nearly one-third of the errors in final position, as was true for initial errors. Omission errors accounted for more errors in the final position than in initial and medial positions, as the proportion here was 21.4%.

City and county figures were in close agreement on the distribution of errors by position, though pupils in the city caseload made a somewhat higher proportion of omission errors and a somewhat lower proportion of distortion errors in the final position.

No particular pattern was evident in the distribution of sounds ordered according to the proportion of substitution to distortion and omission errors made on each of them. While substitution errors accounted for from 74% to 80% of the errors made on **/θ/**, **/ð/**, and **/v/**, and for from 18% to 30% of the errors on **/h/**, **/d/**, **/t/**, and **/p/**, neither the late-developing vs. early-developing or fricative vs. stop dichotomy was apparent beyond the extremes of the distribution. Substitution errors were somewhat randomly distributed among the sounds other than for the extremes mentioned above. The distribution is shown in Figure 1.

A more definite pattern emerged in the distribution of sounds according to the percentage of errors accounted for by distortions. With three exceptions, low percentages of distortion errors were found among the sounds that generally develop early, which are also among the sounds least often misarticulated. Conversely, the sounds that generally develop late and are frequently misarticulated had, as a group, much higher percentages of distortion errors. The exceptions were /v/, /θ/, and /ð/, which had the lowest percentages of distortion errors. One easy sound, /j/, had a slightly higher percentage of distortion errors than the more difficult /l/ and /r/. The relation holds for the sounds as a group, as the progression within the group does not follow either a developmental order or a pattern of error frequency. This distribution is shown in Figure 2.

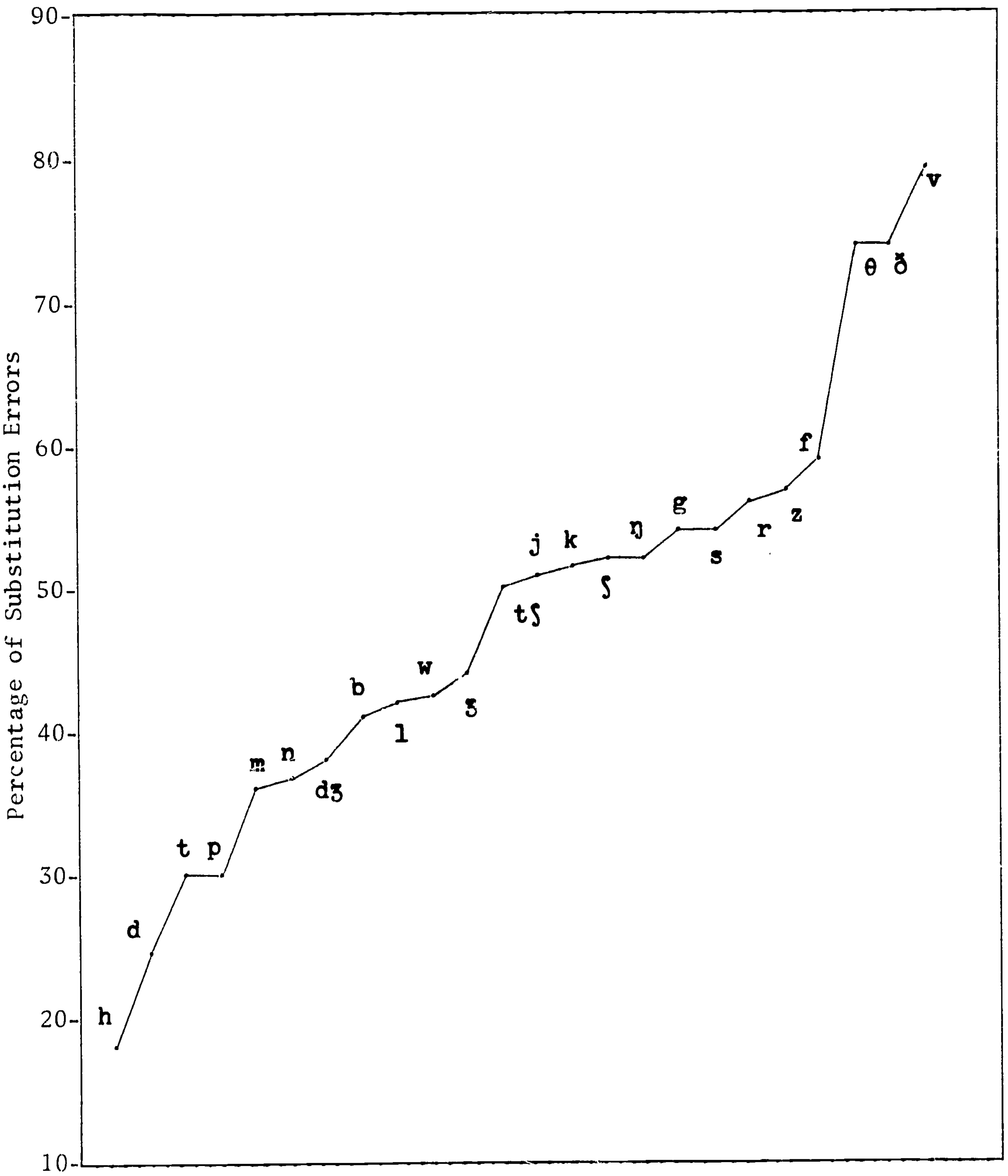
Another definite pattern was apparent in the distribution of the proportion of omission to substitution and distortion errors on each sound. Here again, the relation applies only to the sounds as a group. As with the data on distortions, the ordering within each group does not follow an identifiable pattern of characteristics.

The more difficult sounds had very low proportions of omission errors, while the easier sounds had much higher proportions of omission errors. Two sounds were slightly out of order: /j/ ranked just below /θ/, while /l/ ranked just above /f/. Thus, with these two exceptions, omissions definitely accounted for most of the errors made on easy sounds--sounds that develop early and that are seldom in error. This distribution is shown in Figure 3.

The high proportions of omission errors on /t/ and /d/ raise two kinds of questions. Depending on the kind of test response required, many of these errors might be evidence more of verb form omissions than of inability to articulate the sounds, as they are necessary tense markers for many verbs. The discrepancies between city and county figures on /t/ and /d/ were quite large relative to most other comparisons. It is possible that the differences were a function of testing method, but there is no evidence on which to compare test methods used in the city as opposed to the county schools. Nouns represented by picture stimuli are often used in testing. Under these conditions morphologic changes usually do not influence the results. However, another problem arises with single word responses, as the criteria for judging final stops are variable. The sound may be judged to be omitted because no plosion was evident.

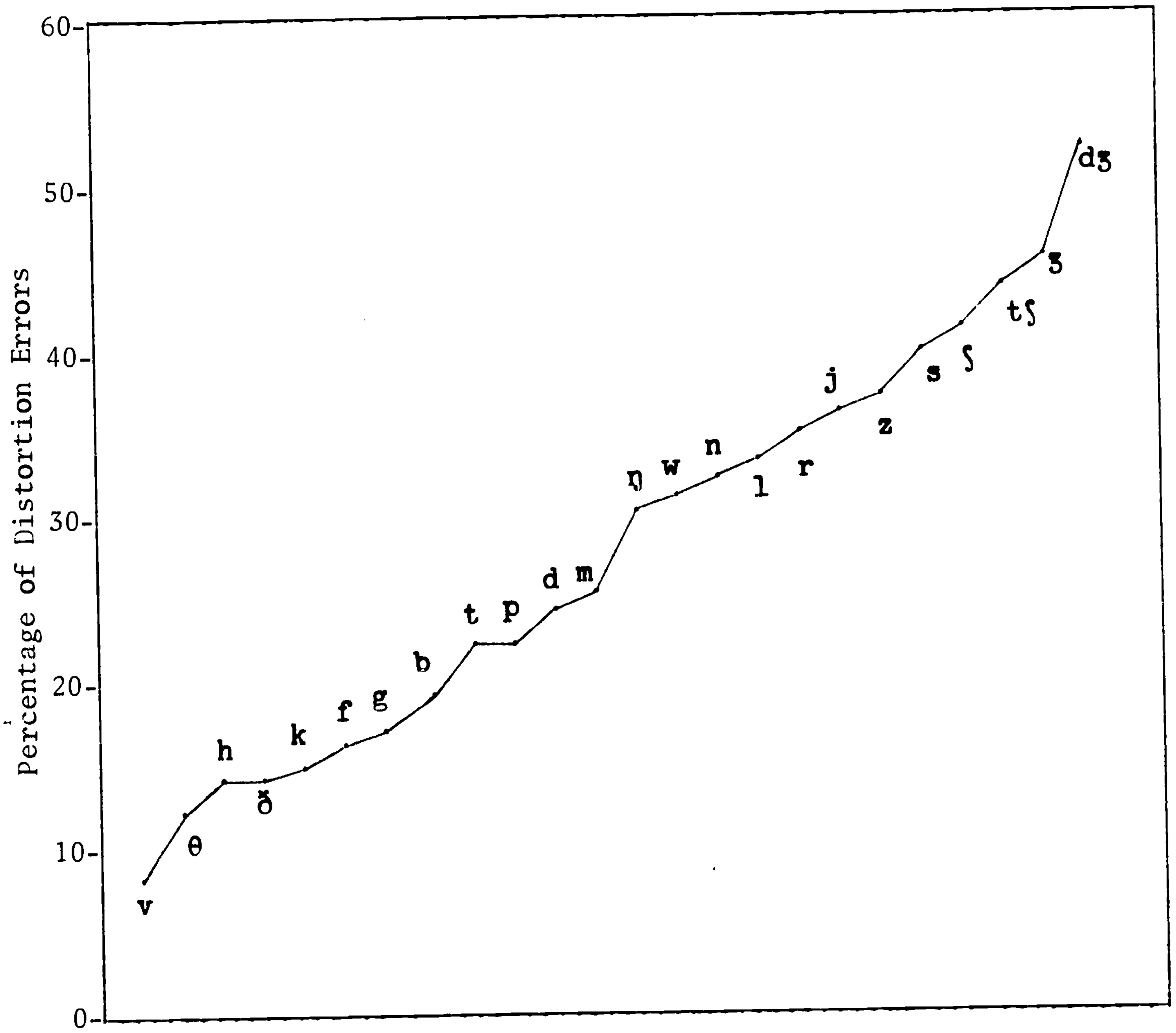
Among the studies on frequency of errors, only Snow's (10) data were reported in such a way that comparisons by type and position of errors could be made. The percentages cited in the following discussion were calculated from her data (10, pp. 279-287), though she did not

FIGURE 1



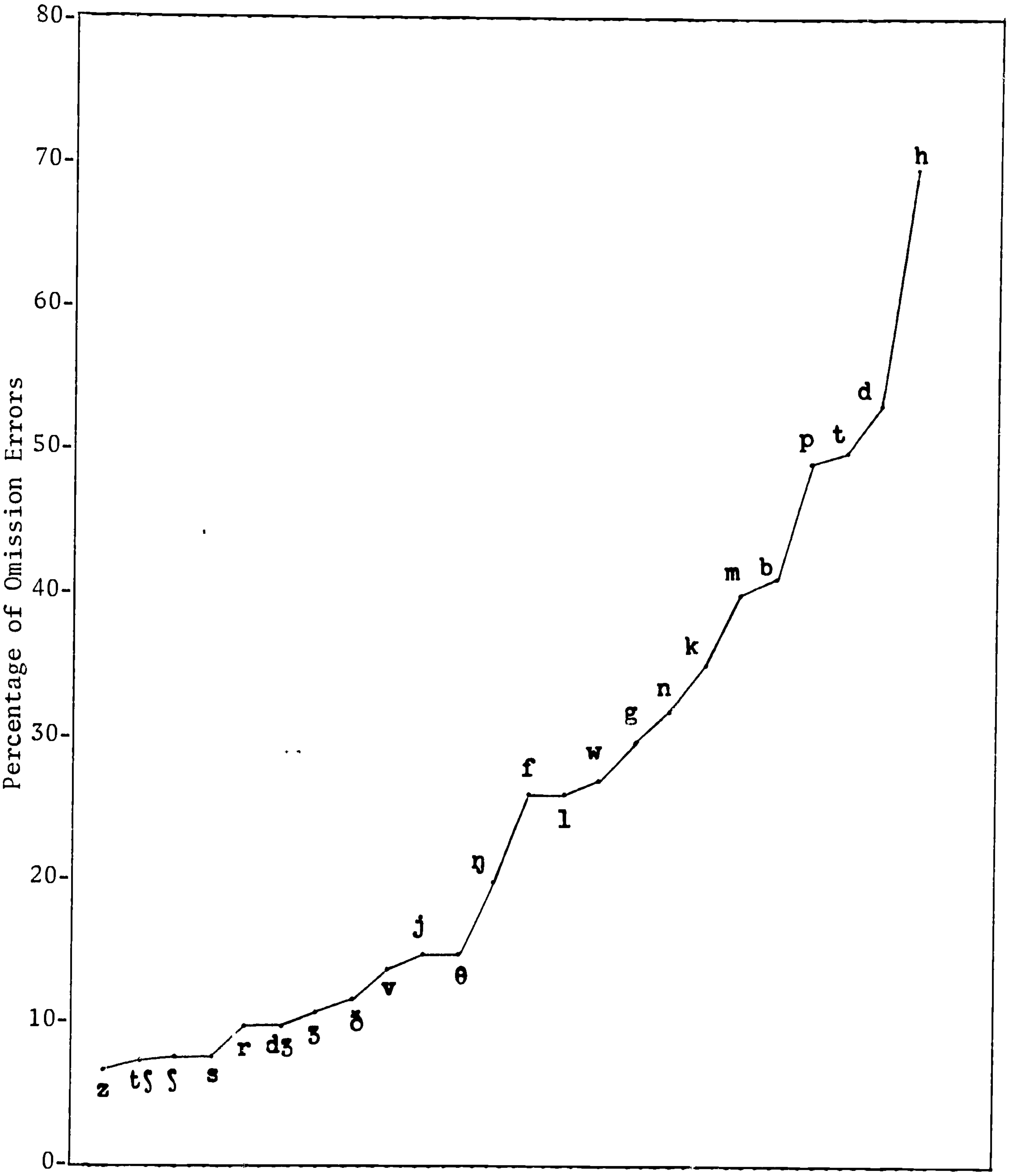
Percentage of substitution errors made on each consonant. The 11 consonants with the highest total number of errors are shown below the graph; those with the lowest total number of errors are shown above.

FIGURE 2



Percentage of distortion errors made on each consonant. The 11 consonants with the highest total number of errors are shown below the graph; those with the lowest total number of errors are shown above.

FIGURE 3



Percentage of omission errors made on each consonant. The 11 consonants with the highest total number of errors are shown below the graph; those with the lowest total number of errors are shown above.

report the percentages herself. Snow's data showed that distortions accounted for 72.0% of the errors; distortions constituted 19.5%; and omissions, 8.5%. In comparison with our findings based on a somewhat older population of pupils with communication disorders, her population of randomly selected younger children produced a much higher proportion of substitutions, a much lower proportion of distortions, and a slightly lower proportion of omissions.

Among substitution errors, those in the medial position occurred in the same proportion that we found. However, her group made considerably fewer substitutions in initial position and considerably more in final position. Her distribution of distortion errors was all but identical with ours. Omission errors in her sample occurred more frequently in the initial position and a little less frequently in final position than in ours. These comparisons are shown below. Percentages for Snow's sample were calculated from her published data, as she had not reported these computations as such.

Coates and Herbert		Snow	
Substitutions	56.3%	Substitutions	72.0%
Initial	37.7%	Initial	24.4%
Medial	33.8%	Medial	34.1%
Final	28.5%	Final	41.5%
Distortions	31.5%	Distortions	19.5%
Initial	31.4%	Initial	31.5%
Medial	36.2%	Medial	36.5%
Final	32.4%	Final	32.0%
Omissions	12.2%	Omissions	8.5%
Initial	8.5%	Initial	15.3%
Medial	32.6%	Medial	34.7%
Final	58.7%	Final	50.0%

Snow's distribution by position also differed from ours. She found a lower proportion of errors in the initial position (25.0% vs. our 32.2%); the same proportion of errors in medial position (34.6% vs. our 34.4%); and a higher proportion of final errors (40.4% vs. our 33.4%).

A somewhat higher proportion of her initial errors were substitutions than in our sample. She found both a lower percentage of distortions and a slightly higher percentage of omissions on initial sounds. Errors on medial sounds were much more frequently substitutions in her sample with fewer distortions and omissions. Differences for types of final errors were notable, also. Her group had a much higher proportion of substitution errors and lower proportions of distortion and omission errors in this position than ours.

Coates and Herbert		Snow	
Initial	32.2%	Initial	25.0%
Substitutions	65.9%	Substitutions	70.2%
Distortions	30.8%	Distortions	24.6%
Omissions	3.3%	Omissions	5.2%
Medial	34.4%	Medial	34.6%
Substitutions	55.3%	Substitutions	70.8%
Distortions	33.2%	Distortions	20.6%
Omissions	11.5%	Omissions	8.6%
Final	33.4%	Final	40.4%
Substitutions	48.0%	Substitutions	73.9%
Distortions	30.6%	Distortions	15.5%
Omissions	21.4%	Omissions	10.6%

The examination of changes in relative proportions among subgroups based on type of errors should serve as an indication of the differences between a population of young normal children, such as Snow studied, and an older population made up almost entirely of pupils with articulation disorders, as in the present study. The comparison should indicate, also, the kinds of changes most likely to occur over a period of time and, thus, form the basis for prediction.

For this kind of comparison, the two populations need to be regarded as being composed of subgroups representing the different types of errors. It is necessary to assume, also, that the older population represents the changes that have occurred within the younger population after the elapse of about two or three years. That is, in the absence of a longitudinal study in which the original population is followed over a period of years in order to determine what changes take place, the estimate of those changes must be made from a comparison of populations with an age differential. Whatever changes occur in the interrelations among subgroups are necessarily adjustments within the original group. Proportions could be changed by either a differential reduction in subgroup size so that one subgroup changes its proportional relation to the others or through shifting from one subgroup to another. In the latter case, the population size could either be reduced or remain stable. Shifting from one subgroup to another must be compatible with what is known about articulatory behavior. For example, substitution and omission errors can become distortion errors, but substitution errors do not shift to omission errors. Shifting does not occur among positions. That is, an error made in final position is not eliminated by being replaced with an error in the initial or medial position.

While both populations had high percentages of substitution errors, the relative concentration in Snow's younger population was much higher, particularly when the errors occurred in medial and final positions. The proportion of distortion errors was increased in our older population, while the proportion of omission errors increased also, but not to the same extent as for distortion errors. We must assume, then, that these differences represent the way in which the younger population has changed during the course of time.

The increase in distortion errors could have come about by shifts from the substitution and omission subgroups, but the increase in omission errors could only occur through reduction in one or both of the other subgroups, since the shift from substitution or distortion errors does not occur. The reduction in substitution errors is very large, particularly since the population size was obviously reduced as indicated by the higher proportion of omission errors.

Another kind of pattern is evident when the errors are grouped by position in words. The proportion of medial errors remains constant for the two groups. The proportion of initial errors is increased in the older group by the amount of the reduction in final errors. Here again, we must assume the data from our group represents the changes occuring as the younger group, represented by Snow's population, becomes older.

Since there can be no shifting among subgroups in this case, the change is obviously due to dropping out of final errors. Some reduction in medial errors would have to occur, also, since a smaller number is necessary to maintain a given proportion in a smaller population. There would be little or no reduction in initial errors, depending on the extent of over-all reduction in population size.

The changes from younger to the older group that are evident from putting these two patterns of change together can be summarized as follows. Distortion errors in any position are increased in the older population regardless of position. Initial substitution errors and medial and final omission errors are also increased. Substitution errors in medial and final position are markedly reduced. Initial omission errors remain relatively constant.

Taking into account the mathematics involved in dealing with proportions as totals differ, these comparisons suggest the following hypotheses about prediction. They would, of course, have to be tested with age, test method, and tester agreement rigidly controlled.

a. Distortion errors are not related to age and do not diminish significantly with age. Medial distortion errors, in particular, do not diminish with age.

b. Substitution errors are related to age and will diminish with age up to some point. Substitution errors in medial and final positions will be substantially reduced as age increases up to some point, but substitution errors in the initial position will not.

c. Omission errors are related to age up to some point, but to a lesser degree than substitution errors. Some reduction in this kind of error will occur as age increases. Omission errors in the initial position are most likely to be revised as age increases.

Blends. Blends were tested in the initial position only. The data were not retrieved in the same detail as for the consonants, as it was not always clear which member of the blend was defective. The number of errors per student was 12.24. These data differ considerably from what might be predicted from the order of development of double and triple blends as cited by Templin (12, p. 51).

As might be expected on the basis of clinical experience, the /s/-blends were the most difficult of the double blends. Errors occurred in about the same proportion on all of them ranging from 4.9% on /sw/ and /sn/ to 5.2% on /sl/ and /st/. The Templin data show that there is a three-year difference between the time 75% of the children in her sample could produce /sl/ and /sw/, which appear late, and the other /s/-blends. The relative percentages of errors on these blends do not reflect developmental order.

Blends that include /r/ were next in difficulty, with /ʃr/ and /θr/ accounting for 3.9% and 3.5% of the errors, respectively. Percentages of errors on the remaining /r/-blends accounted for fewer errors than the easiest of the /s/-blends. According to Templin, five of the seven /s/-blends develop at the same time as five of the nine /r/-blends. Two of the /r/-blends and two of the /s/-blends were not correctly produced by 75% of the children until seven--three years after the majority of these blends have been established. The developmental sequence as cited by Templin is apparently not related to the frequency of misarticulation of these blends.

Errors on /l/-blends accounted for from 1.3% to 1.7% of the total errors, except for /sl/, which contributed a similar percentage of errors as the other /s/-blends. According to the Templin developmental chart, /fl/ should have accounted for more errors than most of the /r/-, /s/-, and other /l/-blends, except for /sl/.

Errors on **/tw/** and **/kw/** occurred rarely, but on the basis of Templin's data, they might be expected to occur with the same frequency as many of the **/s/**-, **/l/**-, and **/r/**-blends.

Bass's (1, p. 41) results also differ from ours. Of the 10 double blends misarticulated by 10% or more of the children beginning kindergarten, eight of them were **/r/**-blends, one was **/sw/**, which was misarticulated by 13% of her sample, and **/fl/**, which was misarticulated by 10% of her sample. By the end of kindergarten, at which time the mean age for her group was 6.0 years, only **/θr/** and **/ʃr/** were misarticulated by more than 10% of her sample.

Roe and Milisen (8, pp. 42-43) tested only four double blends: **/st/**, **/sk/**, **/dr/**, and **/fl/**. The **/st/**-blend was second in the order of frequently misarticulated sounds from which voicing errors had been eliminated. This ranking included both blends and single consonants. The **/sk/**-blend ranked eighth, while **/dr/** ranked fifteenth in this order, and **/fl/** followed in eighteenth place. Sayler's (9, p. 206) data were much the same. She showed **/st/** and **/sk/** as ranking seventh and eighth, respectively. They ranked above **/s/**, **/θ/**, and **/l/** in difficulty. **/fl/** and **/dr/** were in twenty-first and twenty-second place, just ahead of **/ʃ/**.

In our study, four of the five triple blends, **/spr/**, **/str/**, **/skr/**, and **/spl/**, were more difficult than any of the double blends. However, **/skw/** ranked below all double blends involving **/s/**.

The only triple blend tested by Roe and Milisen as well as by Sayler was **/str/**. Roe and Milisen found fewer errors on this triple blend than on **/st/**, but it was more difficult than the other three double blends. Sayler found both **/st/** and **/sk/** more difficult than **/str/**, but the latter was more difficult than **/fl/** and **/dr/**.

Bass (1, p. 40) found that for beginning kindergarten children, the three triple blends **/spr/**, **/str/**, and **/skr/** ranked just below **/ʃr/** in the order of difficulty, while **/spl/** was equivalent in difficulty to **/kr/** and **/gr/**. By the end of kindergarten, **/skr/** had the highest percentage of errors, while **/spr/** and **/str/** were equivalent with **/ʃr/** in difficulty, with 12% of the children still misarticulating them. Only 8% misarticulated **/spl/**, which, according to Templin, is as difficult as **/skr/**, **/spl/**, and **/spr/**, judging by the age at which 75% of her sample had mastered these blends. In contrast, these triple blends were present in 75% of Wellman's (17, p. 101) sample at age five, with only **/θr/** and **/sl/** among the double blends not present until six.

These data indicate that the order of difficulty of double and triple blends, based on the proportions of errors, is apparently different in a population made up almost entirely of children with articulation errors than in a randomly selected population. It would appear, therefore, that these children are not following a normal sequence of phonetic development that is just delayed in time, but manifest developmental distortions.

Percentages of errors on the blends were identical for the city and county samples on seven of the blends. Since the difference between percentages did not exceed 0.4% in any case, it seems reasonable to assume that a sampling error did not produce these results. Therefore, the conclusion follows that relative number of errors on blends and developmental order as previously cited are not related.

Dialect. Dialect problems were found in a higher proportion of pupils with articulation disorders combined with little or no speech, though the total number of such cases was small. More of the pupils with articulation disorders who also had language or stuttering disorders had dialect deviations. Less than 10% of the pupils with articulation disorders as a single disorder or in combination with voice disorders had dialect differences. For the most part, the dialect deviations were foreign rather than regional.

Dental Conditions Related to Speech. The percentage of pupils with occlusion problems was highest in the group having articulation and voice disorders combined. About one-third of the pupils had occlusion inadequate for speech. Approximately one-fourth of the pupils with articulation disorders combined with little or no speech had occlusion problems. Proportions in the other groups varied around 20%. The most frequently occurring inadequacy was over jet (mesiocclusion), which accounted for approximately 40% of the occlusion deviations regardless of type of speech problem. The proportion of pupils with open bite was higher among those with articulation disorders as a single disorder or in combination with stuttering than among pupils in the other groups. A higher proportion with cross bite was found among pupils with articulation and voice disorders combined.

Twenty-seven per cent of the pupils had other kinds of dental conditions said to interfere with speech. A slightly smaller proportion of pupils with articulation as a single disorder and a slightly higher proportion of the pupils with articulation combined with voice disorders had other kinds of dental inadequacies in comparison with pupils with articulation combined with either little or no speech or language or stuttering disorders.

Other Aspects of the Speech Mechanism. In general, fewer pupils had difficulty with the lips than with the tongue (5% vs. 15%, respectively). Lack of mobility was the major reason for inadequacy regardless of the speech disorders. A smaller proportion of pupils with articulation disorders as a single disorder or in combination with stuttering had inadequacies of the lips and tongue.

The rather high proportion of pupils classified as having "other" difficulties with the tongue that interfered with speech suggests that the attributes provided in the case record need to be expanded. Nearly 21% of the pupils with deviations could not be described with the terms provided: lack of mobility, too large, asymmetrical, or combinations thereof. Possible, some or even most of the pupils would be classified as "tongue thrusters." However, similar proportions of pupils having each of the other disorders combined with articulation disorders or articulation disorders as a single disorder were classified as having "other" conditions of the tongue, which perhaps qualifies the above surmise.

Stuttering

Type of Fluency Deviation. Stuttering combined with little or no speech, language disorders, or voice disorders was relatively rare. Regardless of whether stuttering was a single disorder or was combined with other disorders, most pupils produced a combination of the various patterns of nonfluency, such as syllable repetitions, prolongations, and so forth. The number of cases in some categories was so small that no estimate of whether an interaction between disorders groups and fluency deviations was present could be made.

Behaviors. Eye contact was infrequent for about 30% of the city caseload, but for only about 15% of the county caseload, which may be related to the age differential between city and county caseloads. When the number of cases in some of the disorders groups is taken into account, about the same proportions had infrequent eye contact regardless of which of the other speech deviations was combined with stuttering.

About one-fourth of the pupils in the city, but only 17% of those in the county, had distracting mannerisms. Here again the two samples appear to reflect the tendency for older stutterers to have extraneous mannerisms. Neither sample showed evidence of mannerisms being associated with any particular combination of the other disorders with stuttering or with stuttering as a single disorder.

Undesirable oral habits were observed in 27% of the pupils in the city sample who stuttered and in about 20% of the county sample. The distribution within disorders groups was fairly constant in each sample.

Voice Disorders

Voice Quality. More than three-fourths of the pupils with voice disorders had quality deviations. The proportion of pupils having normal voice quality was higher among those having a combination of voice and language disorders; however, the total number of cases was small. Regardless of the combination of disorders, about the same proportions of pupils in each group were nasal--45% in the city caseload and 25% in the county caseload.

One-fifth of the pupils with quality deviations were hoarse. About equal proportions of pupils with each of the other disorders had this kind of voice quality. Only 9% were denasal. Nearly all of these pupils had articulation problems as well, even though the proportion relative to the total number with articulation disorders was quite small. About 8% were breathy and 5% had harsh voice quality. Both of these conditions tended to occur as a single disorder or in combination with articulation.

Pitch, Loudness, and Rate. Pitch deviations were less prevalent than quality disorders. Approximately 40% of the pupils with voice disorders had this kind of deviation; the most common complaint was high pitch (36%). About 26% had pitch that was too low, while about 24% had monotonous pitch. The very small number of pupils in some of the categories does not permit meaningful comparisons either between or within groups. Discrepancies between the city and county caseloads were quite high, especially in view of the frequent agreement between results from the two samples. Here again, this result may be due to the age differential between the two samples.

Nearly 40% of the pupils had loudness deviations. The proportion of pupils with too little intensity was considerably larger in the city caseload.

Rate deviations were relatively rare when compared with voice quality, pitch, and loudness deviations. Twenty-six per cent had deviant rate, though more than half of the pupils with stuttering had rate deviations. For this group, rate was usually jerky and uneven or too rapid. For the group as a whole, rapid rate and uneven or jerky rate were equally prevalent and accounted for about two-thirds of the rate problems. Slowness was a problem for about a fifth of the pupils with rate deviations.

Conditions of the Soft Palate. The total number of pupils with deviations of the soft palate was small; less than 20% had conditions that interfered with speech. Over half of the deviations were due to conditions other than clefts or submucous clefts, inadequate prostheses, shortness, poor mobility, asymmetric function, or combinations thereof. This datum also suggests the need for further exploration of the descriptive system used in the case record.

In all, there were 17 cases of unrepaired clefts of the soft palate. All but two of these pupils produced the combination of voice and language disorders.

Breathing. Forty per cent of the pupils with voice disorders either as a single disorder or in combination with other disorders had deviations in breathing that interfered with oral communication. Most of the deviations in breathing were mouth breathing, which was more frequently associated with the combination of voice and articulation disorders. Shallow breathing was found more frequently among the pupils with voice as a single disorder and those with the combination of voice and language disorders. The total number of pupils classified in the latter group, however, was very small.

SECTION C

ORGANIZATION OF TABLES

Articulation, Stuttering, and Voice Disorders

TABLE C.1

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by vowel and consonant articulation and error consistency within groups having articulation as a single expressive speech disorder and articulation combined with little or no speech, or language, stuttering, or voice disorders.

			Disorders Combined with Articulation Disorders									
	Articulation		Little or No Speech		Language Disorder		Stuttering		Voice Disorder		Total	
Vowel and Consonant Articulation	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Vowels												
Normal	6190	84.6	170	60.3	95	61.3	489	80.8	317	66.5	7261	82.1
Deviant	1130	15.4	112	39.7	60	38.7	116	19.2	160	33.5	1578	17.9
TOTAL	7320	100.0	282	100.0	155	100.0	605	100.0	477	100.0	8839	100.0
Consonants												
Normal	176	2.4	1	.4	2	1.3	31	5.1	5	1.0	215	2.4
Deviant	7264	97.6	280	99.6	157	98.7	582	94.9	480	99.0	8763	97.6
Omissions	55	(.8)	1	(.4)	4	(2.5)	9	(1.5)	2	(.4)	71	(.8)
Distortions	1557	(21.4)	16	(5.7)	10	(6.4)	116	(19.9)	131	(27.3)	1830	(20.9)
Substitutions	1916	(26.4)	24	(8.6)	30	(19.1)	143	(24.6)	64	(13.3)	2177	(24.9)
Additions	1	(--)	--	(--)	--	(--)	1	(.2)	1	(.2)	3	(--)
Combination	3530	(48.6)	232	(82.8)	101	(64.4)	295	(50.7)	269	(56.1)	4427	(50.5)
Other	205	(2.8)	7	(2.5)	12	(7.6)	18	(3.1)	13	(2.7)	255	(2.9)
TOTAL	7440	100.0	281	100.0	159	100.0	613	100.0	485	100.0	8978	100.0
Consistency												
Consistent	5560	79.0	159	60.2	109	77.3	372	68.3	313	70.3	6513	77.2
Inconsistent	1482	21.0	105	39.8	32	22.7	173	31.7	132	29.7	1924	22.8
TOTAL	7042	100.0	264	100.0	141	100.0	545	100.0	445	100.0	8437	100.0

TABLE C.2

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by vowel and consonant articulation and error consistency within groups having articulation as a single expressive speech disorder and articulation combined with little or no speech, or language, stuttering, or voice disorders.

Vowel and Consonant Articulation	Articulation		Disorders Combined with Articulation Disorders								Total	
			Little or No Speech		Language Disorder		Stuttering		Voice Disorder			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Vowels												
Normal	4943	86.7	155	63.8	49	66.2	182	76.2	283	76.1	5612	84.7
Deviant	757	13.3	88	36.2	25	33.8	57	23.8	89	23.9	1016	15.3
TOTAL	5700	100.0	243	100.0	74	100.0	239	100.0	372	100.0	6628	100.0
Consonants												
Normal	112	1.9	5	2.0	2	2.7	6	2.4	1	--	126	1.8
Deviant	5825	98.1	247	98.0	73	97.3	242	97.6	388	100.0	6775	98.2
Omissions	39	(.7)	1	(.4)	--	--	2	(.8)	7	(1.8)	49	(.7)
Distortions	1315	(22.6)	18	(7.3)	2	(2.7)	46	(19.0)	74	(19.1)	1455	(21.5)
Substitutions	1583	(27.2)	25	(10.1)	11	(15.1)	49	(20.2)	67	(17.3)	1735	(25.6)
Additions	1	(--)	--	(--)	--	(--)	--	(--)	--	(--)	1	(--)
Combination	2662	(45.7)	179	(72.5)	53	(72.6)	133	(55.0)	222	(57.2)	3249	(48.0)
Other	225	(3.8)	24	(9.7)	7	(9.6)	12	(5.0)	18	(4.6)	286	(4.2)
TOTAL	5937	100.0	252	100.0	75	100.0	248	100.0	389	100.0	6901	100.0
Consistency												
Consistent	4264	77.9	138	58.2	39	57.4	145	64.4	246	67.2	4832	75.9
Inconsistent	1209	22.1	99	41.8	29	42.6	80	35.6	120	32.8	1537	24.1
TOTAL	5473	100.0	237	100.0	68	100.0	225	100.0	366	100.0	6369	100.0

TABLE C.3

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by groups having articulation as a single expressive speech disorder and articulation combined with little or no speech, or language, stuttering, or voice disorders within categories of vowel and consonant articulation and error-consistency groups.

Vowel and Consonant Articulation	Articulation		Disorders Combined with Articulation Disorders								Total	
			Little or No Speech		Language Disorder		Stuttering		Voice Disorder			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Vowels												
Normal	6190	85.3	170	2.3	95	1.3	489	6.7	317	4.4	7261	100.0
Deviant	1130	71.6	112	7.1	60	3.8	116	7.4	160	10.1	1578	100.0
TOTAL	7320	82.8	282	3.2	155	1.8	605	6.8	477	5.4	8839	100.0
Consonants												
Normal	176	81.9	1	.5	2	.9	31	14.4	5	2.3	215	100.0
Deviant	7264	82.9	280	3.2	157	1.8	582	6.6	480	5.5	8763	100.0
Omissions	55	77.5	1	1.4	4	5.6	9	12.7	2	2.8	71	100.0
Distortions	1557	85.1	16	.9	10	.5	116	6.3	131	7.2	1830	100.0
Substitutions	1916	88.0	24	1.1	30	1.4	143	6.5	64	3.0	2177	100.0
Additions	1	33.4	--	--	--	--	1	33.3	1	33.3	3	100.0
Combination	3530	79.7	232	5.2	101	2.3	295	6.7	269	6.1	4427	100.0
Other	205	80.4	7	2.7	12	4.7	18	7.1	13	5.1	255	100.0
TOTAL	7440	82.9	281	3.1	159	1.8	613	6.8	485	5.4	8978	100.0
Consistency												
Consistent	5560	85.4	159	2.4	109	1.7	372	5.7	313	4.8	6513	100.0
Inconsistent	1482	77.0	105	5.4	32	1.7	173	9.0	132	6.9	1924	100.0
TOTAL	7042	83.5	264	3.1	141	1.7	545	6.4	445	5.3	8437	100.0

TABLE C.4

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by groups having articulation as a single expressive speech disorder and articulation combined with little or no speech, or language, stuttering, or voice disorders within categories of vowel and consonant articulation and error-consistency groups.

Vowel and Consonant Articulation	Articulation		Disorders Combined with Articulation Disorders								Total	
			Little or No Speech		Language Disorder		Stuttering		Voice Disorder			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Vowels												
Normal	4943	88.1	155	2.8	49	.9	182	3.2	283	5.0	5612	100.0
Deviant	757	74.5	88	8.7	25	2.5	57	5.6	89	8.7	1016	100.0
TOTAL	5700	86.0	243	3.7	74	1.1	239	3.6	372	5.6	6628	100.0
Consonants												
Normal	112	88.9	5	4.0	2	1.6	6	4.7	1	.8	126	100.0
Deviant	5825	86.0	247	3.6	73	1.1	242	3.6	388	5.7	6775	100.0
Omissions	39	79.6	1	2.0	--	--	2	4.1	7	14.3	49	100.0
Distortions	1315	90.4	18	1.2	2	.1	46	3.2	74	5.1	1455	100.0
Substitutions	1583	91.3	25	1.4	11	.6	49	2.8	67	3.9	1735	100.0
Additions	1	100.0	--	--	--	--	--	--	--	--	1	100.0
Combination	2662	82.0	179	5.5	53	1.6	133	4.1	222	6.8	3249	100.0
Other	225	78.7	24	8.4	7	2.4	12	4.2	18	6.3	286	100.0
TOTAL	5937	86.0	252	3.7	75	1.1	248	3.6	389	5.6	6901	100.0
Consistency												
Consistent	4264	88.2	138	2.9	39	.8	145	3.0	246	5.1	4832	100.0
Inconsistent	1209	78.7	99	6.4	29	1.9	80	5.2	120	7.8	1537	100.0
TOTAL	5473	86.0	237	3.7	68	1.1	225	3.5	366	5.7	6369	100.0

TABLE C.5

Number of children making vowel, consonant, and consonant-blend errors and receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Combination of Errors	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
Vowel Errors Only	--	--	--	--	--	--
Consonant Errors Only	892	9.4	1587	21.4	2479	14.7
Blend Errors Only	--	--	--	--	--	--
Vowel-Consonant Errors Only	212	2.2	138	1.9	350	2.1
Vowel-Blend Errors Only	--	--	--	--	--	--
Consonant-Blend Errors Only	5533	58.4	4025	54.3	9558	56.7
Vowel-Consonant-Blend Errors Only	2831	30.0	1657	22.4	4488	26.5
TOTAL	9468	100.0	7407	100.0	16875	100.0

TABLE C.6

Vowel and diphthong errors made by children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Vowel and Diphthong Errors	L.A. City		L.A. County		Combined	
	Number	%	Number	%	Number	%
/ i /	103	1.7	75	2.0	178	1.8
/ ɪ /	180	2.9	129	3.4	309	3.1
/ ɛ /	243	3.9	116	3.1	359	3.6
/ æ /	181	2.9	100	2.6	281	2.8
/ ʌ /	96	1.5	59	1.6	155	1.6
/ ə /	130	2.1	70	1.9	200	2.0
/ ɝ /	2124	34.1	1356	36.1	3480	34.9
/ ɚ /	1279	20.5	896	23.8	2175	21.8
/ ɑ /	127	2.0	62	1.7	189	1.9
/ ɔ /	122	2.0	102	2.7	224	2.2
/ ʊ /	130	2.1	63	1.7	193	1.9
/ u /	95	1.5	41	1.1	136	1.4
/ ju /	899	14.4	415	11.0	1314	13.2
/ oʊ /	103	1.7	50	1.3	153	1.5
/ ɑʊ /	85	1.4	58	1.5	143	1.4
/ eɪ /	87	1.4	48	1.3	135	1.3
/ ɑɪ /	128	2.1	62	1.7	190	1.9
/ ɔɪ /	110	1.8	55	1.5	165	1.7
TOTAL	6222	100.0	3757	100.0	9979	100.0
Total Children with Errors	3043		1795		4838	
Mean Number of Errors per Child	2.04		2.09		2.06	

TABLE C.7

Consonant errors made by children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Consonant Errors	L.A. City		L.A. County		Combined	
	Number	%	Number	%	Number	%
/ m /	325	.3	205	.3	530	.3
/ n /	510	.5	396	.5	906	.5
/ ŋ /	931	.9	617	.8	1548	.9
/ p /	735	.7	347	.5	1082	.6
/ b /	761	.8	337	.5	1098	.6
/ t /	1471	1.5	891	1.2	2362	1.3
/ d /	1203	1.2	742	1.0	1945	1.1
/ k /	1483	1.5	1066	1.4	2549	1.5
/ g /	1405	1.4	1015	1.4	2420	1.4
/ r /	8726	8.7	7975	10.7	16701	9.5
/ l /	3604	3.6	3252	4.3	6856	3.9
/ f /	1507	1.5	1111	1.5	2618	1.5
/ v /	3601	3.6	2831	3.8	6432	3.7
/ θ /	9582	9.6	7423	9.9	17005	9.7
/ ð /	7773	7.8	4408	5.9	12181	7.0
/ s /	14662	14.7	12435	16.6	27097	15.5
/ z /	13419	13.4	10292	13.7	23711	13.6
/ ʃ /	8242	8.3	6610	8.8	14852	8.5
/ ʒ /	3634	3.7	1962	2.6	5596	3.2
/ h /	329	.3	149	.2	478	.3
/ hw /	2325	2.3	607	.8	2932	1.7
/ w /	318	.3	206	.3	524	.3
/ j /	1316	1.3	923	1.2	2239	1.3
/ tʃ /	7239	7.3	5667	7.6	12906	7.4
/ dʒ /	4758	4.8	3403	4.5	8161	4.7
TOTAL	99859	100.0	74870	100.0	174729	100.0
Total Children with Errors	9468		7407		16875	
Mean Number of Errors per Child	10.55		10.11		10.35	

TABLE C.8

Type of error--substitution, distortion, omission--made on consonants by children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Type of Consonant Errors	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
Substitution	56709	56.8	41650	55.6	98359	56.3
Initial	21106	(37.2)	15966	(38.3)	37072	(37.7)
Medial	19415	(34.2)	13882	(33.3)	33297	(33.8)
Final	16188	(28.6)	11802	(28.4)	27990	(28.5)
Distortion	29964	30.0	25148	33.6	55112	31.5
Initial	9520	(31.8)	7785	(30.9)	17305	(31.4)
Medial	11010	(36.7)	8946	(35.6)	19956	(36.2)
Final	9434	(31.5)	8417	(33.5)	17851	(32.4)
Omission	13186	13.2	8072	10.8	21258	12.2
Initial	998	(7.6)	851	(10.6)	1849	(8.7)
Medial	3984	(30.2)	2948	(36.5)	6932	(32.6)
Final	8204	(62.2)	4273	(52.9)	12477	(58.7)
TOTAL	99859	100.0	74870	100.0	174729	100.0
Total Children with Errors	9468		7407		16875	
Mean Number of Errors per Child	10.55		10.11		10,35	

TABLE C.9

Position of errors--initial, medial, final--made on consonants by children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Position of Error	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
Initial	31624	31.7	24602	32.9	56226	32.2
Substitution	21106	(66.7)	15966	(64.9)	37072	(65.9)
Distortion	9520	(30.1)	7785	(31.6)	17305	(30.8)
Omission	998	(3.2)	851	(3.5)	1849	(3.3)
Medial	34409	34.4	25776	34.4	60185	34.4
Substitution	19415	(56.4)	13882	(53.9)	33297	(55.3)
Distortion	11010	(32.0)	8946	(34.7)	19956	(33.2)
Omission	3984	(11.6)	2948	(11.4)	6932	(11.5)
Final	33826	33.9	24492	32.7	58318	33.4
Substitution	16188	(47.9)	11802	(48.2)	27990	(48.0)
Distortion	9434	(27.9)	8417	(34.4)	17851	(30.6)
Omission	8204	(24.2)	4273	(17.4)	12477	(21.4)
TOTAL	99859	100.0	74870	100.0	174729	100.0

TABLE C.10

Type of error--substitution, distortion, omission--made on each consonant separately by children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Type of Consonant Errors	L.A. City		L.A. County		Combined	
	Number	%	Number	%	Number	%
/ m /						
Substitution	132	40.6	60	29.3	192	36.2
Initial	31	(23.5)	11	(18.3)	42	(21.9)
Medial	58	(43.9)	22	(36.7)	80	(41.7)
Final	43	(32.6)	27	(45.0)	70	(36.4)
Distortion	60	18.5	71	34.6	131	24.7
Initial	19	(31.7)	21	(29.6)	40	(30.5)
Medial	22	(36.6)	27	(38.0)	49	(37.4)
Final	19	(31.7)	23	(32.4)	42	(32.1)
Omission	133	40.9	74	36.1	207	39.1
Initial	5	(3.7)	10	(13.5)	15	(7.3)
Medial	38	(28.6)	26	(35.1)	64	(30.9)
Final	90	(67.7)	38	(51.4)	128	(61.8)
TOTAL	325	100.0	205	100.0	530	100.0
/ n /						
Substitution	196	38.4	135	34.1	331	36.5
Initial	19	(9.7)	21	(15.5)	40	(12.0)
Medial	42	(21.4)	36	(26.7)	78	(23.6)
Final	135	(68.9)	78	(57.8)	213	(64.4)
Distortion	127	24.9	165	41.7	292	32.2
Initial	31	(24.4)	45	(27.3)	76	(26.0)
Medial	51	(40.2)	44	(26.6)	95	(32.5)
Final	45	(35.4)	76	(46.1)	121	(41.5)
Omission	187	36.7	96	24.2	283	31.3
Inital	8	(4.3)	4	(4.2)	12	(4.2)
Medial	48	(25.7)	31	(32.3)	79	(27.9)
Final	131	(70.0)	61	(63.5)	192	(67.9)
TOTAL	510	100.0	396	100.0	906	100.0

TABLE C.10 (continued)

Type of	L.A. City		L.A. County		Combined	
Consonant Errors	Number	%	Number	%	Number	%
/ ŋ /						
Substitution	471	50.6	331	53.6	802	51.8
Medial	233	(49.5)	153	(46.2)	386	(48.1)
Final	238	(50.5)	178	(53.8)	416	(51.9)
Distortion	273	29.3	185	30.0	458	29.6
Medial	147	(53.8)	77	(41.6)	224	(48.9)
Final	126	(46.2)	108	(58.4)	234	(51.1)
Omission	187	20.1	101	16.4	288	18.6
Medial	63	(33.7)	30	(29.7)	93	(32.3)
Final	124	(66.3)	71	(70.3)	195	(67.7)
TOTAL	931	100.0	617	100.0	1548	100.0
/ p /						
Substitution	213	29.0	112	32.3	325	30.0
Initial	98	(46.0)	57	(50.9)	155	(47.7)
Medial	73	(34.3)	29	(25.9)	102	(31.4)
Final	42	(19.7)	26	(23.2)	68	(20.9)
Distortion	126	17.1	113	32.6	239	22.1
Initial	47	(37.3)	36	(31.9)	83	(34.7)
Medial	39	(31.0)	33	(29.2)	72	(30.1)
Final	40	(31.7)	44	(38.9)	84	(35.2)
Omission	396	53.9	122	35.1	518	47.9
Initial	10	(2.5)	4	(3.3)	14	(2.7)
Medial	65	(16.4)	28	(22.9)	93	(18.0)
Final	321	(81.1)	90	(73.8)	411	(79.3)
TOTAL	735	100.0	347	100.0	1082	100.0

TABLE C.10 (continued)

Type of Consonant Errors	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
/ b /						
Substitution	314	41.3	137	40.7	451	41.1
Initial	55	(17.5)	45	(32.9)	100	(22.2)
Medial	50	(15.9)	41	(29.9)	91	(20.2)
Final	209	(66.6)	51	(37.2)	260	(57.6)
Distortion	116	15.2	95	28.2	211	19.2
Initial	40	(34.5)	29	(30.5)	69	(32.7)
Medial	27	(23.3)	24	(25.3)	51	(24.2)
Final	49	(42.2)	42	(44.2)	91	(43.1)
Omission	331	43.5	105	31.1	436	39.7
Initial	23	(6.9)	14	(13.3)	37	(8.5)
Medial	40	(12.1)	16	(15.3)	56	(12.8)
Final	268	(81.0)	75	(71.4)	343	(78.7)
TOTAL	761	100.0	337	100.0	1098	100.0
/ t /						
Substitution	461	31.3	237	26.6	698	29.6
Initial	145	(31.5)	95	(40.1)	240	(34.4)
Medial	255	(55.3)	97	(40.9)	352	(50.4)
Final	61	(13.2)	45	(19.0)	106	(15.2)
Distortion	248	16.9	262	29.4	510	21.6
Initial	81	(32.7)	88	(33.6)	169	(33.2)
Medial	88	(35.5)	82	(31.3)	170	(33.3)
Final	79	(31.8)	92	(35.1)	171	(33.5)
Omission	762	51.8	392	44.0	1154	48.8
Initial	21	(2.8)	16	(4.1)	37	(3.2)
Medial	167	(21.9)	118	(30.1)	285	(24.7)
Final	574	(75.3)	258	(65.8)	832	(72.1)
TOTAL	1471	100.0	891	100.0	2362	100.0

TABLE C.10 (continued)

Type of Consonant Errors	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
/ **d** /						
Substitution	287	23.9	193	26.0	480	24.7
Initial	77	(26.8)	63	(32.6)	140	(29.2)
Medial	110	(38.3)	82	(42.5)	192	(40.0)
Final	100	(34.9)	48	(24.9)	148	(30.8)
Distortion	213	17.7	259	34.9	472	24.3
Initial	66	(31.0)	80	(30.9)	146	(30.9)
Medial	89	(41.8)	83	(32.0)	172	(36.5)
Final	58	(27.2)	96	(37.1)	154	(32.6)
Omission	703	58.4	290	39.1	993	51.0
Initial	16	(2.3)	11	(3.8)	27	(2.7)
Medial	148	(21.0)	82	(28.3)	230	(23.2)
Final	539	(76.7)	197	(67.9)	736	(74.1)
TOTAL	1203	100.0	742	100.0	1945	100.0
/ **k** /						
Substitution	696	46.9	596	55.9	1292	50.7
Initial	329	(47.3)	278	(46.6)	607	(47.0)
Medial	225	(32.3)	174	(29.2)	399	(30.9)
Final	142	(20.4)	144	(24.2)	286	(22.1)
Distortion	192	13.0	185	17.4	377	14.8
Initial	62	(32.3)	56	(30.3)	118	(31.3)
Medial	61	(31.8)	54	(29.2)	115	(30.5)
Final	69	(35.9)	75	(40.5)	144	(38.2)
Omission	595	40.1	285	26.7	880	34.5
Initial	27	(4.5)	16	(5.6)	43	(4.9)
Medial	144	(24.2)	92	(32.3)	236	(26.8)
Final	424	(71.3)	177	(62.1)	601	(68.3)
TOTAL	1483	100.0	1066	100.0	2549	100.0

TABLE C.10 (continued)

Type of Consonant Errors	L.A. City		L.A. County		Combined	
	Number	%	Number	%	Number	%
/ g /						
Substitution	693	49.3	616	60.7	1309	54.1
Initial	289	(41.7)	254	(41.2)	543	(41.5)
Medial	191	(27.6)	182	(29.6)	373	(28.5)
Final	213	(30.7)	180	(29.2)	393	(30.0)
Distortion	213	15.2	189	18.6	402	16.6
Initial	67	(31.4)	54	(28.6)	121	(30.1)
Medial	80	(37.6)	55	(29.1)	135	(33.6)
Final	66	(31.0)	80	(42.3)	146	(36.3)
Omission	499	35.5	210	20.7	709	29.3
Initial	25	(5.0)	16	(7.6)	41	(5.8)
Medial	84	(16.8)	57	(27.2)	141	(19.9)
Final	390	(78.2)	137	(65.2)	527	(74.3)
TOTAL	1405	100.0	1015	100.0	2420	100.0
/ r /						
Substitution	5146	59.0	4262	53.4	9408	56.3
Initial	2369	(46.0)	2113	(49.6)	4482	(47.6)
Medial	1942	(37.8)	1481	(34.7)	3423	(36.4)
Final	835	(16.2)	668	(15.7)	1503	(16.0)
Distortion	2830	32.4	3014	37.8	5844	35.0
Initial	781	(27.6)	768	(25.5)	1549	(26.5)
Medial	1102	(38.9)	1174	(38.9)	2276	(38.9)
Final	947	(33.5)	1072	(35.6)	2019	(34.6)
Omission	750	8.6	699	8.8	1449	8.7
Initial	21	(2.8)	26	(3.7)	47	(3.2)
Medial	194	(25.9)	208	(29.8)	402	(27.8)
Final	535	(71.3)	465	(66.5)	1000	(69.0)
TOTAL	8726	100.0	7975	100.0	16701	100.0

TABLE C.10 (continued)

Type of Consonant Errors	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
/ l /						
Substitution	1523	42.3	1346	41.4	2869	41.9
Initial	724	(47.5)	619	(46.0)	1343	(46.8)
Medial	505	(33.2)	454	(33.7)	959	(33.4)
Final	294	(19.3)	273	(20.3)	567	(19.8)
Distortion	1112	30.8	1146	35.2	2258	32.9
Initial	347	(31.2)	327	(28.5)	674	(29.8)
Medial	411	(37.0)	390	(34.0)	801	(35.5)
Final	354	(31.8)	429	(37.5)	783	(34.7)
Omission	969	26.9	760	23.4	1729	25.2
Initial	65	(6.7)	59	(7.8)	124	(7.2)
Medial	228	(23.5)	220	(28.9)	448	(25.9)
Final	676	(69.8)	481	(63.3)	1157	(66.9)
TOTAL	3604	100.0	3252	100.0	6856	100.0
/ f /						
Substitution	877	58.2	672	60.5	1549	59.2
Initial	335	(38.2)	255	(38.0)	590	(38.1)
Medial	281	(32.0)	197	(29.3)	478	(30.9)
Final	261	(29.8)	220	(32.7)	481	(31.0)
Distortion	232	15.4	190	17.1	422	16.1
Initial	77	(33.2)	68	(35.8)	145	(34.4)
Medial	82	(35.3)	66	(34.7)	148	(35.1)
Final	73	(31.5)	56	(29.5)	129	(30.5)
Omission	398	26.4	249	22.4	647	24.7
Initial	25	(6.3)	22	(8.8)	47	(7.3)
Medial	99	(24.9)	66	(26.5)	165	(25.5)
Final	274	(68.8)	161	(64.7)	435	(67.2)
TOTAL	1507	100.0	1111	100.0	2618	100.0

TABLE C.10 (continued)

Type of Consonant Errors	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
/ v /						
Substitution	2787	77.4	2305	81.4	5092	79.2
Initial	1495	(53.6)	1191	(51.7)	2686	(52.8)
Medial	680	(24.4)	640	(27.8)	1320	(25.9)
Final	612	(22.0)	474	(20.5)	1086	(21.5)
Distortion	311	8.6	201	7.1	512	7.9
Initial	137	(44.1)	67	(33.3)	204	(39.8)
Medial	107	(34.4)	74	(36.8)	181	(35.4)
Final	67	(21.5)	60	(29.9)	127	(24.8)
Omission	503	14.0	325	11.5	828	12.9
Initial	17	(3.4)	16	(4.9)	33	(4.0)
Medial	105	(20.9)	101	(31.1)	206	(24.9)
Final	381	(75.7)	208	(64.0)	589	(71.1)
TOTAL	3601	100.0	2831	100.0	6432	100.0
/ θ /						
Substitution	7050	73.6	5556	74.9	12606	74.1
Initial	2296	(32.6)	1954	(35.2)	4250	(33.7)
Medial	2204	(31.2)	1719	(30.9)	3923	(31.1)
Final	2550	(36.2)	1883	(33.9)	4433	(35.2)
Distortion	1027	10.7	946	12.7	1973	11.6
Initial	362	(35.3)	299	(31.6)	661	(33.5)
Medial	371	(36.1)	341	(36.1)	712	(36.1)
Final	294	(28.6)	306	(32.3)	600	(30.4)
Omission	1505	15.7	921	12.4	2426	14.3
Initial	51	(3.4)	40	(4.4)	91	(3.7)
Medial	909	(60.4)	609	(66.1)	1518	(62.6)
Final	545	(36.2)	272	(29.5)	817	(33.7)
TOTAL	9582	100.0	7423	100.0	17005	100.0

TABLE C.10 (continued)

Type of Consonant Errors	L.A. City		L.A. County		Combined	
	Number	%	Number	%	Number	%
/ ð /						
Substitution	5757	74.1	3304	74.9	9061	74.4
Initial	1968	(34.2)	1097	(33.2)	3065	(33.8)
Medial	1781	(30.9)	1237	(37.4)	3018	(33.3)
Final	2008	(34.9)	970	(29.4)	2978	(32.9)
Distortion	1046	13.4	713	16.2	1759	14.4
Initial	280	(26.8)	210	(29.4)	490	(27.9)
Medial	362	(34.6)	263	(36.9)	625	(35.5)
Final	404	(38.6)	240	(33.7)	644	(36.6)
Omission	970	12.5	391	8.9	1361	11.2
Initial	44	(4.6)	33	(8.4)	77	(5.7)
Medial	172	(17.7)	105	(26.9)	277	(20.3)
Final	754	(77.7)	253	(64.7)	1007	(74.0)
TOTAL	7773	100.0	4408	100.0	12181	100.0
/ s /						
Substitution	8131	55.5	6521	52.4	14652	54.1
Initial	2869	(35.3)	2285	(35.0)	5154	(35.2)
Medial	2710	(33.3)	2145	(32.9)	4855	(33.1)
Final	2552	(31.4)	2091	(32.1)	4643	(31.7)
Distortion	5514	37.6	5029	40.5	10543	38.9
Initial	1929	(35.0)	1684	(33.5)	3613	(34.3)
Medial	1814	(32.9)	1673	(33.3)	3487	(33.1)
Final	1771	(32.1)	1672	(33.2)	3443	(32.6)
Omission	1017	6.9	885	7.1	1902	7.0
Initial	167	(16.4)	222	(25.1)	389	(20.4)
Medial	283	(27.8)	293	(33.1)	576	(30.3)
Final	567	(55.8)	370	(41.8)	937	(49.3)
TOTAL	14662	100.0	12435	100.0	27097	100.0

TABLE C.10 (continued)

Type of Consonant Errors	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
/ z /						
Substitution	7911	59.0	5583	54.2	13494	56.9
Initial	2945	(37.2)	2172	(38.9)	5117	(37.9)
Medial	2799	(35.4)	1758	(31.5)	4557	(33.8)
Final	2167	(27.4)	1653	(29.6)	3820	(28.3)
Distortion	4742	35.3	4147	40.3	8889	37.5
Initial	1777	(37.5)	1458	(35.1)	3235	(36.4)
Medial	1531	(32.3)	1347	(32.5)	2878	(32.4)
Final	1434	(30.2)	1342	(32.4)	2776	(31.2)
Omission	766	5.7	562	5.5	1328	5.6
Initial	78	(10.2)	99	(17.6)	177	(13.3)
Medial	163	(21.3)	166	(29.5)	329	(24.8)
Final	525	(68.5)	297	(52.9)	822	(61.9)
TOTAL	13419	100.0	10292	100.0	23711	100.0
/ ʃ /						
Substitution	4141	50.3	3506	53.0	7647	51.5
Initial	1441	(34.8)	1211	(34.5)	2652	(34.7)
Medial	1397	(33.7)	1156	(33.0)	2553	(33.4)
Final	1303	(31.5)	1139	(32.5)	2442	(31.9)
Distortion	3514	42.6	2648	40.1	6162	41.5
Initial	1156	(32.9)	877	(33.1)	2033	(33.0)
Medial	1217	(34.6)	886	(33.5)	2103	(34.1)
Final	1141	(32.5)	885	(33.4)	2026	(32.9)
Omission	587	7.1	456	6.9	1043	7.0
Initial	75	(12.8)	42	(9.2)	117	(11.2)
Medial	193	(32.9)	188	(41.2)	381	(36.5)
Final	319	(54.3)	226	(49.6)	545	(52.3)
TOTAL	8242	100.0	6610	100.0	14852	100.0

TABLE C.10 (continued)

Type of	L.A. City		L.A. County		Combined	
Consonant Errors	Number	%	Number	%	Number	%
/ ʒ /						
Substitution	1690	46.5	803	40.9	2493	44.5
Medial	902	(53.4)	482	(60.0)	1384	(55.5)
Final	788	(46.6)	321	(40.0)	1109	(44.5)
Distortion	1565	43.1	953	48.6	2518	45.0
Medial	1002	(64.0)	571	(60.0)	1573	(62.5)
Final	563	(36.0)	382	(40.0)	945	(37.5)
Omission	379	10.4	206	10.5	585	10.5
Medial	175	(46.2)	113	(54.9)	288	(49.2)
Final	204	(53.8)	93	(45.1)	297	(50.8)
TOTAL	3634	100.0	1962	100.0	5596	100.0
/ h /						
Substitution	66	20.1	18	12.1	84	17.6
Initial	29	(43.9)	11	(61.1)	40	(47.6)
Medial	37	(56.1)	7	(38.9)	44	(52.4)
Distortion	38	11.5	27	18.1	65	13.6
Initial	19	(50.0)	14	(51.9)	33	(50.8)
Medial	19	(50.0)	13	(48.1)	32	(49.2)
Omission	225	68.4	104	69.8	329	68.8
Initial	117	(52.0)	60	(57.7)	177	(53.8)
Medial	108	(48.0)	44	(42.3)	152	(46.2)
TOTAL	329	100.0	149	100.0	478	100.0
/ hw /						
Substitution	2155	92.7	458	75.5	2613	89.1
Initial	1210	(56.1)	261	(57.0)	1471	(56.3)
Medial	945	(43.9)	197	(43.0)	1142	(43.7)
Distortion	108	4.6	116	19.1	224	7.6
Initial	67	(62.0)	69	(59.5)	136	(60.7)
Medial	41	(38.0)	47	(40.5)	88	(39.3)

TABLE C.10 (continued)

Type of Consonant Errors	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
/ **hw** / (Continued)						
Omission	62	2.7	33	5.4	95	3.3
Initial	28	(45.2)	16	(48.5)	44	(46.3)
Medial	34	(54.8)	17	(51.5)	51	(53.7)
TOTAL	2325	100.0	607	100.0	2932	100.0
/ **w** /						
Substitution	137	43.1	87	42.2	224	42.8
Initial	57	(41.6)	42	(48.3)	99	(44.2)
Medial	80	(58.4)	45	(51.7)	125	(55.8)
Distortion	95	29.9	68	33.0	163	31.1
Initial	44	(46.3)	38	(55.9)	82	(50.3)
Medial	51	(53.7)	30	(44.1)	81	(49.7)
Omission	86	27.0	51	24.8	137	26.1
Initial	13	(15.1)	13	(25.5)	26	(19.0)
Medial	73	(84.9)	38	(74.5)	111	(81.0)
TOTAL	318	100.0	206	100.0	524	100.0
/ **j** /						
Substitution	638	48.5	490	53.1	1128	50.4
Initial	397	(62.2)	343	(70.0)	740	(65.6)
Medial	241	(37.8)	147	(30.0)	388	(34.4)
Distortion	492	37.4	312	33.8	804	35.9
Initial	222	(45.1)	145	(46.5)	367	(45.6)
Medial	270	(54.9)	167	(53.5)	437	(54.4)
Omission	186	14.1	121	13.1	307	13.7
Initial	59	(31.7)	51	(42.1)	110	(35.8)
Medial	127	(68.3)	70	(57.9)	197	(64.2)
TOTAL	1316	100.0	923	100.0	2239	100.0

TABLE C.10 (continued)

Type of Consonant Errors	L.A. City Number	L.A. City %	L.A. County Number	L.A. County %	Combined Number	Combined %
/ tʃ /						
Substitution	3531	48.8	2884	50.9	6415	49.7
Initial	1327	(37.6)	1073	(37.2)	2400	(37.4)
Medial	1129	(32.0)	899	(31.2)	2028	(31.6)
Final	1075	(30.4)	912	(31.6)	1987	(31.0)
Distortion	3184	44.0	2426	42.8	5610	43.5
Initial	1047	(32.9)	796	(32.8)	1843	(32.9)
Medial	1107	(34.8)	831	(34.3)	1938	(34.5)
Final	1030	(32.3)	799	(32.9)	1829	(32.6)
Omission	524	7.2	357	6.3	881	6.8
Initial	50	(9.5)	32	(9.0)	82	(9.3)
Medial	167	(31.9)	133	(37.2)	300	(34.1)
Final	307	(58.6)	192	(53.8)	499	(56.6)
TOTAL	7239	100.0	5667	100.0	12906	100.0
/ dʒ /						
Substitution	1706	35.9	1438	42.3	3144	38.5
Initial	601	(35.2)	515	(35.8)	1116	(35.5)
Medial	545	(32.0)	502	(34.9)	1047	(33.3)
Final	560	(32.8)	421	(29.3)	981	(31.2)
Distortion	2586	54.3	1688	49.6	4274	52.4
Initial	881	(34.1)	570	(33.8)	1451	(33.9)
Medial	919	(35.5)	593	(35.1)	1512	(35.4)
Final	786	(30.4)	525	(31.1)	1311	(30.7)
Omission	466	9.8	277	8.1	743	9.1
Initial	53	(11.4)	29	(10.5)	82	(11.0)
Medial	157	(33.7)	97	(35.0)	254	(34.2)
Final	256	(54.9)	151	(54.5)	407	(54.8)
TOTAL	4758	100.0	3403	100.0	8161	100.0

TABLE C.10 (continued)

Type of Consonant Errors	L.A. City Number	%	L.A. County Number	%	Combined Number	%
Total Consonant Errors	99859		74870		174729	
Total Children with Errors	9468		7407		16875	
Mean Number of Errors per Child	10.55		10.11		10.35	

TABLE C.11

Consonant-blend errors made by children receiving speech and hearing services in the Los Angeles City Unified School District and 38 Los Angeles County school districts.

Consonant-	L.A. City		L.A. County		Combined	
Blend Errors	Number	%	Number	%	Number	%
/**pr-** /	3017	2.9	1948	2.9	4965	2.9
/**br-** /	2967	2.8	1992	3.0	4959	2.9
/**tr-** /	2834	2.7	2044	3.1	4878	2.8
/**dr-** /	2885	2.7	1984	3.0	4869	2.8
/**kr-** /	2844	2.7	1939	2.9	4783	2.8
/**gr-** /	2854	2.7	1886	2.8	4740	2.8
/**fr-** /	3255	3.1	1999	3.0	5254	3.1
/**θr-** /	3668	3.5	2348	3.5	6016	3.5
/**ʃr-** /	4195	4.0	2451	3.7	6646	3.9
/**pl-** /	1664	1.6	1085	1.6	2749	1.6
/**bl-** /	1305	1.2	876	1.3	2181	1.3
/**kl-** /	1666	1.6	1056	1.6	2722	1.6
/**gl-** /	1639	1.6	1037	1.6	2676	1.6
/**fl-** /	1857	1.8	1149	1.7	3006	1.7
/**sm-** /	5265	5.0	3267	4.9	8532	5.0
/**sn-** /	5207	4.9	3293	5.0	8500	4.9
/**sp-** /	5289	5.0	3422	5.2	8711	5.1
/**st-** /	5327	5.0	3558	5.4	8885	5.2
/**sk-** /	5242	5.0	3429	5.2	8671	5.0
/**sl-** /	5478	5.2	3459	5.2	8937	5.2
/**sw-** /	5256	5.0	3232	4.9	8488	4.9
/**tw-** /	1185	1.1	555	.8	1740	1.0
/**kw-** /	1018	1.0	436	.7	1454	.8
/**spl-** /	5751	5.4	3404	5.1	9155	5.3
/**spr-** /	6384	6.0	3847	5.8	10231	6.0
/**str-** /	6451	6.1	3913	5.9	10364	6.0
/**skr-** /	6466	6.1	3910	5.9	10376	6.0
/**skw-** /	4552	4.3	2846	4.3	7398	4.3
TOTAL	105521	100.0	66365	100.0	171886	100.0
Total Children with Errors	8364		5682		14046	
Mean Number of Errors per Child	12.62		11.68		12.24	

TABLE C.12

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by dialect within groups having articulation as a single expressive speech disorder and articulation combined with little or no speech, or language, stuttering, or voice disorders.

Dialect	Articulation		Disorders Combined with Articulation Disorders								Total	
			Little or No Speech		Language Disorder		Stuttering		Voice Disorder			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Normal	6638	89.7	185	66.5	125	82.8	489	79.5	429	89.6	7866	88.1
Deviant	765	10.3	93	33.5	26	17.2	126	20.5	50	10.4	1060	11.9
Regional	332	(43.4)	25	(26.9)	6	(23.1)	54	(42.9)	18	(36.0)	435	(41.0)
Foreign	433	(56.6)	68	(73.1)	20	(76.9)	72	(57.1)	32	(64.0)	625	(59.0)
TOTAL	7403	100.0	278	100.0	151	100.0	615	100.0	479	100.0	8926	100.0

TABLE C.13

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by dialect within groups having articulation as a single expressive speech disorder and articulation combined with little or no speech, or language, stuttering, or voice disorders.

Dialect	Articulation		Disorders Combined with Articulation Disorders								Total	
			Little or No Speech		Language Disorder		Stuttering		Voice Disorder			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Normal	5566	94.2	196	77.8	58	80.6	220	88.0	357	93.0	6397	93.1
Deviant	345	5.8	56	22.2	14	19.4	30	12.0	27	7.0	472	6.9
Regional	114	(33.0)	12	(21.4)	2	(14.3)	19	(63.3)	9	(33.3)	156	(33.1)
Foreign	231	(67.0)	44	(78.6)	12	(85.7)	11	(36.7)	18	(66.7)	316	(66.9)
TOTAL	5911	100.0	252	100.0	72	100.0	250	100.0	384	100.0	6869	100.0

TABLE C.14

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by groups having articulation as a single expressive speech disorder and articulation combined with little or no speech, or language, stuttering, or voice disorders within categories of dialect.

Dialect	Articulation		Disorders Combined with Articulation Disorders								Total	
			Little or No Speech		Language Disorder		Stuttering		Voice Disorder			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Normal	6638	84.4	185	2.4	125	1.6	489	6.2	429	5.4	7866	100.0
Deviant	765	72.2	93	8.8	26	2.4	126	11.9	50	4.7	1060	100.0
Regional	332	76.3	25	5.8	6	1.4	54	12.4	18	4.1	435	100.0
Foreign	433	69.3	68	10.9	20	3.2	72	11.5	32	5.1	625	100.0
TOTAL	7403	82.9	278	3.1	151	1.7	615	6.9	479	5.4	8926	100.0

TABLE C.15

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by groups having articulation as a single expressive speech disorder and articulation combined with little or no speech, or language, stuttering, or voice disorders within categories of dialect.

Dialect	Articulation		Disorders Combined with Articulation Disorders								Total	
			Little or No Speech		Language Disorder		Stuttering		Voice Disorder			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Normal	5566	87.0	196	3.1	58	.9	220	3.4	357	5.6	6397	100.0
Deviant	345	73.1	56	11.9	14	3.0	30	6.3	27	5.7	472	100.0
Regional	114	73.1	12	7.7	2	1.3	19	12.2	9	5.7	156	100.0
Foreign	231	73.1	44	13.9	12	3.8	11	3.5	18	5.7	316	100.0
TOTAL	5911	86.1	252	3.7	72	1.0	250	3.6	384	5.6	6869	100.0

TABLE C.16

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by adequacy of dental occlusion for speech within groups classified as having articulation deviations as a single expressive speech disorder and articulation problems in combination with little or no speech, or language, stuttering, or voice disorders.

			Disorders Combined with Articulation Disorders									
	Articulation		Little or No Speech		Language Disorder		Stuttering		Voice Disorder		Total	
Occlusion	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Adequate	5675	76.6	204	72.1	122	77.7	485	78.2	326	67.6	6812	76.1
Inadequate	1731	23.4	79	27.9	35	22.3	135	21.8	156	32.4	2136	23.9
Open Bite	561	(32.4)	14	(17.7)	10	(28.6)	41	(30.4)	25	(16.0)	651	(30.5)
Over Jet	715	(41.3)	34	(43.0)	15	(42.8)	50	(37.0)	66	(42.3)	880	(41.2)
Under Jet	83	(4.8)	6	(7.6)	1	(2.9)	6	(4.5)	14	(9.0)	110	(5.1)
Cross Bite	132	(7.6)	7	(8.9)	2	(5.7)	15	(11.1)	27	(17.3)	183	(8.6)
Combination	103	(6.0)	6	(7.6)	4	(11.4)	8	(5.9)	9	(5.8)	130	(6.1)
Other	137	(7.9)	12	(15.2)	3	(8.6)	15	(11.1)	15	(9.6)	182	(8.5)
TOTAL	7406	100.0	283	100.0	157	100.0	620	100.0	482	100.0	8948	100.0

TABLE C.17

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by adequacy of dental occlusion for speech within groups classified as having articulation deviations as a single expressive speech disorder and articulation problems in combination with little or no speech, or language, stuttering, or voice disorders.

			Disorders Combined with Articulation Disorders									
	Articulation		Little or No Speech		Language Disorder		Stuttering		Voice Disorder		Total	
Occlusion	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Adequate	4668	79.1	186	75.3	60	76.9	207	81.2	239	62.1	5360	78.1
Inadequate	1230	20.9	61	24.7	18	23.1	48	18.8	146	37.9	1503	21.9
Open Bite	358	(29.1)	13	(21.3)	3	(16.7)	16	(33.3)	32	(21.9)	422	(28.1)
Over Jet	546	(44.4)	28	(45.9)	9	(49.9)	19	(39.6)	55	(37.7)	657	(43.7)
Under Jet	64	(5.2)	2	(3.3)	--	(--)	5	(10.4)	5	(3.4)	76	(5.1)
Crossbite	101	(8.2)	5	(8.2)	3	(16.7)	1	(2.1)	14	(9.6)	124	(8.2)
Combination	73	(5.9)	5	(8.2)	--	(--)	--	(--)	19	(13.0)	97	(6.5)
Other	88	(7.2)	8	(13.1)	3	(16.7)	7	(14.6)	21	(14.4)	127	(8.4)
TOTAL	5898	100.0	247	100.0	78	100.0	255	100.0	385	100.0	6863	100.0

TABLE C.18

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by groups having articulation deviations as a single expressive speech disorder and articulation deviations in combination with little or no speech, or language, stuttering, or voice disorders within categories of dental occlusion.

			Disorders Combined with Articulation Disorders									
	Articulation		Little or No Speech		Language Disorder		Stuttering		Voice Disorder		Total	
Occlusion	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Adequate	5675	83.3	204	3.0	122	1.8	485	7.1	326	4.8	6812	100.0
Inadequate	1731	81.1	79	3.7	35	1.6	135	6.3	156	7.3	2136	100.0
Open Bite	561	86.2	14	2.2	10	1.5	41	6.3	25	3.8	651	100.0
Over Jet	715	81.2	34	3.9	15	1.7	50	5.7	66	7.5	880	100.0
Under Jet	83	75.4	6	5.5	1	.9	6	5.5	14	12.7	110	100.0
Cross Bite	132	72.1	7	3.8	2	1.1	15	8.2	27	14.8	183	100.0
Combination	103	79.2	6	4.6	4	3.1	8	6.2	9	6.9	130	100.0
Other	137	75.3	12	6.6	3	1.7	15	8.2	15	8.2	182	100.0
TOTAL	7406	82.8	283	3.2	157	1.7	620	6.9	482	5.4	8948	100.0

TABLE C.19

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by groups having articulatory deviations as a single expressive speech disorder and articulation deviations in combination with little or no speech, or language, stuttering, or voice disorders within categories of dental occlusion.

			Disorders Combined with Articulation Disorders									
	Articulation		Little or No Speech		Language Disorder		Stuttering		Voice Disorder		Total	
Occlusion	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Adequate	4668	87.1	186	3.5	60	1.1	207	3.9	239	4.4	5360	100.0
Inadequate	1230	81.8	61	4.1	18	1.2	48	3.2	146	9.7	1503	100.0
Open Bite	358	84.8	13	3.1	3	.7	16	3.8	32	7.6	422	100.0
Over Jet	546	83.1	28	4.2	9	1.4	19	2.9	55	8.4	657	100.0
Under Jet	64	84.2	2	2.6	--	--	5	6.6	5	6.6	76	100.0
Cross Bite	101	81.5	5	4.0	3	2.4	1	.8	14	11.3	124	100.0
Combination	73	75.3	5	5.1	--	--	--	--	19	19.6	97	100.0
Other	88	69.3	8	6.3	3	2.4	7	5.5	21	16.5	127	100.0
TOTAL	5898	86.0	247	3.6	78	1.1	255	3.7	385	5.6	6863	100.0

TABLE C.20

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by adequate and inadequate conditions of teeth within groups having articulation as a single expressive speech disorder and articulation combined with little or no speech, or language, stuttering, or voice disorders.

			Disorders Combined with Articulation Disorders									
	Articulation		Little or No Speech		Language Disorder		Stuttering		Voice Disorder		Total	
Condition of Teeth	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Adequate	5480	73.8	189	66.8	107	66.9	443	71.2	292	60.5	6511	72.6
Inadequate	1943	26.2	94	33.2	53	33.1	179	28.8	191	39.5	2460	27.4
Teeth Missing	531	(27.3)	10	(10.6)	13	(24.5)	35	(19.6)	29	(15.2)	618	(25.1)
Deciduous	477	[89.8]	10	[100.0]	12	[92.3]	28	[80.0]	25	[86.2]	552	[89.3]
Permanent	54	[10.2]	--	[--]	1	[7.7]	7	[20.0]	4	[13.8]	66	[10.7]
Malpositioned	434	(22.3)	19	(20.2)	7	(13.2)	40	(22.3)	56	(29.3)	556	(22.6)
Caries	516	(26.6)	34	(36.2)	14	(26.4)	51	(28.5)	36	(18.9)	651	(26.5)
Combination	362	(18.6)	26	(27.7)	16	(30.2)	42	(23.5)	61	(31.9)	507	(20.6)
Other	100	(5.2)	5	(5.3)	3	(5.7)	11	(6.1)	9	(4.7)	128	(5.2)
TOTAL	7423	100.0	283	100.0	160	100.0	622	100.0	483	100.0	8971	100.0

TABLE C.21

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by adequate and inadequate conditions of teeth within groups having articulation as a single expressive speech disorder and articulation combined with little or no speech, or language, stuttering, or voice disorders.

			Disorders Combined with Articulation Disorders									
	Articulation		Little or No Speech		Language Disorder		Stuttering		Voice Disorder		Total	
Condition of Teeth	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Adequate	4462	75.5	165	66.0	53	67.9	187	71.9	223	57.5	5090	73.9
Inadequate	1448	24.5	85	34.0	25	32.1	73	28.1	165	42.5	1796	26.1
Teeth Missing	505	(34.9)	21	(24.7)	14	(56.0)	30	(41.1)	54	(32.7)	624	(34.7)
Deciduous	438	[86.7]	18	[85.7]	9	[64.3]	28	[93.3]	48	[88.9]	541	[86.7]
Permanent	67	[13.3]	3	[14.3]	5	[35.7]	2	[6.7]	6	[11.1]	83	[13.3]
Malpositioned	300	(20.7)	14	(16.5)	3	(12.0)	14	(19.2)	33	(20.0)	364	(20.3)
Caries	293	(20.2)	18	(21.2)	4	(16.0)	14	(19.2)	22	(13.4)	351	(19.6)
Combination	285	(19.7)	22	(25.9)	4	(16.0)	10	(13.7)	53	(32.1)	374	(20.8)
Other	65	(4.5)	10	(11.7)	--	(--)	5	(6.8)	3	(1.8)	83	(4.6)
TOTAL	5910	100.0	250	100.0	78	100.0	260	100.0	388	100.0	6886	100.0

TABLE C.22

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by groups classified as having articulation as a single expressive speech disorder and articulation combined with little or no speech, or language, stuttering, or voice disorders within groups having adequate and various types of inadequate conditions of teeth.

Condition of Teeth	Articulation		Disorders Combined with Articulation Disorders								Total	
			Little or No Speech		Language Disorder		Stuttering		Voice Disorder			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Adequate	5480	84.2	189	2.9	107	1.6	443	6.8	292	4.5	6511	100.0
Inadequate	1943	79.0	94	3.8	53	2.1	179	7.3	191	7.8	2460	100.0
Teeth Missing	531	85.9	10	1.6	13	2.1	35	5.7	29	4.7	618	100.0
Deciduous	477	86.4	10	1.8	12	2.2	28	5.1	25	4.5	552	100.0
Permanent	54	81.8	--	--	1	1.5	7	10.6	4	6.1	66	100.0
Malpositioned	434	78.0	19	3.4	7	1.3	40	7.2	56	10.1	556	100.0
Caries	516	79.3	34	5.2	14	2.2	51	7.8	36	5.5	651	100.0
Combination	362	71.4	26	5.1	16	3.2	42	8.3	61	12.0	507	100.0
Other	100	78.1	5	3.9	3	2.4	11	8.6	9	7.0	128	100.0
TOTAL	7423	82.7	283	3.2	160	1.8	622	6.9	483	5.4	8971	100.0

TABLE C.23

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by groups classified as having articulation as a single expressive speech disorder and articulation combined with little or no speech, or language, stuttering, or voice disorders within groups having adequate and various types of inadequate conditions of teeth.

Condition of Teeth	Articulation		Disorders Combined with Articulation Disorders								Total	
			Little or No Speech		Language Disorder		Stuttering		Voice Disorder			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Adequate	4462	87.7	165	3.2	53	1.0	187	3.7	223	4.4	5090	100.0
Inadequate	1448	80.6	85	4.7	25	1.4	73	4.1	165	9.2	1796	100.0
Teeth Missing	505	80.9	21	3.4	14	2.2	30	4.8	54	8.7	624	100.0
Deciduous	438	81.0	18	3.3	9	1.6	28	5.2	48	8.9	541	100.0
Permanent	67	80.7	3	3.6	5	6.0	2	2.4	6	7.3	83	100.0
Malpositioned	300	82.4	14	3.8	3	.9	14	3.8	33	9.1	364	100.0
Caries	293	83.5	18	5.1	4	1.1	14	4.0	22	6.3	351	100.0
Combination	285	76.2	22	5.9	4	1.0	10	2.7	53	14.2	374	100.0
Other	65	78.3	10	12.1	--	--	5	6.0	3	3.6	83	100.0
TOTAL	5910	85.8	250	3.6	78	1.1	260	3.8	388	5.7	6886	100.0

TABLE C.24

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by adequacy of lips and tongue for speech within groups classified as having articulation disorders as a single expressive speech disorder, and articulation in combination with little or no speech, or language, stuttering, or voice disorders.

Condition of Lips or Tongue	Articulation		Disorders Combined with Articulation Disorders								Total	
			Little or No Speech		Language Disorder		Stuttering		Voice Disorder			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Lips												
Adequate	7080	94.9	242	85.5	124	78.0	590	95.2	394	81.2	8430	93.6
Inadequate	377	5.1	41	14.5	35	22.0	30	4.8	91	18.8	574	6.4
Repaired Cleft	33	(8.7)	2	(4.9)	--	(--)	2	(6.7)	22	(24.2)	59	(10.3)
Cerebral Palsy	14	(3.8)	10	(24.4)	11	(31.4)	6	(20.0)	5	(5.5)	46	(8.0)
Poor Mobility	281	(74.5)	20	(48.8)	19	(54.3)	18	(60.0)	51	(56.0)	389	(67.8)
Combination	14	(3.7)	6	(14.6)	5	(14.3)	3	(10.0)	9	(9.9)	37	(6.4)
Other	35	(9.3)	3	(7.3)	--	(--)	1	(3.3)	4	(4.4)	43	(7.5)
TOTAL	7457	100.0	283	100.0	159	100.0	620	100.0	485	100.0	9004	100.0
Tongue												
Adequate	6298	84.5	194	68.8	96	61.1	524	84.9	330	68.8	7442	82.8
Inadequate	1157	15.5	88	31.2	61	38.9	93	15.1	150	31.2	1549	17.2
Lack of Mobility	815	(70.4)	63	(71.6)	38	(62.3)	51	(54.8)	108	(72.0)	1075	(69.4)
Too Large	47	(4.1)	2	(2.3)	1	(1.6)	6	(6.5)	2	(1.3)	58	(3.7)
Asymmetrical	12	(1.0)	2	(2.3)	--	--	--	--	--	--	14	(.9)
Combination	81	(7.0)	7	(7.9)	10	(16.4)	15	(16.1)	18	(12.0)	131	(8.5)
Other	202	(17.5)	14	(15.9)	12	(19.7)	21	(22.6)	22	(14.7)	271	(17.5)
TOTAL	7455	100.0	282	100.0	157	100.0	617	100.0	480	100.0	8991	100.0

TABLE C.25

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by adequacy of lips and tongue for speech within groups classified as having articulation disorders as a single expressive speech disorder, and articulation in combination with little or no speech, or language, stuttering, or voice disorders.

Condition of Lips or Tongue	Articulation		Disorders Combined with Articulation Disorders								Total	
			Little or No Speech		Language Disorder		Stuttering		Voice Disorder			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Lips												
Adequate	5793	97.3	230	89.8	65	83.3	243	93.5	351	89.8	6682	96.3
Inadequate	163	2.7	26	10.2	13	16.7	17	6.5	40	10.2	259	3.7
Repaired Cleft	13	(8.0)	3	(11.5)	2	(15.4)	--	(--)	10	(25.0)	28	(10.8)
Cerebral Palsy	4	(2.4)	1	(3.8)	--	(--)	1	(5.9)	--	(--)	6	(2.3)
Poor Mobility	118	(72.4)	19	(73.0)	9	(69.2)	11	(64.7)	19	(47.5)	176	(68.0)
Combination	4	(2.4)	1	(3.8)	--	(--)	--	(--)	7	(17.5)	12	(4.6)
Other	24	(14.8)	2	(7.7)	2	(15.4)	5	(29.4)	4	(10.0)	37	(14.3)
TOTAL	5956	100.0	256	100.0	78	100.0	260	100.0	391	100.0	6941	100.0
Tongue												
Adequate	5231	88.4	184	73.6	57	74.0	205	79.8	277	72.5	5954	86.5
Inadequate	684	11.6	66	26.4	20	26.0	52	20.2	105	27.5	927	13.5
Lack of Mobility	337	(49.3)	40	(60.6)	14	(70.0)	31	(59.6)	51	(48.6)	473	(51.0)
Too Large	46	(6.7)	2	(3.0)	1	(5.0)	3	(5.8)	1	(.9)	53	(5.7)
Asymmetrical	9	(1.3)	2	(3.0)	--	(--)	--	(--)	5	(4.8)	16	(1.7)
Combination	99	(14.5)	9	(13.7)	3	(15.0)	10	(19.2)	19	(18.1)	140	(15.1)
Other	193	(28.2)	13	(19.7)	2	(10.0)	8	(15.4)	29	(27.6)	245	(26.5)
TOTAL	5915	100.0	250	100.0	77	100.0	257	100.0	382	100.0	6881	100.0

TABLE C.26

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by groups having articulation disorders as a single expressive speech disorder, or articulation combined with little or no speech, or language, stuttering, or voice disorders.

Condition of Lips or Tongue	Articulation		Disorders Combined with Articulation Disorders								Total	
			Little or No Speech		Language Disorder		Stuttering		Voice Disorder			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Lips												
Adequate	7080	83.9	242	2.9	124	1.5	590	7.0	394	4.7	8430	100.0
Inadequate	377	65.7	41	7.1	35	6.1	30	5.2	91	15.9	574	100.0
Repaired Cleft	33	55.9	2	3.4	--	--	2	3.4	22	37.3	59	100.0
Cerebral Palsy	14	30.4	10	21.7	11	23.9	6	13.1	5	10.9	46	100.0
Poor Mobility	281	72.2	20	5.2	19	4.9	18	4.6	51	13.1	389	100.0
Combination	14	37.9	6	16.2	5	13.5	3	8.1	9	24.3	37	100.0
Other	35	81.4	3	7.0	--	--	1	2.3	4	9.3	43	100.0
TOTAL	7457	82.8	283	3.1	159	1.8	620	6.9	485	5.4	9004	100.0
Tongue												
Adequate	6298	84.6	194	2.6	96	1.3	524	7.1	330	4.4	7442	100.0
Inadequate	1157	74.7	88	5.7	61	3.9	93	6.0	150	9.7	1549	100.0
Lack of Mobility	815	75.8	63	5.9	38	3.5	51	4.7	108	10.1	1075	100.0
Too Large	47	81.0	2	3.5	1	1.7	6	10.3	2	3.5	58	100.0
Asymmetrical	12	85.7	2	14.3	--	--	--	--	--	--	14	100.0
Combination	81	61.8	7	5.3	10	7.6	15	11.5	18	13.8	131	100.0
Other	202	74.6	14	5.2	12	4.4	21	7.7	22	8.1	271	100.0
TOTAL	7455	82.9	282	3.1	157	1.8	617	6.9	480	5.3	8991	100.0

TABLE C.27

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by groups having articulation disorders as a single expressive speech disorder, or articulation combined with little or no speech, or language, stuttering, or voice disorders.

Condition of Lips or Tongue	Articulation		Disorders Combined with Articulation Disorders								Total	
			Little or No Speech		Language Disorder		Stuttering		Voice Disorder			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Lips												
Adequate	5793	86.7	230	3.4	65	1.0	243	3.6	351	5.3	6682	100.0
Inadequate	163	62.9	26	10.0	13	5.0	17	6.6	40	15.5	259	100.0
Repaired Cleft	13	46.4	3	10.7	2	7.2	--	--	10	35.7	28	100.0
Cerebral Palsy	4	66.6	1	16.7	--	--	1	16.7	--	--	6	100.0
Poor Mobility	118	67.0	19	10.8	9	5.1	11	6.3	19	10.8	176	100.0
Combination	4	33.3	1	8.4	--	--	--	--	7	58.3	12	100.0
Other	24	64.9	2	5.4	2	5.4	5	13.5	4	10.8	37	100.0
TOTAL	5956	85.8	256	3.7	78	1.1	260	3.8	391	5.6	6941	100.0
Tongue												
Adequate	5231	87.9	184	3.1	57	1.0	205	3.4	277	4.6	5954	100.0
Inadequate	684	73.8	66	7.1	20	2.2	52	5.6	105	11.3	927	100.0
Lack of Mobility	337	71.2	40	8.5	14	3.0	31	6.5	51	10.8	473	100.0
Too Large	46	86.8	2	3.8	1	1.9	3	5.6	1	1.9	53	100.0
Asymmetrical	9	56.3	2	12.5	--	--	--	--	5	31.2	16	100.0
Combination	99	70.7	9	6.4	3	2.2	10	7.1	19	13.6	140	100.0
Other	193	78.8	13	5.3	2	.8	8	3.3	29	11.8	245	100.0
TOTAL	5915	86.0	250	3.6	77	1.1	257	3.7	382	5.6	6881	100.0

TABLE C.28

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by type of fluency deviation within groups classified as having stuttering as a single expressive speech disorder and stuttering in combination with little or no speech, or language, articulation, or voice disorders.

Type of Fluency Deviation	Stuttering		Disorders Combined with Stuttering Disorders								Total	
			Little or No Speech		Language Disorder		Articulation		Voice Disorder			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Word-phrase Repetitions	39	4.1	3	20.0	1	12.5	27	5.1	1	3.0	71	4.6
Syllable Repetitions	145	15.2	1	6.7	1	12.5	102	19.2	5	15.2	254	16.4
Prolongations	25	2.6	--	--	--	--	32	6.0	1	3.0	58	3.8
Interjections	3	.3	--	--	--	--	6	1.1	3	9.1	12	.8
Unvocalized Intervals	81	8.5	2	13.3	2	25.0	38	7.1	5	15.2	128	8.3
Combination	654	68.3	9	60.0	4	50.0	325	61.1	17	51.5	1009	65.3
Other	10	1.0	--	--	--	--	2	.4	1	3.0	13	.8
TOTAL	957	100.0	15	100.0	8	100.0	532	100.0	33	100.0	1545	100.0

TABLE C.29

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by type of fluency deviation within groups classified as having stuttering as a single expressive speech disorder and stuttering in combination with little or no speech, or language, articulation, or voice disorders.

Type of Fluency Deviation	Stuttering		Disorders Combined with Stuttering Disorders								Total	
			Little or No Speech		Language Disorder		Articulation		Voice Disorder			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Word-phrase Repetitions	14	6.9	2	22.2	--	--	23	11.0	--	--	39	8.8
Syllable Repetitions	43	21.1	--	--	--	--	39	18.7	1	5.0	83	18.7
Prolongations	11	5.4	--	--	--	--	21	10.0	2	10.0	34	7.7
Interjections	1	.5	1	11.1	--	--	2	1.0	1	5.0	5	1.1
Unvocalized Intervals	6	2.9	--	--	--	--	7	3.3	--	--	13	2.9
Combination	125	61.3	6	66.7	1	100.0	115	55.0	15	75.0	262	59.2
Other	4	1.9	--	--	--	--	2	1.0	1	5.0	7	1.6
TOTAL	204	100.0	9	100.0	1	100.0	209	100.0	20	100.0	443	100.0

TABLE C.30

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by groups having stuttering as a single expressive speech disorder and stuttering in combination with little or no speech, or language, articulation, or voice disorders within each of seven types of fluency deviations.

Type of Fluency Deviation	Stuttering		Disorders Combined with Stuttering Disorders								Total	
			Little or No Speech		Language Disorder		Articulation		Voice Disorder			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Word-phrase Repetitions	39	55.0	3	4.2	1	1.4	27	38.0	1	1.4	71	100.0
Syllable Repetitions	145	57.1	1	.4	1	.4	102	40.1	5	2.0	254	100.0
Prolongations	25	43.1	--	--	--	--	32	55.2	1	1.7	58	100.0
Interjections	3	25.0	--	--	--	--	6	50.0	3	25.0	12	100.0
Unvocalized Intervals	81	63.2	2	1.6	2	1.6	38	29.7	5	3.9	128	100.0
Combination	654	64.8	9	.9	4	.4	325	32.2	17	1.7	1009	100.0
Other	10	76.9	--	--	--	--	2	15.4	1	7.7	13	100.0
TOTAL	957	62.0	15	1.0	8	.5	532	34.4	33	2.1	1545	100.0

TABLE C.31

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by groups having stuttering as a single expressive speech disorder and stuttering in combination with little or no speech, or language, articulation, or voice disorders within each of seven types of fluency deviations.

Type of Fluency Deviation	Stuttering		Disorders Combined with Stuttering Disorders								Total	
			Little or No Speech		Language Disorder		Articulation		Voice Disorder			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Word-phrase Repetitions	14	35.9	2	5.1	--	--	23	59.0	--	--	39	100.0
Syllable Repetitions	43	51.8	--	--	--	--	39	47.0	1	1.2	83	100.0
Prolongations	11	32.3	--	--	--	--	21	61.8	2	5.9	34	100.0
Interjections	1	20.0	1	20.0	--	--	2	40.0	1	20.0	5	100.0
Unvocalized Intervals	6	46.2	--	--	--	--	7	53.8	--	--	13	100.0
Combination	125	47.7	6	2.3	1	.4	115	43.9	15	5.7	262	100.0
Other	4	57.1	--	--	--	--	2	28.6	1	14.3	7	100.0
TOTAL	204	46.1	9	2.0	1	.2	209	47.2	20	4.5	443	100.0

TABLE C.32

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by adequacy of eye contact, and presence or absence of grimaces or mannerisms and undesirable oral habits within groups classified as having stuttering as a single expressive speech disorder and stuttering in combination with little or no speech, or language, articulation, or voice disorders.

Behavioral Characteristic	Stuttering		Disorders Combined with Stuttering Disorders								Total	
			Little or No Speech		Language Disorder		Articulation		Voice Disorder			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Eye Contact												
Adequate	690	68.0	14	70.0	4	40.0	447	72.8	23	63.9	1178	69.5
Inadequate	325	32.0	6	30.0	6	60.0	167	27.2	13	36.1	517	30.5
TOTAL	1015	100.0	20	100.0	10	100.0	614	100.0	36	100.0	1695	100.0
Grimaces and Mannerisms												
None Observed	736	74.3	15	75.0	7	77.8	473	77.7	27	75.0	1258	75.6
Present	255	25.7	5	25.0	2	22.2	136	22.3	9	25.0	407	24.4
TOTAL	991	100.0	20	100.0	9	100.0	609	100.0	36	100.0	1665	100.0
Undesirable Oral Habits												
None Observed	729	72.5	11	61.1	8	80.0	447	74.4	24	66.7	1219	73.0
Present	276	27.5	7	38.9	2	20.0	154	25.6	12	33.3	451	27.0
TOTAL	1005	100.0	18	100.0	10	100.0	601	100.0	36	100.0	1670	100.0

TABLE C.33

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by adequacy of eye contact, and presence or absence of grimaces or mannerisms and undesirable oral habits within groups classified as having stuttering as a single expressive speech disorder and stuttering in combination with little or no speech, or language, articulation, or voice disorders.

			Disorders Combined with Stuttering Disorders									
Behavioral Characteristic	Stuttering		Little or No Speech		Language Disorder		Articulation		Voice Disorder		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Eye Contact												
Adequate	199	83.6	8	80.0	2	100.0	222	86.4	15	71.4	446	84.5
Inadequate	39	16.4	2	20.0	--	--	35	13.6	6	28.6	82	15.5
TOTAL	238	100.0	10	100.0	2	100.0	257	100.0	21	100.0	528	100.0
Grimaces and Mannerisms												
None Observed	195	82.6	7	70.0	2	100.0	219	85.5	14	60.9	437	82.9
Present	41	17.4	3	30.0	--	--	37	14.5	9	39.1	90	17.1
TOTAL	236	100.0	10	100.0	2	100.0	256	100.0	23	100.0	527	100.0
Undesirable Oral Habits												
None Observed	194	82.9	7	77.8	1	50.0	201	77.3	18	78.3	421	79.7
Present	40	17.1	2	22.2	1	50.0	59	22.7	5	21.7	107	20.3
TOTAL	234	100.0	9	100.0	2	100.0	260	100.0	23	100.0	528	100.0

TABLE C.34

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by groups having stuttering as a single expressive speech disorder and stuttering in combination with little or no speech, or language, articulation, or voice disorders within classifications of adequacy of eye contact, and presence or absence of grimaces or mannerisms and undesirable oral habits.

Behavioral Characteristic	Stuttering		Disorders Combined with Stuttering Disorders								Total	
			Little or No Speech		Language Disorder		Articulation		Voice Disorder			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Eye Contact												
Adequate	690	58.6	14	1.2	4	.3	447	37.9	23	2.0	1178	100.0
Inadequate	325	62.8	6	1.2	6	1.2	167	32.3	13	2.5	517	100.0
TOTAL	1015	59.9	20	1.2	10	.5	614	36.2	36	2.1	1695	100.0
Grimaces and Mannerisms												
None Observed	736	58.5	15	1.2	7	.6	473	37.6	27	2.1	1258	100.0
Present	255	62.7	5	1.2	2	.5	136	33.4	9	2.2	407	100.0
TOTAL	991	59.5	20	1.2	9	.5	609	36.6	36	2.2	1665	100.0
Undesirable Oral Habits												
None Observed	729	59.8	11	1.0	8	.6	447	36.7	24	1.9	1219	100.0
Present	276	61.2	7	1.6	2	.4	154	34.1	12	2.7	451	100.0
TOTAL	1005	60.2	18	1.1	10	.6	601	36.0	36	2.1	1670	100.0

TABLE C.35

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by groups having stuttering as a single expressive speech disorder and stuttering in combination with little or no speech, or language, articulation, or voice disorders within classifications of adequacy of eye contact, and presence or absence of grimaces or mannerisms and undesirable oral habits.

			Disorders Combined with Stuttering Disorders									
	Stuttering		Little or No Speech		Language Disorder		Articulation		Voice Disorder		Total	
Behavioral Characteristic	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Eye Contact												
Adequate	199	44.6	8	1.8	2	.4	222	49.8	15	3.4	446	100.0
Inadequate	39	47.6	2	2.4	--	--	35	42.7	6	7.3	82	100.0
TOTAL	238	45.1	10	1.9	2	.4	257	48.6	21	4.0	528	100.0
Grimaces and Mannerisms												
None Observed	195	44.6	7	1.6	2	.5	219	50.1	14	3.2	437	100.0
Present	41	45.6	3	3.3	--	--	37	41.1	9	10.0	90	100.0
TOTAL	236	44.8	10	1.9	2	.4	256	48.5	23	4.4	527	100.0
Undesirable Oral Habits												
None Observed	194	46.1	7	1.7	1	.2	201	47.7	18	4.3	421	100.0
Present	40	37.4	2	1.9	1	.9	59	55.1	5	4.7	107	100.0
TOTAL	234	44.3	9	1.7	2	.4	260	49.2	23	4.4	528	100.0

TABLE C.36

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by type of voice quality and pitch usage within groups classified as having voice disorders as a single expressive speech disorder and voice disorders in combination with little or no speech, or language, articulation, or stuttering disorders.

			Disorders Combined with Voice Disorders									
Voice Characteristic	Voice Disorder		Little or No Speech		Language Disorder		Articulation		Stuttering		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Voice Quality												
Normal	27	28.1	3	37.5	9	52.9	110	22.7	14	38.9	163	25.4
Deviant	69	71.9	5	62.5	8	47.1	374	77.3	22	61.1	478	74.6
Breathy	6	(8.7)	1	(20.0)	--	(--)	31	(8.3)	1	(4.6)	39	(8.2)
Harsh	5	(7.3)	--	(--)	--	(--)	20	(5.3)	1	(4.6)	26	(5.4)
Hoarse	8	(11.6)	2	(40.0)	1	(12.5)	74	(19.8)	6	(27.2)	91	(19.0)
Nasal	29	(42.0)	2	(40.0)	4	(50.0)	169	(45.2)	10	(45.4)	214	(44.8)
Denasal	5	(7.3)	--	(--)	--	(--)	26	(7.0)	1	(4.6)	32	(6.7)
Combination	12	(17.3)	--	(--)	2	(25.0)	43	(11.5)	2	(9.0)	59	(12.3)
Other	4	(5.8)	--	(--)	1	(12.5)	11	(2.9)	1	(4.6)	17	(3.6)
TOTAL	96	100.0	8	100.0	17	100.0	484	100.0	36	100.0	641	100.0
Pitch												
Normal	51	53.1	4	50.0	10	58.8	295	61.0	21	60.0	381	59.5
Deviant	45	46.9	4	50.0	7	41.2	189	39.0	14	40.0	259	40.5
Too High	15	(33.3)	1	(25.0)	2	(28.6)	67	(35.4)	7	(50.0)	92	(35.5)
Too Low	7	(15.6)	1	(25.0)	1	(14.3)	48	(25.4)	3	(21.4)	60	(23.2)
Monotony	16	(35.6)	1	(25.0)	1	(14.3)	54	(28.6)	--	(--)	72	(27.8)
Combination	5	(11.1)	1	(25.0)	3	(42.8)	13	(6.9)	2	(14.3)	24	(9.3)
Other	2	(4.4)	--	(--)	--	(--)	7	(3.7)	2	(14.3)	11	(4.2)
TOTAL	96	100.0	8	100.0	17	100.0	484	100.0	35	100.0	640	100.0

NOTE: See Chapter III, Section H, *Some Aspects of the Case Record*, Page 375.

TABLE C.37

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by type of voice quality and pitch usage within groups classified as having voice disorders as a single expressive speech disorder and voice disorders in combination with little or no speech, or language, articulation, or stuttering disorders.

Voice Characteristic	Voice Disorder		Disorders Combined with Voice Disorders								Total	
			Little or No Speech		Language Disorder		Articulation		Stuttering			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Voice Quality												
Normal	9	12.9	1	20.0	22	68.7	43	10.9	6	25.0	81	15.4
Deviant	61	87.1	4	80.0	10	31.3	351	89.1	18	75.0	444	84.6
Breathy	5	(8.2)	1	(25.0)	1	(10.0)	27	(7.7)	--	(--)	34	(7.6)
Harsh	2	(3.3)	--	(--)	--	(--)	19	(5.4)	2	(11.1)	23	(5.2)
Hoarse	15	(24.6)	2	(50.0)	2	(20.0)	83	(23.6)	4	(22.2)	106	(23.9)
Nasal	13	(21.3)	1	(25.0)	2	(20.0)	89	(25.4)	5	(27.8)	110	(24.8)
Denasal	5	(8.2)	--	(--)	--	(--)	40	(11.4)	1	(5.6)	46	(10.4)
Combination	18	(29.5)	--	(--)	3	(30.0)	75	(21.4)	4	(22.2)	100	(22.5)
Other	3	(4.9)	--	(--)	2	(20.0)	18	(5.1)	2	(11.1)	25	(5.6)
TOTAL	70	100.0	5	100.0	32	100.0	394	100.0	24	100.0	525	100.0
Pitch												
Normal	27	39.7	1	20.0	23	71.9	256	65.8	9	37.5	316	61.0
Deviant	41	60.3	4	80.0	9	28.1	133	34.2	15	62.5	202	39.0
Too High	16	(39.0)	3	(75.0)	2	(22.2)	45	(33.8)	7	(46.6)	73	(36.1)
Too Low	16	(39.0)	--	(--)	2	(22.2)	42	(31.6)	1	(6.7)	61	(30.2)
Monotony	3	(7.3)	--	(--)	2	(22.2)	30	(22.5)	4	(26.7)	39	(19.3)
Combination	6	(14.7)	1	(25.0)	3	(33.4)	11	(8.3)	3	(20.0)	24	(11.9)
Other	--	(--)	--	(--)	--	(--)	5	(3.8)	--	(--)	5	(2.5)
TOTAL	68	100.0	5	100.0	32	100.0	389	100.0	24	100.0	518	100.0

NOTE: See Chapter III, Section H, *Some Aspects of the Case Record*, Page 375.

TABLE C.38

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by groups having voice disorders as a single expressive speech disorder and voice disorders in combination with little or no speech, or language, articulation, or stuttering disorders within categories of voice quality and pitch usage.

			Disorders Combined with Voice Disorders									
	Voice Disorder		Little or No Speech		Language Disorder		Articulation		Stuttering		Total	
Voice Characteristic	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Voice Quality												
Normal	27	16.6	3	1.8	9	5.5	110	67.5	14	8.6	163	100.0
Deviant	69	14.4	5	1.1	8	1.7	374	78.2	22	4.6	478	100.0
Breathy	6	15.4	1	2.6	--	--	31	79.4	1	2.6	39	100.0
Harsh	5	19.2	--	--	--	--	20	76.9	1	3.9	26	100.0
Hoarse	8	8.8	2	2.2	1	1.1	74	81.3	6	6.6	91	100.0
Nasal	29	13.5	2	.9	4	1.9	169	79.0	10	4.7	214	100.0
Denasal	5	15.6	--	--	--	--	26	81.3	1	3.1	32	100.0
Combination	12	20.3	--	--	2	3.4	43	72.9	2	3.4	59	100.0
Other	4	23.5	--	--	1	5.9	11	64.7	1	5.9	17	100.0
TOTAL	96	15.0	8	1.2	17	2.7	484	75.5	36	5.6	641	100.0
Pitch												
Normal	51	13.4	4	1.1	10	2.6	295	77.4	21	5.5	381	100.0
Deviant	45	17.4	4	1.5	7	2.7	189	73.0	14	5.4	259	100.0
Too High	15	16.3	1	1.1	2	2.2	67	72.8	7	7.6	92	100.0
Too Low	7	11.6	1	1.7	1	1.7	48	80.0	3	5.0	60	100.0
Monotony	16	22.2	1	1.4	1	1.4	54	75.0	--	--	72	100.0
Combination	5	20.8	1	4.2	3	12.5	13	54.2	2	8.3	24	100.0
Other	2	18.2	--	--	--	--	7	63.6	2	18.2	11	100.0
TOTAL	96	15.0	8	1.2	17	2.7	484	75.6	35	5.5	640	100.0

NOTE: See Chapter III, Section H, *Some Aspects of the Case Record*, Page 375.

TABLE C.39

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by groups having voice disorders as a single expressive speech disorder and voice disorders in combination with little or no speech, or language, articulation, or stuttering disorders within categories of voice quality and pitch usage.

			Disorders Combined with Voice Disorders									
Voice Characteristic	Voice Disorder		Little or No Speech		Language Disorder		Articulation		Stuttering		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Voice Quality												
Normal	9	11.1	1	1.2	22	27.2	43	53.1	6	7.4	81	100.0
Deviant	61	13.7	4	.9	10	2.2	351	79.1	18	4.1	444	100.0
Breathy	5	14.7	1	2.9	1	2.9	27	79.5	--	--	34	100.0
Harsh	2	8.7	--	--	--	--	19	82.6	2	8.7	23	100.0
Hoarse	15	14.1	2	1.9	2	1.9	83	78.3	4	3.8	106	100.0
Nasal	13	11.8	1	.9	2	1.8	89	80.9	5	4.6	110	100.0
Denasal	5	10.9	--	--	--	--	40	86.9	1	2.2	46	100.0
Combination	18	18.0	--	--	3	3.0	75	75.0	4	4.0	100	100.0
Other	3	12.0	--	--	2	8.0	18	72.0	2	8.0	25	100.0
TOTAL	70	13.3	5	1.0	32	6.1	394	75.0	24	4.6	525	100.0
Pitch												
Normal	27	8.5	1	.3	23	7.3	256	81.0	9	2.9	316	100.0
Deviant	41	20.3	4	2.0	9	4.5	133	65.8	15	7.4	202	100.0
Too High	16	21.9	3	4.1	2	2.7	45	61.7	7	9.6	73	100.0
Too Low	16	26.2	--	--	2	3.3	42	68.9	1	1.6	61	100.0
Monotony	3	7.7	--	--	2	5.1	30	76.9	4	10.3	39	100.0
Combination	6	25.0	.1	4.2	3	12.5	11	45.8	3	12.5	24	100.0
Other	--	--	--	--	--	--	5	100.0	--	--	5	100.0
TOTAL	68	13.1	5	1.0	32	6.2	389	75.1	24	4.6	518	100.0

NOTE: See Chapter III, Section H, *Some Aspects of the Case Record*, Page 375.

TABLE C.40

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by loudness and rate characteristics within groups classified as having voice disorders as a single expressive speech disorder and voice disorders in combination with little or no speech, or language, articulation, or stuttering disorders.

			Disorders Combined with Voice Disorders									
Loudness and Rate Characteristics	Voice Disorder		Little or No Speech		Language Disorder		Articulation		Stuttering		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Loudness												
Normal	50	52.1	2	25.0	7	41.2	295	61.2	21	58.3	375	58.7
Deviant	46	47.9	6	75.0	10	58.8	187	38.8	15	41.7	264	41.3
Too Loud	6	(13.0)	1	(16.7)	--	(--)	24	(12.8)	4	(26.6)	35	(13.2)
Too Soft	30	(65.2)	3	(50.0)	7	(70.0)	121	(64.7)	6	(40.0)	167	(63.3)
Monotony	6	(13.0)	2	(33.3)	1	(10.0)	23	(12.3)	3	(20.0)	35	(13.2)
Combination	3	(6.6)	--	(--)	2	(20.0)	14	(7.5)	1	(6.7)	20	(7.6)
Other	1	(2.2)	--	(--)	--	(--)	5	(2.7)	1	(6.7)	7	(2.7)
TOTAL	96	100.0	8	100.0	17	100.0	482	100.0	36	100.0	639	100.0
Rate												
Normal	70	72.9	5	62.5	12	70.6	354	72.8	17	49.6	458	71.3
Deviant	26	27.1	3	37.5	5	29.4	132	27.2	18	50.4	184	28.7
Too Rapid	8	(30.8)	--	(--)	--	(--)	49	(37.1)	5	(27.7)	62	(33.7)
Too Slow	8	(30.8)	1	(33.3)	4	(80.0)	36	(27.3)	1	(5.6)	50	(27.2)
Jerky	5	(19.2)	1	(33.3)	1	(20.0)	35	(26.5)	11	(61.1)	53	(28.8)
Combination	2	(7.7)	1	(33.4)	--	(--)	7	(5.3)	1	(5.6)	11	(6.0)
Other	3	(11.5)	--	(--)	--	(--)	5	(3.8)	--	(--)	8	(4.3)
TOTAL	96	100.0	8	100.0	17	100.0	486	100.0	35	100.0	642	100.0

TABLE C.41

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by loudness and rate characteristics within groups classified as having voice disorders as a single expressive speech disorder and voice disorders in combination with little or no speech, or language, articulation, or stuttering disorders.

Loudness and Rate Characteristics	Voice Disorder		Disorders Combined with Voice Disorders								Total	
			Little or No Speech		Language Disorder		Articulation		Stuttering			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Loudness												
Normal	36	54.5	2	40.0	20	62.5	270	69.2	12	50.0	340	65.8
Deviant	30	45.5	3	60.0	12	37.5	120	30.8	12	50.0	177	34.2
Too Loud	13	(43.3)	1	(33.3)	--	(--)	33	(27.5)	5	(41.6)	52	(29.4)
Too Soft	13	(43.3)	2	(66.7)	7	(58.3)	54	(45.0)	3	(25.0)	79	(44.6)
Monotony	3	(10.0)	--	(--)	2	(16.7)	20	(16.7)	2	(16.7)	27	(15.2)
Combination	1	(3.4)	--	(--)	3	(25.0)	12	(10.0)	2	(16.7)	18	(10.2)
Other	--	(--)	--	(--)	--	(--)	1	(.8)	--	(--)	1	(.6)
TOTAL	66	100.0	5	100.0	32	100.0	390	100.0	24	100.0	517	100.0
Rate												
Normal	55	80.9	3	60.0	22	75.9	313	80.5	4	16.7	397	77.1
Deviant	13	19.1	2	40.0	7	24.1	76	19.5	20	83.3	118	22.9
Too Rapid	7	(53.8)	--	(--)	--	(--)	29	(38.2)	5	(25.0)	41	(34.7)
Too Slow	3	(23.1)	--	(--)	1	(14.3)	12	(15.7)	--	(--)	16	(13.6)
Jerky	3	(23.1)	--	(--)	5	(71.4)	29	(38.2)	10	(50.0)	47	(39.8)
Combination	--	(--)	2	(100.0)	1	(14.3)	5	(6.6)	5	(25.0)	13	(11.0)
Other	--	(--)	--	(--)	--	(--)	1	(1.3)	--	(--)	1	(.9)
TOTAL	68	100.0	5	100.0	29	100.0	389	100.0	24	100.0	515	100.0

TABLE C.42

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by groups having voice disorders as a single expressive speech disorder and voice disorders in combination with little or no speech, or language, articulation, or stuttering disorders within categories of loudness and rate characteristics.

Loudness and Rate Characteristics	Voice Disorder		Disorders Combined with Voice Disorders								Total	
			Little or No Speech		Language Disorder		Articulation		Stuttering			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Loudness												
Normal	50	13.3	2	.5	7	1.9	295	78.7	21	5.6	375	100.0
Deviant	46	17.4	6	2.3	10	3.8	187	70.8	15	5.7	264	100.0
Too Loud	6	17.1	1	2.9	--	--	24	68.6	4	11.4	35	100.0
Too Soft	30	18.0	3	1.8	7	4.2	121	72.4	6	3.6	167	100.0
Monotony	6	17.1	2	5.7	1	2.9	23	65.7	3	8.6	35	100.0
Combination	3	15.0	--	--	2	10.0	14	70.0	1	5.0	20	100.0
Other	1	14.3	--	--	--	--	5	71.4	1	14.3	7	100.0
TOTAL	96	15.0	8	1.3	17	2.7	482	75.4	36	5.6	639	100.0
Rate												
Normal	70	15.3	5	1.1	12	2.6	354	77.3	17	3.7	458	100.0
Deviant	26	14.1	3	1.6	5	2.7	132	71.8	18	9.8	184	100.0
Too Rapid	8	12.9	--	--	--	--	49	79.0	5	8.1	62	100.0
Too Slow	8	16.0	1	2.0	4	8.0	36	72.0	1	2.0	50	100.0
Jerky	5	9.4	1	1.9	1	1.9	35	66.0	11	20.8	53	100.0
Combination	2	18.2	1	9.1	--	--	7	63.6	1	9.1	11	100.0
Other	3	37.5	--	--	--	--	5	62.5	--	--	8	100.0
TOTAL	96	15.0	8	1.2	17	2.6	486	75.7	35	5.5	642	100.0

TABLE C.43

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by groups having voice disorders as a single expressive speech disorder and voice disorders in combination with little or no speech, or language, articulation, or stuttering disorders within categories of loudness and rate characteristics.

			Disorders Combined with Voice Disorders									
Loudness and Rate Characteristics	Voice Disorder		Little or No Speech		Language Disorder		Articulation		Stuttering		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Loudness												
Normal	36	10.6	2	.6	20	5.9	270	79.4	12	3.5	340	100.0
Deviant	30	16.9	3	1.7	12	6.8	120	67.8	12	6.8	177	100.0
Too Loud	13	25.0	1	1.9	--	--	33	63.5	5	9.6	52	100.0
Too Soft	13	16.5	2	2.5	7	8.9	54	68.3	3	3.8	79	100.0
Monotony	3	11.1	--	--	2	7.4	20	74.1	2	7.4	27	100.0
Combination	1	5.5	--	--	3	16.7	12	66.7	2	11.1	18	100.0
Other	--	--	--	--	--	--	1	100.0	--	--	1	100.0
TOTAL	66	12.8	5	1.0	32	6.2	390	75.4	24	4.6	517	100.0
Rate												
Normal	55	13.9	3	.8	22	5.5	313	78.8	4	1.0	397	100.0
Deviant	13	11.0	2	1.7	7	5.9	76	64.4	20	17.0	118	100.0
Too Rapid	7	17.1	--	--	--	--	29	70.7	5	12.2	41	100.0
Too Slow	3	18.7	--	--	1	6.3	12	75.0	--	--	16	100.0
Jerky	3	6.4	--	--	5	10.6	29	61.7	10	21.3	47	100.0
Combination	--	--	2	15.3	1	7.7	5	38.5	5	38.5	13	100.0
Other	--	--	--	--	--	--	1	100.0	--	--	1	100.0
TOTAL	68	13.2	5	1.0	29	5.6	389	75.5	24	4.7	515	100.0

TABLE C.44

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by condition of the soft palate and groups classified as having voice disorders as a single expressive speech disorder and voice disorders in combination with little or no speech, or language, articulation, or stuttering disorders.

Condition of Soft Palate	Voice Disorder		Disorders Combined with Voice Disorders								Total	
			Little or No Speech		Language Disorder		Articulation		Stuttering			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Adequate	79	81.4	8	40.0	14	22.2	418	96.3	34	60.7	553	82.5
Normal	77	(97.5)	8	(100.0)	14	(100.0)	393	(94.0)	33	(97.1)	525	(94.9)
Repaired Cleft	2	(2.5)	--	(--)	--	(--)	18	(4.3)	--	(--)	20	(3.6)
Prosthesis	--	(--)	--	(--)	--	(--)	1	(.2)	--	(--)	1	(.2)
Combination	--	(--)	--	(--)	--	(--)	6	(1.5)	1	(2.9)	7	(1.3)
Inadequate	18	18.6	12	60.0	49	77.8	16	3.7	22	39.3	117	17.5
Unrepaired Cleft	1	(5.6)	--	(--)	10	(20.4)	1	(6.3)	--	(--)	12	(10.3)
Submucous Cleft	1	(5.6)	--	(--)	1	(2.0)	--	(--)	--	(--)	2	(1.7)
Repaired Cleft	1	(5.6)	--	(--)	--	(--)	--	(--)	--	(--)	1	(.8)
Prosthesis	--	(--)	--	(--)	5	(10.2)	2	(12.5)	2	(9.1)	9	(7.7)
Too Short	2	(11.1)	--	(--)	--	(--)	1	(6.3)	--	(--)	3	(2.6)
Poor Mobility	5	(27.7)	--	(--)	1	(2.0)	--	(--)	1	(4.5)	7	(6.0)
Asymmetric Function	2	(11.1)	--	(--)	9	(18.4)	3	(18.7)	1	(4.5)	15	(12.8)
Combination	4	(22.2)	--	(--)	1	(2.0)	2	(12.5)	--	(--)	7	(6.0)
Other	2	(11.1)	12	(100.0)	22	(45.0)	7	(43.7)	18	(81.9)	61	(52.1)
TOTAL	97	100.0	20	100.0	63	100.0	434	100.0	56	100.0	670	100.0

TABLE C.45

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by condition of the soft palate and groups classified as having voice disorders as a single expressive speech disorder and voice disorders in combination with little or no speech, or language, articulation, or stuttering disorders.

Condition of Soft Palate	Voice Disorder		Disorders Combined with Voice Disorders								Total	
			Little or No Speech		Language Disorder		Articulation		Stuttering			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Adequate	58	86.6	5	55.6	20	43.5	336	98.0	22	51.2	441	86.8
Normal	50	(86.2)	5	(100.0)	20	(100.0)	327	(97.3)	22	(100.0)	424	(96.1)
Repaired Cleft	8	(13.8)	--	(--)	--	(--)	6	(1.8)	--	(--)	14	(3.2)
Prosthesis	--	(--)	--	(--)	--	(--)	1	(.3)	--	(--)	1	(.2)
Combination	--	(--)	--	(--)	--	(--)	2	(.6)	--	(--)	2	(.5)
Inadequate	9	13.4	4	44.4	26	56.5	7	2.0	21	48.8	67	13.2
Unrepaired Cleft	--	(--)	--	(--)	4	(15.4)	1	(14.3)	--	(--)	5	(7.5)
Submucous Cleft	1	(11.1)	--	(--)	--	(--)	--	(--)	--	(--)	1	(1.5)
Repaired Cleft	--	(--)	--	(--)	--	(--)	--	(--)	--	(--)	--	(--)
Prosthesis	--	(--)	1	(25.0)	1	(3.8)	--	(--)	1	(4.8)	3	(4.5)
Too Short	2	(22.2)	--	(--)	--	(--)	--	(--)	--	(--)	2	(3.0)
Poor Mobility	5	(55.6)	--	(--)	1	(3.8)	--	(--)	--	(--)	6	(9.0)
Asymmetric Function	--	(--)	--	(--)	4	(15.4)	2	(28.6)	1	(4.8)	7	(10.4)
Combination	--	(--)	--	(--)	--	(--)	--	(--)	--	(--)	--	(--)
Other	1	(11.1)	3	(75.0)	16	(61.6)	4	(57.1)	19	(90.4)	43	(64.1)
TOTAL	67	100.0	9	100.0	46	100.0	343	100.0	43	100.0	508	100.0

TABLE C.46

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by groups having voice disorders as a single expressive speech disorder and voice disorders in combination with little or no speech, or language, articulation, or stuttering disorders within categories of condition of the soft palate.

Condition of Soft Palate	Voice Disorder		Disorders Combined with Voice Disorders								Total	
			Little or No Speech		Language Disorder		Articulation		Stuttering			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Adequate	79	14.3	8	1.4	14	2.5	418	75.6	34	6.2	553	100.0
Normal	77	14.7	8	1.5	14	2.7	393	74.8	33	6.3	525	100.0
Repaired Cleft	2	10.0	--	--	--	--	18	90.0	--	--	20	100.0
Prosthesis	--	--	--	--	--	--	1	100.0	--	--	1	100.0
Combination	--	--	--	--	--	--	6	85.7	1	14.3	7	100.0
Inadequate	18	15.4	12	10.2	49	41.9	16	13.7	22	18.8	117	100.0
Unrepaired Cleft	1	8.3	--	--	10	83.4	1	8.3	--	--	12	100.0
Submucous Cleft	1	50.0	--	--	1	50.0	--	--	--	--	2	100.0
Repaired Cleft	1	100.0	--	--	--	--	--	--	--	--	1	100.0
Prosthesis	--	--	--	--	5	55.6	2	22.2	2	22.2	9	100.0
Too Short	2	66.7	--	--	--	--	1	33.3	--	--	3	100.0
Poor Mobility	5	71.4	--	--	1	14.3	--	--	1	14.3	7	100.0
Asymmetric Function	2	13.3	--	--	9	60.0	3	20.0	1	6.7	15	100.0
Combination	4	57.1	--	--	1	14.3	2	28.6	--	--	7	100.0
Other	2	3.3	12	19.7	22	36.0	7	11.5	18	29.5	61	100.0
TOTAL	97	14.5	20	3.0	63	9.4	434	64.8	56	8.3	670	100.0

TABLE C.47

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by groups having voice disorders as a single expressive speech disorder and voice disorders in combination with little or no speech, or language, articulation, or stuttering disorders within categories of condition of the soft palate.

Condition of Soft Palate	Voice Disorder		Disorders Combined with Voice Disorders								Total	
			Little or No Speech		Language Disorder		Articulation		Stuttering			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Adequate	58	13.2	5	1.1	20	4.5	336	76.2	22	5.0	441	100.0
Normal	50	11.8	5	1.2	20	4.7	327	77.1	22	5.2	424	100.0
Repaired Cleft	8	57.1	--	--	--	--	6	42.9	--	--	14	100.0
Prosthesis	--	--	--	--	--	--	1	100.0	--	--	1	100.0
Combination	--	--	--	--	--	--	2	100.0	--	--	2	100.0
Inadequate	9	13.4	4	6.0	26	38.8	7	10.5	21	31.3	67	100.0
Unrepaired Cleft	--	--	--	--	4	80.0	1	20.0	--	--	5	100.0
Submucous Cleft	1	100.0	--	--	--	--	--	--	--	--	1	100.0
Repaired Cleft	--	--	--	--	--	--	--	--	--	--	--	--
Prosthesis	--	--	1	33.3	1	33.3	--	--	1	33.4	3	100.0
Too Short	2	100.0	--	--	--	--	--	--	--	--	2	100.0
Poor Mobility	5	83.3	--	--	1	16.7	--	--	--	--	6	100.0
Asymmetric Function	--	--	--	--	4	57.1	2	28.6	1	14.3	7	100.0
Combination	--	--	--	--	--	--	--	--	--	--	--	--
Other	1	2.3	3	7.0	16	37.2	4	9.3	19	44.2	43	100.0
TOTAL	67	13.2	9	1.8	46	9.0	343	67.5	43	8.5	508	100.0

TABLE C.48

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by use of breathing for speech within groups classified as having voice disorders as a single expressive speech disorder and voice disorders in combination with little or no speech, or language, articulation, or stuttering disorders.

Breathing Function	Voice Disorder		Disorders Combined with Voice Disorders								Total	
			Little or No Speech		Language Disorder		Articulation		Stuttering			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Adequate	59	66.3	5	62.5	8	50.0	272	58.5	26	72.2	370	60.3
Inadequate	30	33.7	3	37.5	8	50.0	193	41.5	10	27.8	244	39.7
Shallow	13	(43.4)	--	(--)	3	(37.5)	46	(23.8)	1	(10.0)	63	(25.8)
Jerky	--	(--)	1	(33.3)	--	(--)	7	(3.6)	2	(20.0)	10	(4.1)
Mouth Breathing	10	(33.3)	--	(--)	3	(37.5)	114	(59.1)	3	(30.0)	130	(53.3)
Speaking on Inhalation	--	(--)	--	(--)	--	(--)	--	(--)	--	(--)	--	(--)
Combination	6	(20.0)	2	(66.7)	2	(25.0)	21	(10.9)	4	(40.0)	35	(14.3)
Other	1	(3.3)	--	(--)	--	(--)	5	(2.6)	--	(--)	6	(2.5)
TOTAL	89	100.0	8	100.0	16	100.0	465	100.0	36	100.0	614	100.0

TABLE C.49

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by use of breathing for speech within groups classified as having voice disorders as a single expressive speech disorder and voice disorders in combination with little or no speech, or language, articulation, or stuttering disorders.

			Disorders Combined with Voice Disorders									
	Voice Disorder		Little or No Speech		Language Disorder		Articulation		Stuttering		Total	
Breathing Function	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Adequate	35	56.5	4	80.0	15	50.0	223	59.8	16	72.7	293	59.6
Inadequate	27	43.5	1	20.0	15	50.0	150	40.2	6	27.3	199	40.4
Shallow	10	(37.0)	--	(--)	3	(20.0)	18	(12.0)	1	(16.7)	32	(16.1)
Jerky	1	(3.7)	1	(100.0)	--	(--)	5	(3.3)	2	(33.3)	9	(4.5)
Mouth Breathing	9	(33.4)	--	(--)	10	(66.7)	104	(69.3)	1	(16.7)	124	(62.3)
Speaking on Inhalation	--	(--)	--	(--)	--	(--)	1	(.7)	--	(--)	1	(.5)
Combination	6	(22.2)	--	(--)	2	(13.3)	17	(11.4)	2	(33.3)	27	(13.6)
Other	1	(3.7)	--	(--)	--	(--)	5	(3.3)	--	(--)	6	(3.0)
TOTAL	62	100.0	5	100.0	30	100.0	373	100.0	22	100.0	492	100.0

TABLE C.50

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by groups having voice disorders as a single expressive speech disorder and voice disorders in combination with little or no speech, or language, articulation, or stuttering disorders within categories of use of breathing for speech.

			Disorders Combined with Voice Disorders									
	Voice Disorder		Little or No Speech		Language Disorder		Articulation		Stuttering		Total	
Breathing Function	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Adequate	59	15.9	5	1.4	8	2.2	272	73.5	26	7.0	370	100.0
Inadequate	30	12.3	3	1.2	8	3.3	193	79.1	10	4.1	244	100.0
Shallow	13	20.6	--	--	3	4.8	46	73.0	1	1.6	63	100.0
Jerky	--	--	1	10.0	--	--	7	70.0	2	20.0	10	100.0
Mouth Breathing	10	7.7	--	--	3	2.3	114	87.7	3	2.3	130	100.0
Speaking on Inhalation	--	--	--	--	--	--	--	--	--	--	--	--
Combination	6	17.2	2	5.7	2	5.7	21	60.0	4	11.4	35	100.0
Other	1	16.7	--	--	--	--	5	83.3	--	--	6	100.0
TOTAL	89	14.5	8	1.3	16	2.6	465	75.7	36	5.9	614	100.0

TABLE C.51

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by groups having voice disorders as a single expressive speech disorder and voice disorders in combination with little or no speech, or language, articulation, or stuttering disorders within categories of use of breathing for speech.

			Disorders Combined with Voice Disorders									
	Voice Disorder		Little or No Speech		Language Disorder		Articulation		Stuttering		Total	
Breathing Function	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Adequate	35	11.9	4	1.4	15	5.1	223	76.1	16	5.5	293	100.0
Inadequate	27	13.6	1	.5	15	7.5	150	75.4	6	3.0	199	100.0
Shallow	10	31.3	--	--	3	9.4	18	56.2	1	3.1	32	100.0
Jerky	1	11.1	1	11.1	--	--	5	55.6	2	22.2	9	100.0
Mouth Breathing	9	7.2	--	--	10	8.1	104	83.9	1	.8	124	100.0
Speaking on Inhalation	--	--	--	--	--	--	1	100.0	--	--	1	100.0
Combination	6	22.2	--	--	2	7.4	17	63.0	2	7.4	27	100.0
Other	1	16.7	--	--	--	--	5	83.3	--	--	6	100.0
TOTAL	62	12.6	5	1.0	30	6.1	373	75.8	22	4.5	492	100.0

SECTION D

DISCUSSION

Sex Distribution

Selected variables were examined for males and females separately in order to determine whether the proportions of males and females differed. The source of identification was examined to determine whether a selective factor was operating the identification process. The other variables examined included previous therapy, age, academic achievement, relatives with speech problems, lateral preference, and a number of speech characteristics.

Case Identification

None of the sources of case identification favored one or the other of the sexes. Approximately equal proportions of males and females were identified through speech screening and by the various referring agents.

Previous Therapy

Forty-nine-and-four-tenths per cent of the males, but only 44% of the females, had had previous therapy in school. Similar proportions had had therapy in other agencies, and similar proportions were currently receiving therapy outside of school. Among those who had had previous therapy in school, differences between sexes for number of years of previous therapy were negligible. Among those having had previous therapy with outside agencies, a slightly higher proportion of females had had three or more years of therapy (18.3% females vs. 13.1% males), though the number of pupils was very small.

Age

Proportions of males and females in the various age groups were quite similar throughout the age range to about 16 years. Thereafter, the sex ratio became variable. The change in sex ratio for the group of 819 pupils 16 years or over was small--1.6 males for every female.

Academic Achievement

Higher proportions of males than females were below average in reading readiness and reading achievement, and somewhat higher proportions of females were above average. The proportions who were average were similar. The difference was greater for reading achievement than for reading readiness. Forty-eight per cent of the males as opposed to 40% of the females were below average in reading achievement, whereas 43% of the males and 38% of the females were below average in reading readiness.

Similar proportions in the two groups were below average, average, and above average in arithmetic fundamentals achievement (41%, 37%, and 22%, respectively for both sexes). Approximately the same proportions had below average, average, and above average achievement in arithmetic reasoning, as 43% of the males and 40% of the females were below average; 33% and 35%, respectively, were average; and 24% and 25%, respectively, were above average.

Relatives with Speech Problems

Among the pupils reported to have relatives with speech problems, two males had relatives with speech problems for every female having relatives with speech problems, which is the same as the ratio of males to females in the caseload. The proportions of both males and females having relatives with the different kinds of speech problems were the same, except that a slightly higher proportion of males had fathers who stuttered, and a slightly higher proportion of the females had mothers with articulation disorders. However, the total number of pupils was small.

Lateral Preference

Proportions of males and females having right, left, and mixed preference for hand, foot, and eye usage were nearly identical. Furthermore, the proportions found in the two caseloads did not vary.

Speech Characteristics

Similar proportions of males and females had deviant articulation. Similar proportions had regional and foreign dialects also. Proportionately more males than females were partially intelligible (19% males vs. 16% females), and fewer were intelligible (78% males vs. 82% females). Equal proportions were unintelligible.

The largest difference between sexes obtained for voice quality deviations. A higher proportion of males with voice quality deviations had hoarse voice quality (25% males vs. 15% females). Harsh voice quality was relatively rare, and the difference between proportions of the sexes with this type of voice quality was small (8% vs. 5%). When harsh and hoarse quality were combined into a single category, the proportion of males producing voice quality that might be termed rough was considerably higher (33% males vs. 20% females).

Higher proportions of the females had nasal and breathy voices, though the differences between proportions were small: males, 24% nasal, 15% breathy; females, 29% nasal, 18% breathy.

Slight differences in the proportions of males and females producing loudness deviations obtained also, with 12% of the males producing loudness deviations as opposed to 17% of the females. The difference between proportions having rate deviations was negligible. Differences between proportions of males and females with inadequate response length, vocabulary, and grammar were negligible also.

SECTION D

ORGANIZATION OF TABLES

Sex Distribution

TABLE D.1

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by identification through speech screening or referral from teachers, parents, self, administrators, health or guidance personnel, and other agencies for males and females.

Source of Identification	Sex					
	Males		Females		Total	
	Number	%	Number	%	Number	%
Speech Screening	562	7.9	313	9.2	875	8.3
Referral	6582	92.1	3085	90.8	9667	91.7
Teacher	4645	(70.6)	2117	(68.6)	6762	(69.9)
Parents	241	(3.6)	109	(3.5)	350	(3.6)
Self	111	(1.7)	57	(1.9)	168	(1.7)
Administrator	61	(.9)	43	(1.4)	104	(1.1)
Guidance Personnel	103	(1.6)	29	(.9)	132	(1.4)
Health Personnel	441	(6.7)	283	(9.2)	724	(7.5)
Other	980	(14.9)	447	(14.5)	1427	(14.8)
TOTAL	7144	100.0	3398	100.0	10542	100.0

TABLE D.2

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by identification through speech screening or referral from teachers, parents, self, administrators, health or guidance personnel, and other agencies for males and females.

	Sex					
	Males		Females		Total	
Source of Identification	Number	%	Number	%	Number	%
Speech Screening	1635	33.3	922	35.8	2557	34.1
Referral	3277	66.7	1656	64.2	4933	65.9
Teacher	2580	(78.7)	1255	(75.8)	3835	(77.7)
Parents	144	(4.4)	77	(4.6)	221	(4.5)
Self	140	(4.3)	64	(3.9)	204	(4.1)
Administrator	35	(1.1)	18	(1.1)	53	(1.1)
Guidance Personnel	54	(1.6)	36	(2.2)	90	(1.8)
Health Personnel	24	(.7)	24	(1.4)	48	(1.0)
Other	300	(9.2)	182	(11.0)	482	(9.8)
TOTAL	4912	100.0	2578	100.0	7490	100.0

TABLE D.3

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by sex within sources of identification--speech screening or referral by teachers, parents, self, administrators, health or guidance personnel, or other agencies.

Source of Identification	Sex					
	Males		Females		Total	
	Number	%	Number	%	Number	%
Speech Screening	562	64.2	313	35.8	875	100.0
Referral	6582	68.1	3085	31.9	9667	100.0
Teacher	4645	68.7	2117	31.3	6762	100.0
Parents	241	68.9	109	31.1	350	100.0
Self	111	66.1	57	33.9	168	100.0
Administrator	61	58.7	43	41.3	104	100.0
Guidance Personnel	103	78.0	29	22.0	132	100.0
Health Personnel	441	60.9	283	39.1	724	100.0
Other	980	68.7	447	31.3	1427	100.0
TOTAL	7144	67.8	3398	32.2	10542	100.0

TABLE D.4

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by sex within sources of identification--speech screening or referral by teachers, parents, self, administrators, health or guidance personnel, or other agencies.

Source of Identification	Sex					
	Males		Females		Total	
	Number	%	Number	%	Number	%
Speech Screening	1635	63.9	922	36.1	2557	100.0
Referral	3277	66.4	1656	33.6	4933	100.0
Teacher	2580	67.3	1255	32.7	3835	100.0
Parents	144	65.2	77	34.8	221	100.0
Self	140	68.6	64	31.4	204	100.0
Administrator	35	66.0	18	34.0	53	100.0
Guidance Personnel	54	60.0	36	40.0	90	100.0
Health Personnel	24	50.0	24	50.0	48	100.0
Other	300	62.2	182	37.8	482	100.0
TOTAL	4912	65.6	2578	34.4	7490	100.0

TABLE D.5

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by amount of previous therapy in school and in other agencies for males and females.

	Sex					
	Males		Females		Total	
Therapy History	Number	%	Number	%	Number	%
No Previous Therapy	2934	41.3	1645	48.3	4579	43.5
Previous Therapy--School	3885	54.6	1635	48.0	5520	52.5
Previous Therapy--Outside Agency	241	3.4	106	3.1	347	3.3
Current Therapy--Outside Agency	49	.7	20	.6	69	.7
TOTAL	7109	100.0	3406	100.0	10515	100.0
Previous Therapy--School						
1 Year	2027	52.2	918	56.2	2945	53.4
2 Years	875	22.5	314	19.2	1189	21.5
3 Years	471	12.1	203	12.4	674	12.2
4 Years	239	6.2	88	5.4	327	5.9
5 Years	113	2.9	54	3.3	167	3.0
6 or More Years	160	4.1	58	3.5	218	4.0
TOTAL	3885	100.0	1635	100.0	5520	100.0
Previous Therapy--Outside Agency						
1 Year	154	63.9	69	65.1	223	64.3
2 Years	55	22.8	19	17.9	74	21.3
3 Years	14	5.8	9	8.5	23	6.6
4 Years	7	2.9	2	1.9	9	2.6
5 Years	3	1.3	4	3.8	7	2.0
6 or More Years	8	3.3	3	2.8	11	3.2
TOTAL	241	100.0	106	100.0	347	100.0

TABLE D.6

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by amount of previous therapy in school and in other agencies for males and females.

	Sex					
	Males		Females		Total	
Therapy History	Number	%	Number	%	Number	%
No Previous Therapy	2734	55.4	1509	59.0	4243	56.6
Previous Therapy-- School	2066	41.8	991	38.8	3057	40.8
Previous Therapy-- Outside Agency	89	1.8	47	1.8	136	1.8
Current Therapy-- Outside Agency	51	1.0	9	.4	60	.8
TOTAL	4940	100.0	2556	100.0	7496	100.0
Previous Therapy--School						
1 Year	1261	61.0	605	61.1	1866	61.1
2 Years	445	21.5	225	22.7	670	21.9
3 Years	233	11.3	101	10.2	334	10.9
4 Years	79	3.8	43	4.3	122	4.0
5 Years	28	1.4	9	.9	37	1.2
6 or More Years	20	1.0	8	.8	28	.9
TOTAL	2066	100.0	991	100.0	3057	100.0
Previous Therapy--Outside Agency						
1 Year	60	67.4	28	59.6	88	64.7
2 Years	17	19.1	9	19.2	26	19.1
3 Years	8	9.0	5	10.6	13	9.5
4 Years	1	1.1	4	8.5	5	3.7
5 Years	2	2.3	--	--	2	1.5
6 or More Years	1	1.1	1	2.1	2	1.5
TOTAL	89	100.0	47	100.0	136	100.0

TABLE D.7

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by sex within categories of amount of previous therapy.

	Sex					
	Males		Females		Total	
Therapy History	Number	%	Number	%	Number	%
No Previous Therapy	2934	64.1	1645	35.9	4579	100.0
Previous Therapy--School	3885	70.4	1635	29.6	5520	100.0
Previous Therapy--Outside Agency	241	69.5	106	30.5	347	100.0
Current Therapy--Outside Agency	49	71.0	20	29.0	69	100.0
TOTAL	7109	67.6	3406	32.4	10515	100.0
Previous Therapy--School						
1 Year	2027	68.8	918	31.2	2945	100.0
2 Years	875	73.6	314	26.4	1189	100.0
3 Years	471	69.9	203	30.1	674	100.0
4 Years	239	73.1	88	26.9	327	100.0
5 Years	113	67.7	54	32.3	167	100.0
6 or More Years	160	73.4	58	26.6	218	100.0
TOTAL	3885	70.4	1635	29.6	5520	100.0
Previous Therapy--Outside Agency						
1 Year	154	69.1	69	30.9	223	100.0
2 Years	55	74.3	19	25.7	74	100.0
3 Years	14	60.9	9	39.1	23	100.0
4 Years	7	77.8	2	22.2	9	100.0
5 Years	3	42.9	4	57.1	7	100.0
6 or More Years	8	72.7	3	27.3	11	100.0
TOTAL	241	69.5	106	30.5	347	100.0

TABLE D.8

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by sex within categories of amount of previous therapy.

	Sex					
	Males		Females		Total	
Therapy History	Number	%	Number	%	Number	%
No Previous Therapy	2734	64.4	1509	35.6	4243	100.0
Previous Therapy--School	2066	67.6	991	32.4	3057	100.0
Previous Therapy--Outside Agency	89	65.4	47	34.6	136	100.0
Current Therapy--Outside Agency	51	85.0	9	15.0	60	100.0
TOTAL	4940	65.9	2556	34.1	7496	100.0
Previous Therapy--School						
1 Year	1261	67.6	605	32.4	1866	100.0
2 Years	445	66.4	225	33.6	670	100.0
3 Years	233	69.8	101	30.2	334	100.0
4 Years	79	64.8	43	35.2	122	100.0
5 Years	28	75.7	9	24.3	37	100.0
6 or More Years	20	71.4	8	28.6	28	100.0
TOTAL	2066	67.6	991	32.4	3057	100.0
Previous Therapy--Outside Agency						
1 Year	60	68.2	28	31.8	88	100.0
2 Years	17	65.4	9	34.6	26	100.0
3 Years	8	61.5	5	38.5	13	100.0
4 Years	1	20.0	4	80.0	5	100.0
5 Years	2	100.0	--	--	2	100.0
6 or More Years	1	50.0	1	50.0	2	100.0
TOTAL	89	65.4	47	34.6	136	100.0

TABLE D.9

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by age for males and females.

	Sex					
	Males		Females		Total	
Age in Years	Number	%	Number	%	Number	%
3	1	--	1	--	2	--
4	15	.2	10	.3	25	.2
5	132	1.8	73	2.1	205	1.9
6	730	10.2	321	9.4	1051	9.9
7	1160	16.2	496	14.5	1656	15.6
8	1152	16.0	530	15.5	1682	15.9
9	971	13.5	454	13.2	1425	13.4
10	739	10.3	322	9.4	1061	10.0
11	514	7.2	225	6.6	739	7.0
12	326	4.5	182	5.3	508	4.8
13	391	5.4	221	6.4	612	5.8
14	360	5.0	178	5.2	538	5.1
15	231	3.2	131	3.8	362	3.4
16	192	2.7	138	4.0	330	3.1
17	169	2.4	94	2.7	263	2.5
18	87	1.2	44	1.3	131	1.2
19	11	.2	11	.3	22	.2
20	2	--	1	--	3	--
TOTAL	7183	100.0	3432	100.0	10615	100.0

TABLE D.10

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by age for males and females.

	Sex					
	Males		Females		Total	
Age in Years	Number	%	Number	%	Number	%
3	--	--	1	--	1	--
4	11	.2	9	.3	20	.3
5	291	5.6	169	6.3	460	5.8
6	867	16.6	433	16.2	1300	16.5
7	1123	21.5	560	20.9	1683	21.3
8	990	19.0	478	17.8	1468	18.6
9	727	14.0	382	14.3	1109	14.1
10	509	9.8	243	9.1	752	9.5
11	296	5.7	165	6.2	461	5.8
12	162	3.1	111	4.1	273	3.5
13	106	2.0	46	1.7	152	1.9
14	65	1.2	38	1.4	103	1.3
15	26	.5	16	.6	42	.5
16	13	.3	11	.4	24	.3
17	16	.3	11	.4	27	.4
18	4	.1	6	.2	10	.1
19	6	.1	3	.1	9	.1
20	--	--	--	--	--	--
TOTAL	5212	100.0	2682	100.0	7894	100.0

TABLE D.11

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by sex for each age group.

	Sex					
	Males		Females		Total	
Age in Years	Number	%	Number	%	Number	%
3	1	50.0	1	50.0	2	100.0
4	15	60.0	10	40.0	25	100.0
5	132	64.4	73	35.6	205	100.0
6	730	69.5	321	30.5	1051	100.0
7	1160	70.0	496	30.0	1656	100.0
8	1152	68.5	530	31.5	1682	100.0
9	971	68.1	454	31.9	1425	100.0
10	739	69.7	322	30.3	1061	100.0
11	514	69.6	225	30.4	739	100.0
12	326	64.2	182	35.8	508	100.0
13	391	63.9	221	36.1	612	100.0
14	360	66.9	178	33.1	538	100.0
15	231	63.8	131	36.2	362	100.0
16	192	58.2	138	41.8	330	100.0
17	169	64.3	94	35.7	263	100.0
18	87	66.4	44	33.6	131	100.0
19	11	50.0	11	50.0	22	100.0
20	2	66.7	1	33.3	3	100.0
TOTAL	7183	67.7	3432	32.3	10615	100.0

TABLE D.12

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by sex for each age group.

	Sex					
	Males		Females		Total	
Age in Years	Number	%	Number	%	Number	%
3	--	--	1	100.0	1	100.0
4	11	55.0	9	45.0	20	100.0
5	291	63.3	169	36.7	460	100.0
6	867	66.7	433	33.3	1300	100.0
7	1123	66.7	560	33.3	1683	100.0
8	990	67.4	478	32.6	1468	100.0
9	727	65.6	382	34.4	1109	100.0
10	509	67.7	243	32.3	752	100.0
11	296	64.2	165	35.8	461	100.0
12	162	59.3	111	40.7	273	100.0
13	106	69.7	46	30.3	152	100.0
14	65	63.1	38	36.9	103	100.0
15	26	61.9	16	38.1	42	100.0
16	13	54.2	11	45.8	24	100.0
17	16	59.3	11	40.7	27	100.0
18	4	40.0	6	60.0	10	100.0
19	6	66.7	3	33.3	9	100.0
20	--	--	--	--	--	--
TOTAL	5212	66.0	2682	34.0	7894	100.0

TABLE D.13

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by below average, average, and above average reading and arithmetic achievement for males and females.

	Sex					
	Males		Females		Total	
Type of Test	Number	%	Number	%	Number	%
Reading						
a. Readiness						
Below Average	734	49.5	326	43.2	1060	47.4
Average	500	33.8	261	34.6	761	34.0
Above Average	248	16.7	167	22.2	415	18.6
TOTAL	1482	100.0	754	100.0	2236	100.0
b. Achievement						
Below Average	1742	50.2	744	44.5	2486	48.4
Average	1115	32.2	571	34.2	1686	32.8
Above Average	609	17.6	355	21.3	964	18.8
TOTAL	3466	100.0	1670	100.0	5136	100.0
Arithmetic						
a. Fundamentals						
Below Average	1174	42.7	587	44.2	1761	43.2
Average	969	35.3	442	33.2	1411	34.6
Above Average	603	22.0	301	22.6	904	22.2
TOTAL	2746	100.0	1330	100.0	4076	100.0
b. Reasoning						
Below Average	1168	44.7	559	43.9	1727	44.5
Average	826	31.7	414	32.6	1240	31.9
Above Average	617	23.6	299	23.5	916	23.6
TOTAL	2611	100.0	1272	100.0	3883	100.0

TABLE D.14

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by below average, average, and above average reading and arithmetic achievement for males and females.

	Sex					
	Males		Females		Total	
Type of Test	Number	%	Number	%	Number	%
Reading						
a. Readiness						
Below Average	539	37.0	235	32.0	774	35.3
Average	503	34.6	244	33.2	747	34.1
Above Average	414	28.4	256	34.8	670	30.6
TOTAL	1456	100.0	735	100.0	2191	100.0
b. Achievement						
Below Average	1023	45.8	384	33.5	1407	41.6
Average	712	31.8	430	37.6	1142	33.8
Above Average	501	22.4	331	28.9	832	24.6
TOTAL	2236	100.0	1145	100.0	3381	100.0
Arithmetic						
a. Fundamentals						
Below Average	587	37.5	282	33.7	869	36.2
Average	616	39.3	369	44.2	985	41.0
Above Average	363	23.2	185	22.1	548	22.8
TOTAL	1566	100.0	836	100.0	2402	100.0
b. Reasoning						
Below Average	547	40.3	244	33.6	791	37.9
Average	480	35.3	298	41.1	778	37.3
Above Average	332	24.4	184	25.3	516	24.8
TOTAL	1359	100.0	726	100.0	2085	100.0

TABLE D.15

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by sex within below average, average, and above average reading and arithmetic achievement groups.

	Sex					
	Males		Females		Total	
Type of Test	Number	%	Number	%	Number	%
Reading						
a. Readiness						
Below Average	734	69.2	326	30.8	1060	100.0
Average	500	65.7	261	34.3	761	100.0
Above Average	248	59.8	167	40.2	415	100.0
TOTAL	1482	66.3	754	33.7	2236	100.0
b. Achievement						
Below Average	1742	70.1	744	29.9	2486	100.0
Average	1115	66.1	571	33.9	1686	100.0
Above Average	609	63.2	355	36.8	964	100.0
TOTAL	3466	67.5	1670	32.5	5136	100.0
Arithmetic						
a. Fundamentals						
Below Average	1174	66.7	587	33.3	1761	100.0
Average	969	68.7	442	31.3	1411	100.0
Above Average	603	66.7	301	33.3	904	100.0
TOTAL	2746	67.4	1330	32.6	4076	100.0
b. Reasoning						
Below Average	1168	67.6	559	32.4	1727	100.0
Average	826	66.6	414	33.4	1240	100.0
Above Average	617	67.4	299	32.6	916	100.0
TOTAL	2611	67.2	1272	32.8	3883	100.0

TABLE D.16

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by sex within below average, average, and above average reading and arithmetic achievement groups.

	Sex					
	Males		Females		Total	
Type of Test	Number	%	Number	%	Number	%
Reading						
a. Readiness						
Below Average	539	69.6	235	30.4	774	100.0
Average	503	67.3	244	32.7	747	100.0
Above Average	414	61.8	256	38.2	670	100.0
TOTAL	1456	66.5	735	33.5	2191	100.0
b. Achievement						
Below Average	1023	72.7	384	27.3	1407	100.0
Average	712	62.3	430	37.7	1142	100.0
Above Average	501	60.2	331	39.8	832	100.0
TOTAL	2236	66.1	1145	33.9	3381	100.0
Arithmetic						
a. Fundamentals						
Below Average	587	67.5	282	32.5	869	100.0
Average	616	62.5	369	37.5	985	100.0
Above Average	363	66.2	185	33.8	548	100.0
TOTAL	1566	65.2	836	34.8	2402	100.0
b. Reasoning						
Below Average	547	69.2	244	30.8	791	100.0
Average	480	61.7	298	38.3	778	100.0
Above Average	332	64.3	184	35.7	516	100.0
TOTAL	1359	65.2	726	34.8	2085	100.0

TABLE D.17

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by type of expressive speech disorder found among relatives for males and females. Only the primary disorder was counted if multiple disorders were present.

Relative and Type of Problem	Sex					
	Males		Females		Total	
	Number	%	Number	%	Number	%
Mother						
Little or No Speech	2	2.0	3	5.3	5	3.2
Language Disorder	10	9.8	4	7.0	14	8.8
Articulation	55	53.9	35	61.4	90	56.6
Stuttering	32	31.4	14	24.6	46	28.9
Voice Disorder	3	2.9	1	1.7	4	2.5
TOTAL	102	100.0	57	100.0	159	100.0
Father						
Little or No Speech	2	1.7	3	6.5	5	3.0
Language Disorder	11	9.3	5	10.9	16	9.8
Articulation	42	35.7	17	37.0	59	36.0
Stuttering	60	50.8	21	45.6	81	49.4
Voice Disorder	3	2.5	--	--	3	1.8
TOTAL	118	100.0	46	100.0	164	100.0
One Sibling Only						
Little or No Speech	7	.8	6	1.1	13	.9
Language Disorder	27	2.9	19	3.7	46	3.2
Articulation	756	81.5	407	78.6	1163	80.5
Stuttering	129	13.9	75	14.5	204	14.1
Voice Disorder	8	.9	11	2.1	19	1.3
TOTAL	927	100.0	518	100.0	1445	100.0
Two Siblings						
Little or No Speech	1	.7	--	--	1	.5
Language Disorder	7	5.2	3	4.2	10	4.9
Articulation	112	83.0	56	78.9	168	81.5
Stuttering	12	8.9	12	16.9	24	11.6
Voice Disorder	3	2.2	--	--	3	1.5
TOTAL	135	100.0	71	100.0	206	100.0

TABLE D.17 (continued)

Relative and Type of Problem	Sex					
	Males		Females		Total	
	Number	%	Number	%	Number	%
Three or More Siblings						
Little or No Speech	2	6.1	--	--	2	3.5
Language Disorder	4	12.1	2	8.3	6	10.5
Articulation	23	69.7	18	75.0	41	71.9
Stuttering	4	12.1	4	16.7	8	14.1
Voice Disorder	--	--	--	--	--	--
TOTAL	33	100.0	24	100.0	57	100.0
Other Relatives						
Little or No Speech	1	1.2	--	--	1	.8
Language Disorder	6	7.3	4	10.5	10	8.3
Articulation	31	37.8	14	36.8	45	37.5
Stuttering	41	50.0	18	47.4	59	49.2
Voice Disorder	3	3.7	2	5.3	5	4.2
TOTAL	82	100.0	38	100.0	120	100.0

TABLE D.18

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by type of expressive speech disorder found among relatives for males and females. Only the primary disorder was counted if multiple disorders were present.

Relative and Type of Problem	Sex Males Number	%	Females Number	%	Total Number	%
Mother						
Little or No Speech	1	1.8	1	2.1	2	1.9
Language Disorder	3	5.4	3	6.4	6	5.8
Articulation	40	71.4	34	72.4	74	71.9
Stuttering	7	12.5	5	10.6	12	11.7
Voice Disorder	5	8.9	4	8.5	9	8.7
TOTAL	56	100.0	47	100.0	103	100.0
Father						
Little or No Speech	2	4.1	--	--	2	2.9
Language Disorder	2	4.1	4	19.0	6	8.5
Articulation	25	51.0	14	66.7	39	55.7
Stuttering	18	36.7	3	14.3	21	30.0
Voice Disorder	2	4.1	--	--	2	2.9
TOTAL	49	100.0	21	100.0	70	100.0
One Sibling Only						
Little or No Speech	6	.9	3	.7	9	.8
Language Disorder	6	.9	5	1.2	11	1.0
Articulation	634	90.4	396	94.7	1030	92.0
Stuttering	47	6.7	9	2.2	56	5.0
Voice Disorder	8	1.1	5	1.2	13	1.2
TOTAL	701	100.0	418	100.0	1119	100.0
Two Siblings						
Little or No Speech	2	1.7	--	--	2	1.1
Language Disorder	--	--	2	2.8	2	1.1
Articulation	113	94.1	63	88.7	176	92.1
Stuttering	5	4.2	5	7.1	10	5.2
Voice Disorder	--	--	1	1.4	1	.5
TOTAL	120	100.0	71	100.0	191	100.0

TABLE D.18 (continued)

Relative and Type of Problem	Sex Males Number	%	Females Number	%	Total Number	%
Three or More Siblings						
Little or No Speech	1	3.0	3	14.3	4	7.4
Language Disorder	1	3.0	1	4.8	2	3.7
Articulation	30	91.0	17	80.9	47	87.0
Stuttering	1	3.0	--	--	1	1.9
Voice Disorder	--	--	--	--	--	--
TOTAL	33	100.0	21	100.0	54	100.0
Other Relatives						
Little or No Speech	3	7.0	2	10.0	5	7.9
Language Disorder	2	4.6	1	5.0	3	4.8
Articulation	24	55.8	16	80.0	40	63.5
Stuttering	14	32.6	1	5.0	15	23.8
Voice Disorder	--	--	--	--	--	--
TOTAL	43	100.0	20	100.0	63	100.0

TABLE D.19

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by sex within types of expressive speech disorders found among relatives. Only the primary disorder was counted if multiple disorders were present.

Relative and	Sex					
	Males		Females		Total	
Type of Problem	Number	%	Number	%	Number	%
Mother						
Little or No Speech	2	40.0	3	60.0	5	100.0
Language Disorder	10	71.4	4	28.6	14	100.0
Articulation	55	61.1	35	38.9	90	100.0
Stuttering	32	69.6	14	30.4	46	100.0
Voice Disorder	3	75.0	1	25.0	4	100.0
TOTAL	102	64.2	57	35.8	159	100.0
Father						
Little or No Speech	2	40.0	3	60.0	5	100.0
Language Disorder	11	68.8	5	31.2	16	100.0
Articulation	42	71.2	17	28.8	59	100.0
Stuttering	60	74.1	21	25.9	81	100.0
Voice Disorder	3	100.0	--	--	3	100.0
TOTAL	118	72.0	46	28.0	164	100.0
One Sibling Only						
Little or No Speech	7	53.8	6	46.2	13	100.0
Language Disorder	27	58.7	19	41.3	46	100.0
Articulation	756	65.0	407	35.0	1163	100.0
Stuttering	129	63.2	75	36.8	204	100.0
Voice Disorder	8	42.1	11	57.9	19	100.0
TOTAL	927	64.2	518	35.8	1445	100.0
Two Siblings						
Little or No Speech	1	100.0	--	--	1	100.0
Language Disorder	7	70.0	3	30.0	10	100.0
Articulation	112	66.7	56	33.3	168	100.0
Stuttering	12	50.0	12	50.0	24	100.0
Voice Disorder	3	100.0	--	--	3	100.0
TOTAL	135	65.5	71	34.5	206	100.0

TABLE D.19 (continued)

Relative and Type of Problem	Sex					
	Males		Females		Total	
	Number	%	Number	%	Number	%
Three or More Siblings						
Little or No Speech	2	100.0	--	--	2	100.0
Language Disorder	4	66.7	2	33.3	6	100.0
Articulation	23	56.1	18	43.9	41	100.0
Stuttering	4	50.0	4	50.0	8	100.0
Voice Disorder	--	--	--	--	--	--
TOTAL	33	57.9	24	42.1	57	100.0
Other Relatives						
Little or No Speech	1	100.0	--	--	1	100.0
Language Disorder	6	60.0	4	40.0	10	100.0
Articulation	31	68.9	14	31.1	45	100.0
Stuttering	41	69.5	18	30.5	59	100.0
Voice Disorder	3	60.0	2	40.0	5	100.0
TOTAL	82	68.3	38	31.7	120	100.0

TABLE D.20

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by sex within types of expressive speech disorders found among relatives. Only the primary disorder was counted if multiple disorders were present.

Relative and Type of Problem	Sex Males Number	%	Females Number	%	Total Number	%
Mother						
Little or No Speech	1	50.0	1	50.0	2	100.0
Language Disorder	3	50.0	3	50.0	6	100.0
Articulation	40	54.0	34	46.0	74	100.0
Stuttering	7	58.3	5	41.7	12	100.0
Voice Disorder	5	55.6	4	44.4	9	100.0
TOTAL	56	54.4	47	45.6	103	100.0
Father						
Little or No Speech	2	100.0	--	--	2	100.0
Language Disorder	2	33.3	4	66.7	6	100.0
Articulation	25	64.1	14	35.9	39	100.0
Stuttering	18	85.7	3	14.3	21	100.0
Voice Disorder	2	100.0	--	--	2	100.0
TOTAL	49	70.0	21	30.0	70	100.0
One Sibling Only						
Little or No Speech	6	66.7	3	33.3	9	100.0
Language Disorder	6	54.5	5	45.5	11	100.0
Articulation	634	61.6	396	38.4	1030	100.0
Stuttering	47	83.9	9	16.1	56	100.0
Voice Disorder	8	61.5	5	38.5	13	100.0
TOTAL	701	62.6	418	37.4	1119	100.0
Two Siblings						
Little or No Speech	2	100.0	--	--	2	100.0
Language Disorder	--	--	2	100.0	2	100.0
Articulation	113	64.2	63	35.8	176	100.0
Stuttering	5	50.0	5	50.0	10	100.0
Voice Disorder	--	--	1	100.0	1	100.0
TOTAL	120	62.8	71	37.2	191	100.0

TABLE D.20 (continued)

Relative and Type of Problem	Sex					
	Males		Females		Total	
	Number	%	Number	%	Number	%
Three or More Siblings						
Little or No Speech	1	25.0	3	75.0	4	100.0
Language Disorder	1	50.0	1	50.0	2	100.0
Articulation	30	63.8	17	36.2	47	100.0
Stuttering	1	100.0	--	--	1	100.0
Voice Disorder	--	--	--	--	--	--
TOTAL	33	61.1	21	38.9	54	100.0
Other Relatives						
Little or No Speech	3	60.0	2	40.0	5	100.0
Language Disorder	2	66.7	1	33.3	3	100.0
Articulation	24	60.0	16	40.0	40	100.0
Stuttering	14	93.3	1	6.7	15	100.0
Voice Disorder	--	--	--	--	--	--
TOTAL	43	68.3	20	31.7	63	100.0

TABLE D.21

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by hand, foot, and eye usage for males and females.

	Sex					
	Males		Females		Total	
Usage	Number	%	Number	%	Number	%
Hand Usage						
Right	6011	84.6	2911	85.7	8922	85.0
Left	814	11.5	368	10.8	1182	11.3
Mixed	277	3.9	117	3.5	394	3.7
TOTAL	7102	100.0	3396	100.0	10498	100.0
Foot Usage						
Right	5531	78.3	2704	80.1	8235	78.8
Left	1018	14.4	472	13.9	1490	14.3
Mixed	515	7.3	203	6.0	718	6.9
TOTAL	7064	100.0	3379	100.0	10443	100.0
Eye Usage						
Right	4434	63.3	2116	63.3	6550	63.3
Left	1966	28.0	927	27.8	2893	28.0
Mixed	608	8.7	298	8.9	906	8.7
TOTAL	7008	100.0	3341	100.0	10349	100.0

TABLE D.22

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by hand, foot, and eye usage for males and females.

	Sex					
	Males		Females		Total	
Usage	Number	%	Number	%	Number	%
Hand Usage						
Right	4035	85.2	2152	88.0	6187	86.1
Left	544	11.5	228	9.3	772	10.8
Mixed	157	3.3	67	2.7	224	3.1
TOTAL	4736	100.0	2447	100.0	7183	100.0
Foot Usage						
Right	3645	78.6	1939	80.7	5584	79.4
Left	648	14.0	290	12.1	938	13.3
Mixed	341	7.4	173	7.2	514	7.3
TOTAL	4634	100.0	2402	100.0	7036	100.0
Eye Usage						
Right	2848	64.5	1501	65.9	4349	65.0
Left	1206	27.3	632	27.7	1838	27.4
Mixed	360	8.2	145	6.4	505	7.6
TOTAL	4414	100.0	2278	100.0	6692	100.0

TABLE D.23

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by sex for right, left, and mixed hand, foot, and eye usage.

	Sex					
	Males		Females		Total	
Usage	Number	%	Number	%	Number	%
Hand Usage						
Right	6011	67.4	2911	32.6	8922	100.0
Left	814	68.9	368	31.1	1182	100.0
Mixed	277	70.3	117	29.7	394	100.0
TOTAL	7102	67.7	3396	32.3	10498	100.0
Foot Usage						
Right	5531	67.2	2704	32.8	8235	100.0
Left	1018	68.3	472	31.7	1490	100.0
Mixed	515	71.7	203	28.3	718	100.0
TOTAL	7064	67.6	3379	32.4	10443	100.0
Eye Usage						
Right	4434	67.7	2116	32.3	6550	100.0
Left	1966	68.0	927	32.0	2893	100.0
Mixed	608	67.1	298	32.9	906	100.0
TOTAL	7008	67.7	3341	32.3	10349	100.0

TABLE D.22

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by hand, foot, and eye usage for males and females.

	Sex					
	Males		Females		Total	
Usage	Number	%	Number	%	Number	%
Hand Usage						
Right	4035	85.2	2152	88.0	6187	86.1
Left	544	11.5	228	9.3	772	10.8
Mixed	157	3.3	67	2.7	224	3.1
TOTAL	4736	100.0	2447	100.0	7183	100.0
Foot Usage						
Right	3645	78.6	1939	80.7	5584	79.4
Left	648	14.0	290	12.1	938	13.3
Mixed	341	7.4	173	7.2	514	7.3
TOTAL	4634	100.0	2402	100.0	7036	100.0
Eye Usage						
Right	2848	64.5	1501	65.9	4349	65.0
Left	1206	27.3	632	27.7	1838	27.4
Mixed	360	8.2	145	6.4	505	7.6
TOTAL	4414	100.0	2278	100.0	6692	100.0

TABLE D.23

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by sex for right, left, and mixed hand, foot, and eye usage.

	Sex					
	Males		Females		Total	
Usage	Number	%	Number	%	Number	%
Hand Usage						
Right	6011	67.4	2911	32.6	8922	100.0
Left	814	68.9	368	31.1	1182	100.0
Mixed	277	70.3	117	29.7	394	100.0
TOTAL	7102	67.7	3396	32.3	10498	100.0
Foot Usage						
Right	5531	67.2	2704	32.8	8235	100.0
Left	1018	68.3	472	31.7	1490	100.0
Mixed	515	71.7	203	28.3	718	100.0
TOTAL	7064	67.6	3379	32.4	10443	100.0
Eye Usage						
Right	4434	67.7	2116	32.3	6550	100.0
Left	1966	68.0	927	32.0	2893	100.0
Mixed	608	67.1	298	32.9	906	100.0
TOTAL	7008	67.7	3341	32.3	10349	100.0

TABLE D.24

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by sex for right, left, and mixed hand, foot, and eye usage.

	Sex					
	Males		Females		Total	
Usage	Number	%	Number	%	Number	%
Hand Usage						
Right	4035	65.2	2152	34.8	6187	100.0
Left	544	70.5	228	29.5	772	100.0
Mixed	157	70.1	67	29.9	224	100.0
TOTAL	4736	65.9	2447	34.1	7183	100.0
Foot Usage						
Right	3645	65.3	1939	34.7	5584	100.0
Left	648	69.1	290	30.9	938	100.0
Mixed	341	66.3	173	33.7	514	100.0
TOTAL	4634	65.8	2402	34.2	7036	100.0
Eye Usage						
Right	2848	65.5	1501	34.5	4349	100.0
Left	1206	65.6	632	34.4	1838	100.0
Mixed	360	71.3	145	28.7	505	100.0
TOTAL	4414	66.0	2278	34.0	6692	100.0

TABLE D.25

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by articulation in spontaneous speech, consistency of errors, dialect, and intelligibility for males and females.

	Sex					
	Males		Females		Total	
Characteristic	Number	%	Number	%	Number	%
Articulation						
Normal	5931	83.9	2812	83.2	8743	83.7
Deviant	1138	16.1	567	16.8	1705	16.3
TOTAL	7069	100.0	3379	100.0	10448	100.0
Consistency						
Consistent	4756	76.6	2339	77.1	7095	76.8
Inconsistent	1449	23.4	696	22.9	2145	23.2
TOTAL	6205	100.0	3035	100.0	9240	100.0
Dialect						
Normal	6262	87.7	2979	87.4	9241	87.6
Deviant	877	12.3	429	12.6	1306	12.4
Regional	367	(41.8)	189	(44.1)	556	(42.6)
Foreign	510	(58.2)	240	(55.9)	750	(57.4)
TOTAL	7139	100.0	3408	100.0	10547	100.0
Intelligibility						
Intelligible	5533	77.1	2738	79.8	8271	78.0
Partially Intelligible	1458	20.3	588	17.1	2046	19.3
Unintelligible	187	2.6	105	3.1	292	2.7
TOTAL	7178	100.0	3431	100.0	10609	100.0

TABLE D.26

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by articulation in spontaneous speech, consistency of errors, dialect, and intelligibility for males and females.

	Sex					
	Males		Females		Total	
Characteristic	Number	%	Number	%	Number	%
Articulation						
Normal	4142	84.7	2160	85.3	6302	84.9
Deviant	747	15.3	373	14.7	1120	15.1
TOTAL	4889	100.0	2533	100.0	7422	100.0
Consistency						
Consistent	3415	75.1	1801	76.8	5216	75.7
Inconsistent	1134	24.9	544	23.2	1678	24.3
TOTAL	4549	100.0	2345	100.0	6894	100.0
Dialect						
Normal	4689	92.4	2426	92.3	7115	92.4
Deviant	386	7.6	203	7.7	589	7.6
Regional	126	(32.6)	60	(29.6)	186	(31.6)
Foreign	260	(67.4)	143	(70.4)	403	(68.4)
TOTAL	5075	100.0	2629	100.0	7704	100.0
Intelligibility						
Intelligible	4107	80.2	2235	84.6	6342	81.7
Partially Intelligible	873	17.0	339	12.8	1212	15.6
Unintelligible	144	2.8	67	2.6	211	2.7
TOTAL	5124	100.0	2641	100.0	7765	100.0

TABLE D.27

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by sex within ratings of articulation in spontaneous speech, consistency of errors, dialect, and intelligibility.

	Sex					
	Males		Females		Total	
Characteristic	Number	%	Number	%	Number	%
Articulation						
Normal	5931	67.8	2812	32.2	8743	100.0
Deviant	1138	66.7	567	33.3	1705	100.0
TOTAL	7069	67.7	3379	32.3	10448	100.0
Consistency						
Consistent	4756	67.0	2339	33.0	7095	100.0
Inconsistent	1449	67.6	696	32.4	2145	100.0
TOTAL	6205	67.2	3035	32.8	9240	100.0
Dialect						
Normal	6262	67.8	2979	32.2	9241	100.0
Deviant	877	67.2	429	32.8	1306	100.0
Regional	367	66.0	189	34.0	556	100.0
Foreign	510	68.0	240	32.0	750	100.0
TOTAL	7139	67.7	3408	32.3	10547	100.0
Intelligibility						
Intelligible	5533	66.9	2738	33.1	8271	100.0
Partially Intelligible	1458	71.3	588	28.7	2046	100.0
Unintelligible	187	64.0	105	36.0	292	100.0
TOTAL	7178	67.7	3431	32.3	10609	100.0

TABLE D.28

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by sex within ratings of articulation in spontaneous speech, consistency of errors, dialect, and intelligibility.

	Sex					
	Males		Females		Total	
Characteristic	Number	%	Number	%	Number	%
Articulation						
Normal	4142	65.7	2160	34.3	6302	100.0
Deviant	747	66.7	373	33.3	1120	100.0
TOTAL	4889	65.9	2533	34.1	7422	100.0
Consistency						
Consistent	3415	65.5	1801	34.5	5216	100.0
Inconsistent	1134	67.6	544	32.4	1678	100.0
TOTAL	4549	66.0	2345	34.0	6894	100.0
Dialect						
Normal	4689	65.9	2426	34.1	7115	100.0
Deviant	386	65.5	203	34.5	589	100.0
Regional	126	67.7	60	32.3	186	100.0
Foreign	260	64.5	143	35.5	403	100.0
TOTAL	5075	65.9	2629	34.1	7704	100.0
Intelligibility						
Intelligible	4107	64.8	2235	35.2	6342	100.0
Partially Intelligible	873	72.0	339	28.0	1212	100.0
Unintelligible	144	68.2	67	31.8	211	100.0
TOTAL	5124	66.0	2641	34.0	7765	100.0

TABLE D.29

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by Voice quality disorders and pitch, loudness, and rate usage for males and females.

	Sex					
Voice Characteristic	Males		Females		Total	
	Number	%	Number	%	Number	%
Voice Quality						
Normal	6085	84.3	2975	86.3	9060	85.0
Deviant	1131	15.7	471	13.7	1602	15.0
Breathy	178	(15.7)	107	(22.7)	285	(17.8)
Harsh	78	(6.9)	21	(4.4)	99	(6.2)
Hoarse	272	(24.1)	62	(13.2)	334	(20.8)
Nasal	307	(27.1)	152	(32.3)	459	(28.7)
Denasal	111	(9.8)	38	(8.1)	149	(9.3)
Combination	108	(9.6)	53	(11.2)	161	(10.0)
Other	77	(6.8)	38	(8.1)	115	(7.2)
TOTAL	7216	100.0	3446	100.0	10662	100.0
Pitch						
Normal	6638	92.0	3130	90.8	9768	91.6
Deviant	581	8.0	317	9.2	898	8.4
TOTAL	7219	100.0	3447	100.0	10666	100.0
Loudness						
Normal	6357	88.1	2765	80.2	9122	85.5
Deviant	860	11.9	684	19.8	1544	14.5
TOTAL	7217	100.0	3449	100.0	10666	100.0
Rate						
Normal	5955	82.7	2971	86.5	8926	84.0
Deviant	1244	17.3	465	13.5	1709	16.0
TOTAL	7199	100.0	3436	100.0	10635	100.0

TABLE D.30

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by voice quality disorders and pitch, loudness, and rate usage for males and females.

Voice Characteristic	Sex Males Number	%	Females Number	%	Total Number	%
Voice Quality						
Normal	4350	84.7	2273	85.7	6623	85.1
Deviant	786	15.3	378	14.3	1164	14.9
Breathy	101	(12.9)	50	(13.2)	151	(13.0)
Harsh	71	(9.0)	22	(5.8)	93	(8.0)
Hoarse	200	(25.4)	68	(18.0)	268	(23.0)
Nasal	156	(19.8)	91	(24.1)	247	(21.2)
Denasal	83	(10.6)	58	(15.4)	141	(12.1)
Combination	121	(15.4)	61	(16.1)	182	(15.6)
Other	54	(6.9)	28	(7.4)	82	(7.1)
TOTAL	5136	100.0	2651	100.0	7787	100.0
Pitch						
Normal	4701	91.4	2418	91.4	7119	91.4
Deviant	444	8.6	228	8.6	672	8.6
TOTAL	5145	100.0	2646	100.0	7791	100.0
Loudness						
Normal	4582	88.9	2294	86.5	6876	88.0
Deviant	575	11.1	358	13.5	933	12.0
TOTAL	5157	100.0	2652	100.0	7809	100.0
Rate						
Normal	4432	86.3	2397	90.7	6829	88.0
Deviant	704	13.7	245	9.3	949	12.0
TOTAL	5136	100.0	2642	100.0	7778	100.0

TABLE D.31

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by sex within categories of voice quality disorders and pitch, loudness, and rate usage.

	Sex					
Voice	Males		Females		Total	
Characteristic	Number	%	Number	%	Number	%
Voice Quality						
Normal	6085	67.2	2975	32.8	9060	100.0
Deviant	1131	70.6	471	29.4	1602	100.0
Breathy	178	62.5	107	37.5	285	100.0
Harsh	78	78.8	21	21.2	99	100.0
Hoarse	272	81.4	62	18.6	334	100.0
Nasal	307	66.9	152	33.1	459	100.0
Denasal	111	74.5	38	25.5	149	100.0
Combination	108	67.1	53	32.9	161	100.0
Other	77	67.0	38	33.0	115	100.0
TOTAL	7216	67.7	3446	32.3	10662	100.0
Pitch						
Normal	6638	68.0	3130	32.0	9768	100.0
Deviant	581	64.7	317	35.3	898	100.0
TOTAL	7219	67.7	3447	32.3	10666	100.0
Loudness						
Normal	6357	69.7	2765	30.3	9122	100.0
Deviant	860	55.7	684	44.3	1544	100.0
TOTAL	7217	67.7	3449	32.3	10666	100.0
Rate						
Normal	5955	66.7	2971	33.3	8926	100.0
Deviant	1244	72.8	465	27.2	1709	100.0
TOTAL	7199	67.7	3436	32.3	10635	100.0

TABLE D.32

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by sex within categories of voice quality disorders and pitch, loudness, and rate usage.

Voice Characteristic	Sex					
	Males		Females		Total	
	Number	%	Number	%	Number	%
Voice Quality						
Normal	4350	65.7	2273	34.3	6623	100.0
Deviant	786	67.5	378	32.5	1164	100.0
Breathy	101	66.9	50	33.1	151	100.0
Harsh	71	76.3	22	23.7	93	100.0
Hoarse	200	74.6	68	25.4	268	100.0
Nasal	156	63.2	91	36.8	247	100.0
Denasal	83	58.9	58	41.1	141	100.0
Combination	121	66.5	61	33.5	182	100.0
Other	54	65.9	28	34.1	82	100.0
TOTAL	5136	66.0	2651	34.0	7787	100.0
Pitch						
Normal	4701	66.0	2418	34.0	7119	100.0
Deviant	444	66.1	228	33.9	672	100.0
TOTAL	5145	66.0	2646	34.0	7791	100.0
Loudness						
Normal	4582	66.6	2294	33.4	6876	100.0
Deviant	575	61.6	358	38.4	933	100.0
TOTAL	5157	66.0	2652	34.0	7809	100.0
Rate						
Normal	4432	64.9	2397	35.1	6829	100.0
Deviant	704	74.2	245	25.8	949	100.0
TOTAL	5136	66.0	2642	34.0	7778	100.0

TABLE D.33

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by acceptability of length of responses, vocabulary, and grammar for males and females.

	Sex					
Language Characteristic	Males Number	%	Females Number	%	Total Number	%
Response Length						
Acceptable	5904	81.8	2809	81.7	8713	81.8
Unacceptable	1311	18.2	631	18.3	1942	18.2
TOTAL	7215	100.0	3440	100.0	10655	100.0
Vocabulary						
Acceptable	6006	83.6	2869	83.7	8875	83.6
Limited	1182	16.4	560	16.3	1742	16.4
TOTAL	7188	100.0	3429	100.0	10617	100.0
Grammar						
Acceptable	5797	81.5	2848	84.3	8645	82.4
Poor	1316	18.5	530	15.7	1846	17.6
TOTAL	7113	100.0	3378	100.0	10491	100.0

TABLE D.34

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by acceptability of length of responses, vocabulary, and grammar for males and females.

Language Characteristic	Sex					
	Males		Females		Total	
	Number	%	Number	%	Number	%
Response Length						
Acceptable	4276	83.9	2234	84.9	6510	84.3
Unacceptable	819	16.1	398	15.1	1217	15.7
TOTAL	5095	100.0	2632	100.0	7727	100.0
Vocabulary						
Acceptable	4387	86.9	2298	88.3	6685	87.4
Limited	659	13.1	304	11.7	963	12.6
TOTAL	5046	100.0	2602	100.0	7648	100.0
Grammar						
Acceptable	4023	81.9	2145	84.6	6168	82.8
Poor	889	18.1	390	15.4	1279	17.2
TOTAL	4912	100.0	2535	100.0	7447	100.0

TABLE D.35

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by sex within classifications of acceptability of length of responses, vocabulary, and grammar.

Language Characteristic	Sex Males Number	%	Females Number	%	Total Number	%
Response Length						
Acceptable	5904	67.8	2809	32.2	8713	100.0
Unacceptable	1311	67.5	631	32.5	1942	100.0
TOTAL	7215	67.7	3440	32.3	10655	100.0
Vocabulary						
Acceptable	6006	67.7	2869	32.3	8875	100.0
Limited	1182	67.9	560	32.1	1742	100.0
TOTAL	7188	67.7	3429	32.3	10617	100.0
Grammar						
Acceptable	5797	67.1	2848	32.9	8645	100.0
Poor	1316	71.3	530	28.7	1846	100.0
TOTAL	7113	67.8	3378	32.2	10491	100.0

TABLE D.36

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by sex within classifications of acceptability of length of responses, vocabulary, and grammar.

Language Characteristic	Sex Males Number	%	 Females Number	%	 Total Number	%
Response Length						
Acceptable	4276	65.7	2234	34.3	6510	100.0
Unacceptable	819	67.3	398	32.7	1217	100.0
TOTAL	5095	65.9	2632	34.1	7727	100.0
Vocabulary						
Acceptable	4387	65.6	2298	34.4	6685	100.0
Limited	659	68.4	304	31.6	963	100.0
TOTAL	5046	66.0	2602	34.0	7648	100.0
Grammar						
Acceptable	4023	65.2	2145	34.8	6168	100.0
Poor	889	69.5	390	30.5	1279	100.0
TOTAL	4912	66.0	2535	34.0	7447	100.0

SECTION E

DISCUSSION

Age

The variables examined in relation to age include socioeconomic status, case identification, reading achievement, articulation test scores, and voice quality disorders. The relation of age to the sex distribution was discussed in Section D.

The large number of elementary schools in the county sample resulted in a rather marked age difference between the city and county caseloads; therefore, the two caseloads are discussed separately. Age was grouped by one-year intervals. Thus, the five-year group included pupils five to six years old; the six-year group included those who were six to seven, and so forth. The age interval needs to be kept in mind in order that the age group referred to is not taken to be younger than was actually the case.

Socioeconomic Background

No tendency for differential selection of pupils by age and socioeconomic background was observed among the six- to 15-year age groups in either the city or county caseloads. There was a tendency, however, for the proportion of pupils among the lowest age groups to be selected from the upper-middle socioeconomic group. Over-all, 29% of the pupils were from families in the upper-middle income group. In the city caseload, 10 of the 23 three- and four-year-olds and eight of the 20 three- and four-year-olds in the county caseload came from the upper-middle socioeconomic group. When these pupils were combined with the five-year-olds, where the same tendency was evident, 40% of the pupils in these three age groups had upper-middle socioeconomic backgrounds, which is high relative to the proportion of other pupils with the same background. The remaining three- and four-year-olds were from the two lowest socioeconomic groups, which included 36% of all of the pupils in the combined caseload.

These results suggest that in case selection among the youngest groups of children, preference was given to children from backgrounds generally expected to provide the stimulation and learning experiences necessary for good speech development rather than children from backgrounds usually regarded as less salubrious for speech development. It might be reasoned that the concentration of the youngest group in the upper-middle socioeconomic group was less likely a matter of case selection per se, but rather, due to the greater sensitivity to speech disorders of parents from the higher socioeconomic levels and greater initiative on their part in seeking service for children with disorders. Nonetheless, as discussed later, very few pupils in the caseload were referred by parents--about 4%.

In contrast, the oldest group of pupils tended to come from the lowest socioeconomic group. With all pupils 15 years and over included, a considerably higher proportion came from the lowest socioeconomic group than from other socioeconomic levels. Over-all, 15.5% of the combined caseload came from the low socioeconomic group compared with 25.3% of the older pupils. A lower percentage of the older pupils had upper-middle class backgrounds (23.2% vs. 28.9%), and a slightly lower percentage had middle socioeconomic backgrounds (19.1% vs. 23.0%) than the group as a whole. Percentages of older pupils from the lower-middle and upper socioeconomic groups were the same as for the entire caseload--19.8% vs. 20.0% lower-middle for the older pupils and the entire caseload, respectively, and 12.6% upper for both the older pupils and the entire caseload.

When the older pupils from the two lowest socioeconomic groups were combined, 45% or nearly half were from the two lowest groups compared with 35.5% of the caseload as a whole. This result suggests that pupils in the low socioeconomic groups tend to have more difficulty in overcoming speech disorders than pupils in the other socioeconomic groups, particularly those in the upper socioeconomic groups.

Case Identification

Teacher referrals accounted for the large majority of pupils in both the city and county caseloads identified in this way. About 4% were referred by parents, 2.6% were self-referrals; and administrators referred 1%. Health and guidance personnel referred 6.7%, though a much higher proportion of the pupils in the city schools than in the county schools came from this resource (8.7% and 2.8%, respectively). Other agencies referred 13.2%.

Teacher referrals increased from about 60% of the four-year-olds to about 85% of the six-year-olds, and decreased gradually with age up to a point where a sharp decrease occurred followed by another gradual decrease. In the city caseload, the percentage of pupils referred by teacher dropped sharply from 71.2% of the 11-year-olds to 53.5% of the 12-year-olds. In the county caseload, the marked drop occurred between the 14- and 15-year groups; 65.1% of the 14-year-olds, but only 44.7% of the 15-year-olds were referred by teachers.

Relatively few of the pupils were referred by parents--about 4%. The proportions of pupils referred by parents decreased with age from about 11% of the five-year-olds to 6% of the six-year-olds followed by a variable decrease to 1.6% of the 13-year-olds. In the county caseload, the proportion of referrals by parents jumped to a high of 15.8% of the 15-year-olds; however, there were only 38 pupils in this age group. Self-referrals increased gradually with age, while referrals by administrators varied around 1% throughout the age range.

Referrals by health and guidance personnel remained fairly constant for the younger pupils, though there was a slight increase with age, particularly in the county caseload. While only 6% of the 11-year-olds in the city caseload were referred by health and guidance personnel, 18.9% of the 12-year-olds were referred by these resources; the percentages increased with age to the 17-year group, but became variable thereafter. In the county caseload, the marked increase in referrals from health and guidance personnel occurred for the 15-year group and remained relatively high though variable for the remainder of the older group; however, the total number of older pupils was very small.

Referrals from other agencies generally increased steadily with age to a peak of 26.6% through the 18-year group in the city caseload. In the county caseload, between 11% and 13% of the pupils from eight to 13 years were referred by other agencies, but the proportion dropped in the 13- to 16-year group and then increased to approximately 30% for the pupils between 16 and 19 years old.

Of the 29 four-year-olds in the combined caseload, most were referred by teachers; only five were referred by parents. The one three-year-old was referred by health personnel. There were 26 19- and 20-year-olds. Twelve were referred by teacher; 10 were referred by health and guidance personnel and other agencies; two were self-referrals; and two were referred by administrators.

Reading Achievement

Reading achievement ratings were not reported for all of the pupils. For the group for whom information was available, achievement was somewhat better among the pupils in the county caseload than in the city caseload. In the city caseload, 48.4% of the pupils had below average reading achievement compared with 41.5% in the county caseload. About equal proportions were average (32.8% vs. 33.7%, respectively), while 18.8% in the city and 24.8% in the county had above average reading achievement.

No pattern of difference in reading achievement between age levels obtained when the caseloads were combined, except for the pupils 18 years and over. Of this group of 115 pupils, 53.9% had below average reading achievement, 39.1% had average achievement, while only 7.0% had above average reading achievement.

In both caseloads, a slightly lower proportion of the pupils below nine years had above average reading achievement than in the older group to 18 years. However the difference was small, and there was no tendency for the remainder to be concentrated in the below average group.

Means for the 50-Item Test

Means for the 50 items included in the Templin-Darley test were low in both caseloads. In the city caseload, the means ranged from 20.4

for the five-year-olds to 42.1 for the 18-year olds. The mean for the two 20-year-old pupils was 47.0. The range of means in the county caseload was from 28.5 for the five-year-olds to 42.0 for the 18-year-olds.

In discussing articulation scores for the various ages, the Templin-Darley (13, p. 19) cut-off scores are sometimes used for comparisons. It should be noted that apparently these cut-off scores have not been independently validated. They often seem unrealistically low when compared with the intelligibility of the spontaneous speech of the children whose scores are somewhat above the cut-off. Nonetheless, they are, perhaps, the best quantitative measure available today for gaining some indication of the articulation disability.

In the city caseload, only the mean for the four-year-olds was near the cut-off score specified by Templin and Darley. There were 18 four-year-olds; their mean score was 26.4 correct; the median was 20.5. The cut-off score for 4.5-year-olds--the midpoint of our age interval--is 26. The mean for this age in the Templin sample was 35.8.

Beginning with the five-year group, means were approximately 10 points below cut-off scores for comparable ages. Excluding the two pupils in the 20-year group, the means were below the cut-off score for eight-year-olds (the highest cut-off score) throughout the entire age range. Means for the nine-year-olds on ranged from 35.5 to 42.1 for the 18-year-olds. The mean for the 18 pupils in the 19-year group was 38.7 which is quite low.

Means and medians were very close. The largest difference was 3.7, which obtained for the 18-year group, where the mean was 42.1, and the median was 45.8. On the average, the difference between means and medians was .62. It is reasonable to conclude, therefore, that the means were not depressed by a few extremely low scores. Variances, however, were quite large, though Qs were small.

Means for the different age groups in the county caseload were considerably higher among the younger group than for the city. Even so, they all fell below the specified cut-off scores at comparable age levels, except for 16 four-year-olds for whom the mean score was 32.7, which is above the cut-off score for five-year-olds.

Whereas, in the city caseload, means for the nine-year group on generally increased gradually, means at each age level for pupils from nine to 17 years in the county caseload were all 39 and ranged from 39.1 to 39.9. The mean for the 35 pupils over 16 was 35.7. The difference between means and medians for the group as a whole was less than one in the county caseload also. Variances and Qs for this sample were similar to those for the city.

Phonetic Inventory Scores

Means for the phonetic inventory made up of 18 vowels and diphthongs and 25 consonants had a much more restricted range than means for the 50-item test. The means ranged from 32.8 (five-year-olds) to 39.3 (11-year-olds) in the city caseload and from 33.2 (19-year-olds) to 39.5 (10-year-olds) in the county caseload. While the difference between the highest and lowest means for the 50-item test was 26.6 (or 21.7 if the two 19-year-olds are excluded), the difference between highest and lowest means for the phonetic inventory was 6.5 for the city caseload. For the county caseload, the difference between highest and lowest means on the 50-item test was 13.5, and 6.5 on the phonetic inventory.

Phonetic inventory scores for the city caseload were quite homogeneous from eight years on, except for the 19-year-olds, as the means ranged from 38.3 to 39.3. The mean for the 18 pupils in the 19-year group was 36.3, which is comparable to the mean of 36.9 for seven-year-olds; however, on the 50-item test, the mean for this group was nearer that for 12-year-olds. The two pupils in the 20-year group, whose mean score on the 50-item test was 47.0, had a mean of 39.0 on the phonetic inventory, which is comparable to the mean of 39.3 for the 11-year group and the mean of 39.1 for the 12-, 13-, and 14-year-olds.

In the county sample, phonetic inventory scores were homogeneous from seven to 16 years. The means ranged from 38.3 to 39.4. The mean for the 55 pupils from 16 years on was 33.8, which is approximately the same as the mean of 33.9 for the 16 four-year-olds and the mean of 34.3 for the five-year-olds; however, on the 50-item test, the mean for the pupils 16 and over was 37.2, which was closest to that for the eight-year group. The 18-year-olds (N = 9) had the highest mean on the 50-item test, yet their mean phonetic inventory score was 36.6. There were 10 age groups having higher means, including the six-year-olds.

The 50-item and phonetic inventory scores place some age groups in different relations to each other. The 50-item test has a tendency to give older pupils the appearance of better articulation skill than is indicated by the phonetic inventory.

Voice Quality Disorders

The number of pupils three and four years old as well as 19 and 20 years old who had voice quality disorders was so small in the city caseload that proportions are misleading. Therefore, these pupils have been disregarded in the comparisons among age groups.

Relatively large proportions of the older pupils 15 to 19 years old had breathy voice quality. While 17.8% of the entire group had breathy voices, 22.2% to 26.5% of these age groups had breathy voice quality.

Compared with other age groups, a higher proportion of the 14-year-olds had harsh voice quality. A relatively high proportion of the five-year-olds also had harsh voices, though the total number of pupils was small.

Hoarse voice was more prevalent than harshness. Only 6.2% had harsh voice quality, while 20.8% had hoarse voice quality. Higher proportions of the younger groups had hoarse voices than the group from 11 years on. From 23.6% to 27.2% of the pupils five to 11 years old were hoarse, but only 9.2% to 19.7% of the pupils from 11 to 18 years were hoarse.

The reverse was true of nasality, the most prevalent of the voice quality disorders in the city caseload. Nasality was present in 28.7% of the entire group. From 31.8% to 47.1% of the pupils 12 years and over were nasal, while the percentages of pupils under 12 ranged from 24.3% to 28.4%.

Denasality was present in 9.4% of the entire group and was more concentrated in the group from eight to 12 years old, except that only the average proportion of the 10-year-olds were denasal. A higher proportion of the 11-year-olds were denasal than in other age groups, followed by a high proportion of the eight-year-olds. A fairly high proportion of the nine-year-olds also had denasality in comparison with other age groups.

Ten per cent of the pupils produced combinations of voice quality disorders; variability among the age groups was small. Only 7% were classified as having "other" kinds of voice quality disorders.

In the county sample, there were so few pupils in the three- and four-year groups and also in the groups 14 years and over that they have been disregarded in the comparisons among age groups.

About 13% of the entire group had breathy voice quality--a somewhat smaller proportion than the 17.8% in the city caseload. A higher proportion of pupils in the 11-year group had breathy voices. The proportion of five-year-olds was high, also.

The percentage of the entire group having harsh voices was about the same as for the city caseload (7.7% vs. 6.2%, respectively). Higher proportions of the five- and ten-year-olds had harsh voice quality than were found in the other age groups. The percentages of five-year-olds with harsh voices were similar in the two caseloads (10.3% and 12.5%, respectively).

In contrast with the city caseload, hoarseness was the most prevalent of the voice quality disorders; 23.0% of the entire group had hoarse voice quality as opposed to 20.8% in the city caseload. Relatively high proportions of the nine- and ten-year-olds had hoarse voice quality, though nearly a fourth of the pupils in the age groups from six to nine years had hoarse voices also. These proportions are similar to those found in the city caseload except there was a comparatively smaller percentage of hoarseness among the five-year-olds in the county caseload.

In the county caseload, 21.0% of the entire group had nasal voice quality compared with 28.7% in the city caseload. The proportion of pupils in the 12-year group with nasal voices was much larger than for other age groups. A high proportion of the pupils in the 13-year group had nasal voices, also. However, the total number of pupils in both of these age groups was small.

The findings on hoarse and nasal voice quality in the two samples are in general agreement in showing that hoarse voice quality is a greater problem among younger pupils, while nasality constitutes a greater problem among older pupils.

A high proportion of 12-year-olds relative to other age groups had denasal voices, though proportions of the six- and eight-year-olds who were denasal were high also. A slightly higher percentage of the pupils in the county caseload had denasality than in the city caseload (12.3% and 9.4%, respectively). Though the distribution was somewhat different in the two caseloads, interestingly enough, the percentage of eight-year-olds having denasality was 13.8% in the county and 13.2% in the city caseload.

About 16% of the group had combinations of voice quality disorders--a somewhat higher percentage than the 10% for the city caseload. Variability among age groups was small, except that a little over one-fourth of the five-year-olds had combinations of voice disorders.

Considering the large number of descriptive terms used for voice quality deviations and the confusion that often exists about them, these percentages are quite small. It might be noted, also, that the data show evidence of a rather clear distinction between harshness and hoarseness. In both caseloads, the proportion of hoarseness was about three times greater than the proportion of harshness, and distribution by age groups varied for the two disorders.

SECTION E

ORGANIZATION OF TABLES

Age

TABLE E.1

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by low, lower middle, middle, upper middle, and high socioeconomic status within each age group.

	Socioeconomic Status											
	Low		Lower Middle		Middle		Upper Middle		High		Total	
Age in Years	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
3	--	--	1	50.0	--	--	1	50.0	--	--	2	100.0
4	1	4.8	6	28.6	4	19.0	9	42.8	1	4.8	21	100.0
5	29	14.9	39	20.0	39	20.0	54	27.7	34	17.4	195	100.0
6	184	18.8	209	21.3	240	24.5	221	22.5	126	12.9	980	100.0
7	346	22.5	289	18.8	332	21.5	366	23.8	206	13.4	1539	100.0
8	395	25.3	294	18.8	306	19.6	351	22.5	216	13.8	1562	100.0
9	299	22.7	227	17.2	216	16.4	348	26.4	228	17.3	1318	100.0
10	242	25.2	197	20.5	167	17.4	216	22.5	139	14.4	961	100.0
11	191	27.4	142	20.4	104	14.9	150	21.6	109	15.7	696	100.0
12	121	25.6	97	20.5	75	15.8	102	21.6	78	16.5	473	100.0
13	140	24.0	123	21.1	111	19.0	116	19.9	93	16.0	583	100.0
14	144	28.2	85	16.6	89	17.5	103	20.2	89	17.5	510	100.0
15	94	27.7	64	18.8	64	18.8	78	22.9	40	11.8	340	100.0
16	71	22.8	56	17.9	67	21.5	67	21.5	51	16.3	312	100.0
17	75	30.5	48	19.5	52	21.1	49	19.9	22	9.0	246	100.0
18	37	29.6	26	20.8	20	16.0	27	21.6	15	12.0	125	100.0
19	6	30.0	6	30.0	--	--	5	25.0	3	15.0	20	100.0
20	1	33.3	2	66.7	--	--	--	--	--	--	3	100.0
TOTAL	2376	24.0	1911	19.3	1886	19.1	2263	22.9	1450	14.7	9886	100.0

TABLE E.2

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by low, lower middle, middle, upper middle, and high socioeconomic status within each age group.

	Socioeconomic Status											
	Low		Lower Middle		Middle		Upper Middle		High		Total	
Age in Years	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
3	--	--	--	--	--	--	1	100.0	--	--	1	100.0
4	2	10.6	10	52.6	--	--	7	36.8	--	--	19	100.0
5	15	3.5	85	19.8	103	24.0	198	46.2	28	6.5	429	100.0
6	42	3.5	253	21.1	371	31.0	439	36.6	93	7.8	1198	100.0
7	70	4.5	360	23.1	444	28.5	552	35.5	131	8.4	1557	100.0
8	54	4.0	273	20.2	357	26.4	480	35.6	186	13.8	1350	100.0
9	37	3.6	209	20.4	280	27.3	390	38.1	108	10.6	1024	100.0
10	23	3.3	135	19.5	210	30.4	257	37.2	66	9.6	691	100.0
11	19	4.4	77	18.0	131	30.5	162	37.8	40	9.3	429	100.0
12	15	5.8	41	15.7	76	29.1	106	40.6	23	8.8	261	100.0
13	6	4.5	25	18.6	47	35.1	43	32.1	13	9.7	134	100.0
14	5	5.4	23	25.0	26	28.3	31	33.7	7	7.6	92	100.0
15	1	2.4	10	24.4	9	22.0	15	36.6	6	14.6	41	100.0
16	2	9.1	3	13.6	3	13.6	10	45.5	4	18.2	22	100.0
17	2	8.0	7	28.0	3	12.0	10	40.0	3	12.0	25	100.0
18	1	10.0	2	20.0	2	20.0	4	40.0	1	10.0	10	100.0
19	1	12.5	4	50.0	--	--	3	37.5	--	--	8	100.0
20	--	--	--	--	--	--	--	--	--	--	--	--
TOTAL	295	4.0	1517	20.8	2062	28.3	2708	37.2	709	9.7	7291	100.0

TABLE E.3

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by age within low, lower middle, middle, upper middle, and high socioeconomic groups.

	Socioeconomic Status											
	Low		Lower Middle		Middle		Upper Middle		High		Total	
Age in Years	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
3	--	--	1	.1	--	--	1	--	--	--	2	--
4	1	--	6	.3	4	.2	9	.4	1	.1	21	.2
5	29	1.2	39	2.1	39	2.1	54	2.4	34	2.4	195	2.0
6	184	7.7	209	10.9	240	12.7	221	9.8	126	8.7	980	9.9
7	346	14.6	289	15.1	332	17.6	366	16.2	206	14.2	1539	15.6
8	395	16.6	294	15.4	306	16.2	351	15.5	216	14.9	1562	15.8
9	299	12.6	227	11.9	216	11.4	348	15.4	228	15.7	1318	13.3
10	242	10.2	197	10.3	167	8.9	216	9.5	139	9.6	961	9.7
11	191	8.0	142	7.4	104	5.5	150	6.6	109	7.5	696	7.0
12	121	5.1	97	5.1	75	4.0	102	4.5	78	5.4	473	4.8
13	140	5.9	123	6.4	111	5.9	116	5.1	93	6.4	583	5.9
14	144	6.1	85	4.4	89	4.7	103	4.6	89	6.1	510	5.2
15	94	4.0	64	3.4	64	3.4	78	3.4	40	2.8	340	3.4
16	71	3.0	56	2.9	67	3.5	67	3.0	51	3.5	312	3.2
17	75	3.2	48	2.5	52	2.8	49	2.2	22	1.5	246	2.5
18	37	1.6	26	1.4	20	1.1	27	1.2	15	1.0	125	1.3
19	6	.2	6	.3	--	--	5	.2	3	.2	20	.2
20	1	--	2	.1	--	--	--	--	--	--	3	--
TOTAL	2376	100.0	1911	100.0	1886	100.0	2263	100.0	1450	100.0	9886	100.0

TABLE E.4

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by age within low, lower middle, middle, upper middle, and high socioeconomic groups.

	Socioeconomic Status											
	Low		Lower Middle		Middle		Upper Middle		High		Total	
Age in Years	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
3	--	--	--	--	--	--	1	--	--	--	1	--
4	2	.7	10	.7	--	--	7	.3	--	--	19	.3
5	15	5.1	85	5.6	103	5.0	198	7.3	28	3.9	429	5.9
6	42	14.2	253	16.6	371	18.0	439	16.2	93	13.1	1198	16.4
7	70	23.7	360	23.7	444	21.5	552	20.4	131	18.5	1557	21.4
8	54	18.3	273	18.0	357	17.3	480	17.7	186	26.2	1350	18.5
9	37	12.5	209	13.8	280	13.6	390	14.4	108	15.2	1024	14.0
10	23	7.8	135	8.9	210	10.2	257	9.5	66	9.3	691	9.5
11	19	6.5	77	5.1	131	6.4	162	6.0	40	5.7	429	5.9
12	15	5.1	41	2.7	76	3.7	106	3.9	23	3.3	261	3.6
13	6	2.0	25	1.6	47	2.3	43	1.6	13	1.8	134	1.8
14	5	1.7	23	1.5	26	1.3	31	1.1	7	1.0	92	1.3
15	1	.3	10	.7	9	.4	15	.6	6	.9	41	.6
16	2	.7	3	.2	3	.1	10	.4	4	.6	22	.3
17	2	.7	7	.5	3	.1	10	.4	3	.4	25	.3
18	1	.3	2	.1	2	.1	4	.1	1	.1	10	.1
19	1	.3	4	.3	--	--	3	.1	--	--	8	.1
20	--	--	--	--	--	--	--	--	--	--	--	--
TOTAL	295	100.0	1517	100.0	2062	100.0	2708	100.0	709	100.0	7291	100.0

TABLE E.5

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by source of referral--teachers, parents, self, administrators, health or guidance personnel, and other agencies--within each age group. (This table is completed on the succeeding page.)

	Source of Referral							
	Teacher		Parents		Self		Administrator	
Age in Years	Number	%	Number	%	Number	%	Number	%
3	--	--	--	--	--	--	--	--
4	10	62.4	1	6.3	1	6.3	1	6.3
5	144	78.7	23	12.6	1	.6	3	1.6
6	792	84.7	68	7.3	5	.5	9	1.0
7	1189	82.9	63	4.4	12	.8	10	.7
8	1198	79.5	59	3.9	11	.7	10	.7
9	988	76.2	40	3.1	13	1.0	24	1.8
10	743	75.9	27	2.8	15	1.5	10	1.0
11	486	71.2	21	3.1	15	2.2	8	1.2
12	258	53.5	16	3.3	11	2.3	7	1.5
13	245	44.4	8	1.4	15	2.7	7	1.3
14	233	45.4	9	1.8	19	3.7	5	1.0
15	138	42.6	1	.3	14	4.3	1	.3
16	102	37.1	3	1.1	14	5.1	4	1.5
17	81	36.2	1	.4	11	4.9	2	.9
18	48	45.7	1	1.0	9	8.6	2	1.9
19	10	52.6	--	--	2	10.5	--	--
20	1	33.3	--	--	--	--	--	--
TOTAL	6666	69.9	341	3.6	168	1.8	103	1.1

TABLE E.5 (continued)

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by source of referral--teachers, parents, self, administrators, health or guidance personnel, and other agencies--within each age group.

	Source of Referral					
	Health or Guidance Personnel		Other Agencies		Total	
Age in Years	Number	%	Number	%	Number	%
3	1	100.0	--	--	1	100.0
4	2	12.4	1	6.3	16	100.0
5	9	4.9	3	1.6	183	100.0
6	33	3.5	28	3.0	935	100.0
7	56	3.9	105	7.3	1435	100.0
8	49	3.3	179	11.9	1506	100.0
9	47	3.6	185	14.3	1297	100.0
10	38	3.9	146	14.9	979	100.0
11	41	6.0	111	16.3	682	100.0
12	91	18.9	99	20.5	482	100.0
13	130	23.6	147	26.6	552	100.0
14	116	22.6	131	25.5	513	100.0
15	73	22.5	97	30.0	324	100.0
16	76	27.6	76	27.6	275	100.0
17	53	23.7	76	33.9	224	100.0
18	12	11.4	33	31.4	105	100.0
19	4	21.1	3	15.8	19	100.0
20	2	66.7	--	--	3	100.0
TOTAL	833	8.7	1420	14.9	9531	100.0

TABLE E.6

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by source of referral--teachers, parents, self, administrators, health or guidance personnel, and other agencies--within each age group. (This table is completed on the succeeding page.)

	Source of Referral							
	Teacher		Parents		Self		Administrator	
Age in Years	Number	%	Number	%	Number	%	Number	%
3	--	--	--	--	--	--	--	--
4	8	61.5	4	30.8	--	--	--	--
5	199	84.7	25	10.6	1	.4	2	.9
6	527	86.0	27	4.4	17	2.8	--	--
7	766	83.3	36	3.9	24	2.6	8	.9
8	702	77.5	37	4.1	43	4.7	4	.4
9	572	74.1	27	3.5	51	6.6	5	.6
10	433	77.0	16	2.9	22	3.9	6	1.1
11	263	74.1	19	5.3	15	4.2	6	1.7
12	154	72.6	11	5.2	10	4.7	4	1.9
13	83	65.4	3	2.4	15	11.8	4	3.1
14	56	65.1	4	4.7	7	8.1	4	4.7
15	17	44.7	6	15.8	1	2.6	3	7.9
16	2	14.3	1	7.1	--	--	--	--
17	7	38.9	--	--	--	--	2	11.1
18	2	25.0	--	--	--	--	1	12.5
19	1	25.0	--	--	--	--	2	50.0
20	--	--	--	--	--	--	--	--
TOTAL	3792	77.7	216	4.4	206	4.2	51	1.0

TABLE E.6 (continued)

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by source of referral--teachers, parents, self, administrators, health or guidance personnel, and other agencies--within each age group.

	Source of Referral					
	Health or Guidance Personnel		Other Agencies		Total	
Age in Years	Number	%	Number	%	Number	%
3	1	100.0	--	--	1	100.0
4	1	7.7	--	--	13	100.0
5	5	2.1	3	1.3	235	100.0
6	7	1.1	35	5.7	613	100.0
7	11	1.2	74	8.1	919	100.0
8	17	1.9	103	11.4	906	100.0
9	17	2.2	100	13.0	772	100.0
10	14	2.5	71	12.6	562	100.0
11	12	3.4	40	11.3	355	100.0
12	9	4.3	24	11.3	212	100.0
13	10	7.9	12	9.4	127	100.0
14	8	9.3	7	8.1	86	100.0
15	9	23.7	2	5.3	38	100.0
16	7	50.0	4	28.6	14	100.0
17	3	16.7	6	33.3	18	100.0
18	3	37.5	2	25.0	8	100.0
19	1	25.0	--	--	4	100.0
20	--	--	--	--	--	--
TOTAL	135	2.8	483	9.9	4883	100.0

TABLE E.7

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by age within groups referred by teachers, parents, self, administrators, health or guidance personnel, and other agencies. (This table is completed on the succeeding page.)

	Source of Referral							
	Teacher		Parents		Self		Administrator	
Age in Years	Number	%	Number	%	Number	%	Number	%
3	--	--	--	--	--	--	--	--
4	10	.2	1	.3	1	.6	1	1.0
5	144	2.1	23	6.8	1	.6	3	2.9
6	792	11.9	68	19.9	5	3.0	9	8.7
7	1189	17.8	63	18.5	12	7.1	10	9.7
8	1198	18.0	59	17.3	11	6.6	10	9.7
9	988	14.8	40	11.7	13	7.7	24	23.3
10	743	11.1	27	7.9	15	8.9	10	9.7
11	486	7.3	21	6.2	15	8.9	8	7.8
12	258	3.9	16	4.7	11	6.6	7	6.8
13	245	3.7	8	2.3	15	8.9	7	6.8
14	233	3.5	9	2.6	19	11.3	5	4.9
15	138	2.1	1	.3	14	8.3	1	1.0
16	102	1.5	3	.9	14	8.3	4	3.9
17	81	1.2	1	.3	11	6.6	2	1.9
18	48	.7	1	.3	9	5.4	2	1.9
19	10	.2	--	--	2	1.2	--	--
20	1	--	--	--	--	--	--	--
TOTAL	6666	100.0	341	100.0	168	100.0	103	100.0

TABLE E.7 (continued)

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by age within groups referred by teachers, parents, self, administrators, health or guidance personnel, and other agencies.

Age in Years	Source of Referral					
	Health or Guidance Personnel		Other Agencies		Total	
	Number	%	Number	%	Number	%
3	1	.1	--	--	1	--
4	2	.2	1	.1	16	.2
5	9	1.1	3	.2	183	1.9
6	33	4.0	28	2.0	935	9.8
7	56	6.7	105	7.4	1435	15.1
8	49	5.9	179	12.6	1506	15.8
9	47	5.7	185	13.0	1297	13.6
10	38	4.6	146	10.3	979	10.3
11	41	4.9	111	7.8	682	7.1
12	91	10.9	99	7.0	482	5.1
13	130	15.6	147	10.3	552	5.8
14	116	13.9	131	9.2	513	5.4
15	73	8.8	97	6.8	324	3.4
16	76	9.1	76	5.4	275	2.9
17	53	6.4	76	5.4	224	2.3
18	12	1.4	33	2.3	105	1.1
19	4	.5	3	.2	19	.2
20	2	.2	--	--	3	--
TOTAL	833	100.0	1420	100.0	9531	100.0

TABLE E.8

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by age within groups referred by teachers, parents, self, administrators, health or guidance personne., and other agencies. (This table is completed on the succeeding page.)

	Source of Referral							
	Teacher		Parents		Self		Administrator	
Age in Years	Number	%	Number	%	Number	%	Number	%
3	--	--	--	--	--	--	--	--
4	8	.2	4	1.8	--	--	--	--
5	199	5.2	25	11.6	1	.5	2	3.9
6	527	13.9	27	12.5	17	8.2	--	--
7	766	20.2	36	16.7	24	11.6	8	15.8
8	702	18.5	37	17.1	43	20.9	4	7.8
9	572	15.1	27	12.5	51	24.8	5	9.8
10	433	11.4	16	7.4	22	10.7	6	11.8
11	263	6.9	19	8.8	15	7.3	6	11.8
12	154	4.1	11	5.1	10	4.8	4	7.8
13	83	2.2	3	1.4	15	7.3	4	7.8
14	56	1.5	4	1.8	7	3.4	4	7.8
15	17	.4	6	2.8	1	.5	3	5.9
16	2	.1	1	.5	--	--	--	--
17	7	.2	--	--	--	--	2	3.9
18	2	.1	--	--	--	--	1	2.0
19	1	--	--	--	--	--	2	3.9
20	--	--	--	--	--	--	--	--
TOTAL	3792	100.0	216	100.0	206	100.0	51	100.0

TABLE E.8 (continued)

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by age within groups referred by teachers, parents, self, administrators, health or guidance personnel, and other agencies.

	Source of Referral					
	Health or Guidance Personnel		Other Agencies		Total	
Age in Years	Number	%	Number	%	Number	%
3	1	.7	--	--	1	--
4	1	.7	--	--	13	.3
5	5	3.7	3	.6	235	4.8
6	7	5.2	35	7.3	613	12.5
7	11	8.2	74	15.3	919	18.8
8	17	12.6	103	21.3	906	18.6
9	17	12.6	100	20.7	772	15.8
10	14	10.4	71	14.7	562	11.5
11	12	8.9	40	8.3	355	7.3
12	9	6.7	24	5.0	212	4.3
13	10	7.4	12	2.5	127	2.6
14	8	5.9	7	1.5	86	1.7
15	9	6.7	2	.4	38	.8
16	7	5.2	4	.8	14	.3
17	3	2.2	6	1.2	18	.4
18	3	2.2	2	.4	8	.2
19	1	.7	--	--	4	.1
20	--	--	--	--	--	--
TOTAL	135	100.0	483	100.0	4883	100.0

TABLE E.9

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by below average, average, and above average reading achievement within each age group.

	Reading Achievement							
	Below Average		Average		Above Average		Total	
Age in Years	Number	%	Number	%	Number	%	Number	%
3	--	--	--	--	--	--	--	--
4	--	--	--	--	--	--	--	--
5	2	25.0	5	62.5	1	12.5	8	100.0
6	99	43.4	101	44.3	28	12.3	228	100.0
7	438	53.6	244	29.8	136	16.6	818	100.0
8	457	52.0	271	30.9	150	17.1	878	100.0
9	259	48.3	180	33.6	97	18.1	536	100.0
10	205	40.3	168	33.1	135	26.6	508	100.0
11	188	42.9	160	36.5	90	20.6	438	100.0
12	146	48.7	90	30.0	64	21.3	300	100.0
13	157	48.6	103	31.9	63	19.5	323	100.0
14	171	53.8	89	28.0	58	18.2	318	100.0
15	99	45.0	80	36.4	41	18.6	220	100.0
16	97	44.3	73	33.3	49	22.4	219	100.0
17	81	46.3	57	32.6	37	21.1	175	100.0
18	53	54.6	36	37.1	8	8.3	97	100.0
19	7	53.8	6	46.2	--	--	13	100.0
20	--	--	2	100.0	--	--	2	100.0
TOTAL	2459	48.4	1665	32.8	957	18.8	5081	100.0

TABLE E.10

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by below average, average, and above average reading achievement within each age group.

Age in Years	Reading Achievement Below Average Number	 Below Average %	 Average Number	 Average %	 Above Average Number	 Above Average %	 Total Number	 Total %
3	--	--	--	--	--	--	--	--
4	--	--	--	--	--	--	--	--
5	4	57.1	3	42.9	--	--	7	100.0
6	70	36.6	89	46.6	32	16.8	191	100.0
7	265	39.5	273	40.7	133	19.8	671	100.0
8	328	41.4	283	35.7	181	22.9	792	100.0
9	289	43.5	208	31.3	167	25.2	664	100.0
10	171	39.2	123	28.2	142	32.6	436	100.0
11	121	47.1	77	30.0	59	22.9	257	100.0
12	62	38.8	38	23.7	60	37.5	160	100.0
13	30	40.0	18	24.0	27	36.0	75	100.0
14	27	48.2	10	17.9	19	33.9	56	100.0
15	13	65.0	3	15.0	4	20.0	20	100.0
16	3	60.0	--	--	2	40.0	5	100.0
17	--	--	1	50.0	1	50.0	2	100.0
18	1	50.0	1	50.0	--	--	2	100.0
19	1	100.0	--	--	--	--	1	100.0
20	--	--	--	--	--	--	--	--
TOTAL	1385	41.5	1127	33.7	827	24.8	3339	100.0

TABLE E.11

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by age within below average, average, and above average reading achievement groups.

	Reading Achievement							
	Below Average		Average		Above Average		Total	
Age in Years	Number	%	Number	%	Number	%	Number	%
3	--	--	--	--	--	--	--	--
4	--	--	--	--	--	--	--	--
5	2	.1	5	.3	1	.1	8	.2
6	99	4.0	101	6.1	28	2.9	228	4.5
7	438	17.8	244	14.6	136	14.2	818	16.1
8	457	18.6	271	16.3	150	15.7	878	17.3
9	259	10.5	180	10.8	97	10.1	536	10.5
10	205	8.3	168	10.1	135	14.1	508	10.0
11	188	7.7	160	9.6	90	9.4	438	8.6
12	146	5.9	90	5.4	64	6.7	300	5.9
13	157	6.4	103	6.2	63	6.6	323	6.4
14	171	7.0	89	5.3	58	6.1	318	6.3
15	99	4.0	80	4.8	41	4.3	220	4.3
16	97	3.9	73	4.4	49	5.1	219	4.3
17	81	3.3	57	3.4	37	3.9	175	3.4
18	53	2.2	36	2.2	8	.8	97	1.9
19	7	.3	6	.4	--	--	13	.3
20	--	--	2	.1	--	--	2	--
TOTAL	2459	100.0	1665	100.0	957	100.0	5081	100.0

TABLE E.12

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by age within below average, average, and above average reading achievement groups.

	Reading Achievement							
	Below Average		Average		Above Average		Total	
Age in Years	Number	%	Number	%	Number	%	Number	%
3	--	--	--	--	--	--	--	--
4	--	--	--	--	--	--	--	--
5	4	.3	3	.3	--	--	7	.2
6	70	5.0	89	7.9	32	3.9	191	5.7
7	265	19.1	273	24.2	133	16.1	671	20.0
8	328	23.7	283	25.1	181	21.9	792	23.7
9	289	20.9	208	18.4	167	20.2	664	19.9
10	171	12.3	123	10.9	142	17.2	436	13.1
11	121	8.7	77	6.8	59	7.1	257	7.7
12	62	4.5	38	3.4	60	7.2	160	4.8
13	30	2.2	18	1.6	27	3.3	75	2.3
14	27	2.0	10	.9	19	2.3	56	1.7
15	13	.9	3	.3	4	.5	20	.6
16	3	.2	--	--	2	.2	5	.1
17	--	--	1	.1	1	.1	2	.1
18	1	.1	1	.1	--	--	2	.1
19	1	.1	--	--	--	--	1	--
20	--	--	--	--	--	--	--	--
TOTAL	1385	100.0	1127	100.0	827	100.0	3339	100.0

TABLE E.13

Mean and median scores on the 50 items included in the Templin-Darley articulation test by age for children receiving speech and hearing services in the Los Angeles City Unified School District.

Age in Years	Number	Mean	Standard Deviation	Median	Q
3	1	--	--	--	--
4	18	26.4	13.96	20.5	11.12
5	191	20.4	11.64	17.9	8.99
6	1014	24.6	11.00	24.7	8.71
7	1576	29.9	9.78	31.6	6.84
8	1579	33.8	8.30	35.4	4.54
9	1288	35.5	8.08	36.9	3.87
10	951	36.2	7.94	37.7	4.16
11	621	37.6	7.28	38.0	3.83
12	404	39.0	8.66	39.0	5.50
13	459	39.8	8.14	40.0	5.62
14	408	41.1	8.21	43.0	5.28
15	246	40.7	8.68	42.3	6.21
16	238	40.7	9.48	43.4	5.33
17	186	41.8	7.37	43.1	5.22
18	89	42.1	9.78	45.8	5.18
19	18	38.7	10.11	39.5	7.54
20	2	47.0	2.00	47.0	2.00
TOTAL	9289				

TABLE E.14

Mean and median scores on the 50 items included in the Templin-Darley articulation test by age for children receiving speech and hearing services in 38 Los Angeles County school districts.

Age in Years	Number	Mean	Standard Deviation	Median	Q
3	1	50.0	--	--	--
4	16	32.7	14.29	40.5	13.25
5	424	28.5	12.73	28.8	10.74
6	1241	32.7	11.34	34.8	8.07
7	1593	35.8	9.85	37.3	6.52
8	1367	37.3	8.91	38.1	5.57
9	1021	38.3	7.96	38.3	4.81
10	658	39.1	7.64	38.5	5.42
11	413	39.4	7.61	39.0	5.29
12	217	39.3	7.64	39.0	4.78
13	102	39.9	7.80	39.2	4.64
14	62	39.8	8.46	41.0	4.70
15	30	39.5	9.31	38.5	5.46
16	20	39.7	8.80	41.2	7.50
17	21	34.3	9.08	35.0	5.75
18	9	42.0	3.87	40.3	3.15
19	5	30.6	11.90	35.0	9.25
20	--	--	--	--	--
TOTAL	7200				

TABLE E.15

Mean and median scores on a phonetic inventory of 43 sounds (18 vowel and diphthongs, 25 consonants) by age for children receiving speech and hearing services in the Los Angeles City Unified School District.

Age in Years	Number	Mean	Standard Deviation	Median	Q
3	1	--	--	--	--
4	18	33.6	4.93	31.5	3.62
5	191	32.8	5.76	33.6	3.63
6	1014	35.0	4.88	35.8	3.28
7	1576	36.9	4.35	37.8	2.77
8	1579	38.3	3.42	39.2	1.98
9	1288	38.7	3.49	39.7	1.79
10	951	38.7	3.82	39.8	1.77
11	621	39.3	2.82	40.1	1.57
12	404	39.1	3.39	40.2	1.75
13	459	39.1	3.24	40.1	1.72
14	408	39.1	3.31	40.1	1.90
15	246	38.8	4.00	39.9	1.92
16	238	38.9	3.97	40.2	1.78
17	186	38.9	3.72	40.1	2.01
18	89	38.4	4.15	39.8	2.24
19	18	36.3	5.30	38.5	4.31
20	2	39.0	2.00	39.0	2.00
TOTAL	9289				

TABLE E.16

Mean and median scores on a phonetic inventory of 43 sounds (18 vowel and diphthongs, 25 consonants) by age for children receiving speech and hearing services in 38 Los Angeles County school districts.

Age in Years	Number	Mean	Standard Deviation	Median	Q
3	1	42.0	--	--	--
4	16	33.9	10.87	38.5	3.33
5	424	34.3	5.26	35.1	3.46
6	1241	37.1	4.43	38.2	2.81
7	1593	38.3	3.51	39.3	2.21
8	1367	38.9	3.46	39.9	1.84
9	1021	39.2	2.92	40.0	1.67
10	658	39.5	2.74	40.3	1.46
11	413	39.4	3.25	40.4	1.55
12	217	39.4	2.84	40.6	1.57
13	102	39.7	2.90	40.7	1.55
14	62	39.4	2.80	40.5	1.24
15	30	38.3	4.66	40.1	1.98
16	20	34.7	5.56	34.5	4.50
17	21	31.8	6.15	31.2	5.56
18	9	36.6	3.82	37.2	3.56
19	5	33.2	5.50	30.2	3.81
20	--	--	--	--	--
TOTAL	7200				

TABLE E.17

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by breathy, harsh, hoarse, nasal, and denasal voice quality disorders within age groups. (This table is completed on the succeeding page.)

	Type of Voice Quality Disorder							
	Breathy		Harsh		Hoarse		Nasal	
Age in Years	Number	%	Number	%	Number	%	Number	%
3	--	--	--	--	--	--	1	100.0
4	5	50.0	--	--	1	10.0	1	10.0
5	5	12.5	5	12.5	10	25.0	10	25.0
6	26	17.6	13	8.8	35	23.6	42	28.4
7	29	14.9	12	6.1	53	27.2	49	25.1
8	39	16.7	11	4.7	56	23.9	63	26.9
9	44	21.0	8	3.8	54	25.7	51	24.3
10	24	14.8	11	6.8	40	24.7	44	27.2
11	18	17.6	6	5.9	20	19.7	25	24.5
12	15	17.6	8	9.4	13	15.3	27	31.8
13	14	15.8	3	3.4	13	14.6	34	38.2
14	7	9.2	10	13.2	14	18.4	25	32.9
15	19	26.4	4	5.6	9	12.5	22	30.6
16	14	22.2	3	4.8	6	9.5	22	35.0
17	14	26.0	3	5.6	5	9.2	19	35.2
18	9	26.5	1	2.9	--	--	16	47.1
19	1	10.0	--	--	1	10.0	5	50.0
20	--	--	--	--	--	--	--	--
TOTAL	283	17.8	98	6.2	330	20.8	456	28.7

TABLE E.17 (continued)

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by breathy, harsh, hoarse, nasal, and denasal voice quality disorders within age groups.

	Type of Voice Quality Disorder							
	Denasal		Combination		Other		Total	
Age in Years	Number	%	Number	%	Number	%	Number	%
3	--	--	--	--	--	--	1	100.0
4	1	10.0	1	10.0	1	10.0	10	100.0
5	3	7.5	2	5.0	5	12.5	40	100.0
6	13	8.8	12	8.1	7	4.7	148	100.0
7	15	7.7	24	12.3	13	6.7	195	100.0
8	31	13.2	24	10.3	10	4.3	234	100.0
9	22	10.5	20	9.5	11	5.2	210	100.0
10	15	9.3	16	9.8	12	7.4	162	100.0
11	18	17.6	11	10.8	4	3.9	102	100.0
12	6	7.1	8	9.4	8	9.4	85	100.0
13	5	5.6	10	11.2	10	11.2	89	100.0
14	7	9.2	7	9.2	6	7.9	76	100.0
15	5	6.9	6	8.3	7	9.7	72	100.0
16	5	7.9	8	12.7	5	7.9	63	100.0
17	3	5.6	5	9.2	5	9.2	54	100.0
18	--	--	2	5.9	6	17.6	34	100.0
19	--	--	2	20.0	1	10.0	10	100.0
20	--	--	--	--	1	100.0	1	100.0
TOTAL	149	9.4	158	10.0	112	7.1	1586	100.0

TABLE E.18

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by breathy, harsh, hoarse, nasal, and denasal voice quality disorders within age groups. (This table is completed on the succeeding page.)

	Type of Voice Quality Disorder							
	Breathy		Harsh		Hoarse		Nasal	
Age in Years	Number	%	Number	%	Number	%	Number	%
3	--	--	--	--	--	--	--	--
4	1	50.0	--	--	--	--	1	50.0
5	11	16.2	7	10.3	11	16.2	11	16.2
6	22	11.7	13	6.9	46	24.5	40	21.3
7	27	12.5	15	6.9	53	24.4	40	18.4
8	26	12.4	19	9.1	50	23.8	39	18.6
9	18	11.8	10	6.5	44	28.7	32	20.9
10	17	12.9	15	11.4	35	26.5	26	19.7
11	19	23.5	5	6.2	13	16.0	19	23.5
12	1	3.0	2	6.1	3	9.1	14	42.4
13	3	12.0	1	4.0	5	20.0	8	32.0
14	4	25.0	--	--	2	12.5	1	6.3
15	1	10.0	--	--	1	10.0	7	70.0
16	--	--	1	33.3	--	--	1	33.3
17	--	--	--	--	--	--	--	--
18	--	--	--	--	--	--	--	--
19	--	--	--	--	--	--	1	100.0
20	--	--	--	--	--	--	--	--
TOTAL	150	13.1	88	7.7	263	23.0	240	21.0

TABLE E.18 (continued)

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by breathy, harsh, hoarse, nasal, and denasal voice quality disorders within age groups.

	Type of Voice Quality Disorder							
	Denasal		Combination		Other		Total	
Age in Years	Number	%	Number	%	Number	%	Number	%
3	--	--	--	--	--	--	--	--
4	--	--	--	--	--	--	2	100.0
5	6	8.8	18	26.4	4	5.9	68	100.0
6	30	15.9	26	13.8	11	5.9	188	100.0
7	23	10.6	39	18.0	20	9.2	217	100.0
8	29	13.8	32	15.2	15	7.1	210	100.0
9	18	11.8	20	13.1	11	7.2	153	100.0
10	12	9.1	20	15.1	7	5.3	132	100.0
11	10	12.3	11	13.6	4	4.9	81	100.0
12	8	24.3	4	12.1	1	3.0	33	100.0
13	1	4.0	5	20.0	2	8.0	25	100.0
14	2	12.5	3	18.7	4	25.0	16	100.0
15	1	10.0	--	--	--	--	10	100.0
16	--	--	1	33.4	--	--	3	100.0
17	--	--	--	--	--	--	--	--
18	--	--	1	33.3	2	66.7	3	100.0
19	--	--	--	--	--	--	1	100.0
20	--	--	--	--	--	--	--	--
TOTAL	140	12.3	180	15.8	81	7.1	1142	100.0

TABLE E.19

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by age within types of voice quality disorders. (This table is completed on the succeeding page.)

	Type of Voice Quality Disorder							
	Breathy		Harsh		Hoarse		Nasal	
Age in Years	Number	%	Number	%	Number	%	Number	%
3	--	--	--	--	--	--	1	.2
4	5	1.8	--	--	1	.3	1	.2
5	5	1.8	5	5.1	10	3.0	10	2.2
6	26	9.2	13	13.3	35	10.6	42	9.2
7	29	10.2	12	12.2	53	16.1	49	10.8
8	39	13.8	11	11.2	56	17.0	63	13.8
9	44	15.5	8	8.2	54	16.4	51	11.2
10	24	8.5	11	11.2	40	12.1	44	9.6
11	18	6.4	6	6.1	20	6.1	25	5.5
12	15	5.3	8	8.1	13	3.9	27	5.9
13	14	4.9	3	3.1	13	3.9	34	7.5
14	7	2.5	10	10.2	14	4.3	25	5.5
15	19	6.7	4	4.1	9	2.7	22	4.8
16	14	4.9	3	3.1	6	1.8	22	4.8
17	14	4.9	3	3.1	5	1.5	19	4.2
18	9	3.2	1	1.0	--	--	16	3.5
19	1	.4	--	--	1	.3	5	1.1
20	--	--	--	--	--	--	--	--
TOTAL	283	100.0	98	100.0	330	100.0	456	100.0

TABLE E.19 (continued)

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by age within types of voice quality disorders.

Age in Years	Type of Voice Quality Disorder Denasal Number	%	Combination Number	%	Other Number	%	Total Number	%
3	--	--	--	--	--	--	1	--
4	1	.7	1	.6	1	.9	10	.6
5	3	2.0	2	1.3	5	4.5	40	2.5
6	13	8.8	12	7.6	7	6.2	148	9.4
7	15	10.1	24	15.2	13	11.6	195	12.3
8	31	20.8	24	15.2	10	8.9	234	14.8
9	22	14.8	20	12.7	11	9.8	210	13.3
10	15	10.1	16	10.1	12	10.7	162	10.2
11	18	12.1	11	7.0	4	3.6	102	6.4
12	6	4.0	8	5.1	8	7.1	85	5.4
13	5	3.3	10	6.3	10	8.9	89	5.6
14	7	4.7	7	4.4	6	5.4	76	4.8
15	5	3.3	6	3.8	7	6.2	72	4.6
16	5	3.3	8	5.1	5	4.5	63	4.0
17	3	2.0	5	3.2	5	4.5	54	3.4
18	--	--	2	1.2	6	5.4	34	2.1
19	--	--	2	1.2	1	.9	10	.6
20	--	--	--	--	1	.9	1	--
TOTAL	149	100.0	158	100.0	112	100.0	1586	100.0

TABLE E.20

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by age within types of voice quality disorders. (This table is completed on the succeeding page.)

	Type of Voice Quality Disorder							
	Breathy		Harsh		Hoarse		Nasal	
Age in Years	Number	%	Number	%	Number	%	Number	%
3	--	--	--	--	--	--	--	--
4	1	.7	--	--	--	--	1	.4
5	11	7.3	7	8.0	11	4.2	11	4.6
6	22	14.7	13	14.8	46	17.5	40	16.7
7	27	18.0	15	17.0	53	20.2	40	16.7
8	26	17.3	19	21.6	50	19.0	39	16.3
9	18	12.0	10	11.4	44	16.7	32	13.4
10	17	11.3	15	17.0	35	13.3	26	10.8
11	19	12.7	5	5.7	13	4.9	19	7.9
12	1	.7	2	2.3	3	1.1	14	5.8
13	3	2.0	1	1.1	5	1.9	8	3.3
14	4	2.6	--	--	2	.8	1	.4
15	1	.7	--	--	1	.4	7	2.9
16	--	--	1	1.1	--	--	1	.4
17	--	--	--	--	--	--	--	--
18	--	--	--	--	--	--	--	--
19	--	--	--	--	--	--	1	.4
20	--	--	--	--	--	--	--	--
TOTAL	150	100.0	88	100.0	263	100.0	240	100.0

TABLE E.20 (continued)

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by age within types of voice quality disorders.

Age in Years	Type of Voice Quality Disorder							
	Denasal		Combination		Other		Total	
	Number	%	Number	%	Number	%	Number	%
3	--	--	--	--	--	--	--	--
4	--	--	--	--	--	--	2	.2
5	6	4.3	18	10.0	4	4.9	68	5.9
6	30	21.4	26	14.4	11	13.6	188	16.4
7	23	16.4	39	21.6	20	24.7	217	19.0
8	29	20.8	32	17.8	15	18.5	210	18.4
9	18	12.9	20	11.1	11	13.6	153	13.4
10	12	8.6	20	11.1	7	8.7	132	11.5
11	10	7.1	11	6.1	4	4.9	81	7.1
12	8	5.7	4	2.2	1	1.2	33	2.9
13	1	.7	5	2.8	2	2.5	25	2.2
14	2	1.4	3	1.7	4	4.9	16	1.4
15	1	.7	--	--	--	--	10	.9
16	--	--	1	.6	--	--	3	.3
17	--	--	--	--	--	--	--	--
18	--	--	1	.6	2	2.5	3	.3
19	--	--	--	--	--	--	1	.1
20	--	--	--	--	--	--	--	--
TOTAL	140	100.0	180	100.0	81	100.0	1142	100.0

SECTION F

DISCUSSION

Socioeconomic Status

The variables examined in relation to socioeconomic status include case identification, intelligence, academic achievement, dental conditions related to speech, response length, vocabulary, grammar, and communicative responsiveness.

Case Identification

A substantially lower percentage of pupils in the city caseload than in the county caseload were identified through speech screening. In the population for which both socioeconomic status and source of identification were reported, 8.6% of the pupils in the city caseload were identified through screening, while 34.3% of the pupils in the county caseload were identified in this way.

In the combined caseload, a definite trend was observed for the proportions of pupils identified through speech screening to increase as socioeconomic level increased from the low through the upper-middle group. The percentage of pupils identified through screening changed from 9.3% of the pupils in the low socioeconomic group to 18.2% in the lower-middle group followed by 20.7% and 25.1% in the middle and upper-middle groups, respectively. In the high socioeconomic group the percentage of pupils identified through screening dropped to 16.9%.

When the caseloads were examined separately, the trend was not as marked as in the combined caseload. In the city caseload, differences between proportions of pupils from the various socioeconomic groups identified through screening were small. The greatest difference was between the low and upper-middle groups. In the county caseload, where a great many more pupils were identified through screening, the trend was somewhat different from that for the combined caseload. Approximately equal proportions in the lower-middle and middle groups were identified through screening (31.9% and 31.3%, respectively), but 36.5% of the pupils with high socioeconomic backgrounds were identified in this way. Whereas in the combined caseload, the proportion in the high socioeconomic group was smaller than in the upper-middle group, the difference between these two groups in the county caseload was negligible (38.1% in the upper-middle group vs. 36.5% in the high socioeconomic group). When the two lowest and two highest socioeconomic groups were combined, the proportions identified through screening were 31.1% and 37.8%, respectively.

Since the proportion of pupils identified through speech screening was very low for the city, the county data are more representative of the relation between socioeconomic status and case identification through speech screening.

Among pupils referred, proportions referred by teachers were essentially the same for all socioeconomic groups in both caseloads, though teachers in the county were responsible for a higher percentage of the pupils referred. Relatively few pupils were referred by parents--3.7% and 4.6% in the city and county respectively, or 4.0% for the combined caseload. The proportions of pupils referred by parents showed small increments with succeeding socioeconomic levels from 1.7% in the low socioeconomic group to 5.9% in the high socioeconomic group. The proportions of pupils referred by school administrators and guidance personnel were similar for all socioeconomic groups. Among pupils referred by health personnel, the proportion of pupils with low socioeconomic backgrounds was slightly higher than the proportions referred from other socioeconomic backgrounds. Other agencies tended to refer slightly higher proportions of pupils in the low socioeconomic group relative to pupils from higher socioeconomic groups.

Intelligence

Among pupils in the caseload, intelligence varied with socioeconomic level. The proportions of pupils with IQs of 75 or less as well as those with IQs from 76 to 90 decreased with each succeeding socioeconomic group from low to high. Whereas 20.2% of the pupils in the low socioeconomic group had IQs of 75 or less, only 3.6% of the pupils in the high socioeconomic group had IQs of 75 or less. In the low socioeconomic group, 36.6% of the pupils had IQs ranging from 76 to 90. Only 10.2% of the pupils in the high socioeconomic group had IQs in this range.

The converse was true for pupils with IQs ranging from 111 to 130 and from 131 and above. The increase in proportions of pupils in succeeding socioeconomic groups from low to high was substantial and regular for pupils in the IQ range from 111 to 130 as shown by the following percentages beginning with the low socioeconomic group: 7.1%, 14.1%, 21.6%, 29.2%, and 36.1%. A much smaller increase obtained for pupils with IQs of 131 and above. Only 0.8% of the pupils in the low socioeconomic group had IQs in this range. The percentages of pupils in succeeding socioeconomic groups beginning with the lower-middle group were 2.4%, 3.3%, 5.6%, to 10.0% in the high socioeconomic group.

A different distribution occurred for pupils with average IQs (91 to 110). There was relatively little difference between the proportions of pupils in the different socioeconomic groups, though a smaller proportion of the pupils in the low socioeconomic group had average intelligence--35.2% compared with proportions ranging from 40.0% with average intelligence in the high socioeconomic group to 45.2% in the middle socioeconomic group.

Academic Achievement

In both caseloads, reading readiness and achievement in reading, arithmetic fundamentals, and arithmetic reasoning varied with socioeconomic status in about the same way that intelligence varied. In all three areas of achievement as well as in reading readiness, the proportions of pupils who were below average decreased substantially between succeeding socioeconomic groups from low to high with a concomitant increase in the proportion of pupils with above average ratings, though the magnitude of the increases was smaller. For the most part, the proportions of pupils with average reading readiness or achievement in reading and arithmetic tended to increase with succeeding socioeconomic groups from low to high.

The range of the proportions of pupils who were below average in all four areas was from 58.6% to 63.4% in the lowest socioeconomic group, while the range of proportions of pupils who were below average in the highest socioeconomic group was from 21.7% to 25.2%. The range of the proportions of pupils who were above average was from 8.2% to 10.8% in the lowest socioeconomic group compared with a range of 35.9% to 40.6% above average in the highest socioeconomic group. From 27.8% to 32.1% of the pupils in the low socioeconomic group were average, while from 37.7% to 42.0% in the high socioeconomic group were average.

Dental Conditions Related to Speech

The proportions of pupils with deviations in occlusion that interfered with speech were similar in the two caseloads--22.7% in the city caseload and 21.6% in the county caseload, or 22.2% in the combined caseload.

The proportions of pupils with malocclusion did not vary with socioeconomic status, though some kinds of occlusion deviations varied with socioeconomic background. Among the pupils with malocclusion, the proportion of pupils with open bite was high in the low socioeconomic group relative to the proportions found in the other groups. The percentages decreased as socioeconomic status increased to the upper-middle group; however, the percentage of pupils in the high socioeconomic group was larger than in the upper-middle group. In the low socioeconomic group, 37.8% had open bite. The percentages in succeeding groups were 31.3%, 28.7%, 23.1%, and 26.1% in the high socioeconomic group. In contrast, the proportion of pupils with over jet (mesiocclusion) progressed from 33.2% in the low socioeconomic group to 37.8%, 42.1%, 48.5%, and 48.9% in succeeding socioeconomic groups.

A slightly larger proportion in the low group had under jet (distocclusion), and a slightly smaller proportion had cross bite. The small number of pupils with these conditions makes the small difference between proportions insignificent.

Other kinds of dental conditions that ostensibly interfered with speaking were present in 26.1% of the combined caseload; 26.7% of the pupils in the city caseload and 25.4% in the county caseload were reported as having such conditions. Though the proportions of pupils in the low and lower-middle socioeconomic groups who had other kinds of defective dental conditions were about the same (31.4% and 30.5%, respectively), thereafter the proportions decreased as socioeconomic status increased to 20.4% of the pupils in the high socioeconomic group.

Among those with defective dental conditions, the proportion of pupils with missing teeth increased from the low socioeconomic group to the two highest socioeconomic groups as follows: 17.2% to 25.3%, 30.5%, to 34.7% and 34.1% in the upper-middle and high socioeconomic groups. The proportion of pupils with malpositioned teeth also increased from 16.2% in the low group to 34.6% in the high group. The reverse was true for caries. The proportions of pupils with caries declined from 39.1% in the low socioeconomic group to 13.4% in the high socioeconomic group.

A fourth of the pupils had "other" dental conditions that interfered with speaking. As mentioned earlier, the high proportion with unidentified conditions indicates that too few descriptive terms were supplied in the case record. Apparently the "other" conditions have some relation to socioeconomic status as the two highest socioeconomic groups contained smaller proportions of pupils with these conditions than did the two lowest and middle socioeconomic groups.

The implications of the data on caries deserves some mention. It was intended that the dental conditions reported in the case record be those conditions that actually interfered with speaking or with the modification of speech patterns. A total of 1,051 pupils were said to have caries that interfered with speech, a number that represents 6.2% of the caseload. This figure seems very high, as it is generally understood that caries scarcely ever constitute an obstacle to speech. It is not clear whether the figures reported were limited to only those pupils with caries that actually interfered with speaking, or whether this information was regarded by those reporting it as essentially a part of the health history in which concomitant conditions are reported regardless of the existence of a demonstrable relation to speech. At any rate, further investigation is needed to determine the basis of these data.

Response Length, Vocabulary, and Grammar in Spontaneous Speech

Among pupils in both caseloads, response length, vocabulary, and grammar were related to socioeconomic background. Higher proportions of pupils from low socioeconomic backgrounds had inadequate response than pupils from the other socioeconomic groups. Though differences between succeeding groups were small, the proportions decreased for succeeding levels from the low to the upper-middle and high socioeconomic groups, where the proportions of pupils with inadequate responses were essentially the same. The proportions of pupils having inadequate response length progressed from low to high socioeconomic groups as follows: 23.0%, 20.3%, 16.1%, 12.1%, and 12.9%.

The trend was even more marked for vocabulary and grammar. A little over one-fourth of the pupils from low socioeconomic backgrounds had limited vocabularies and poor grammar. Differences between low, lower-middle, and middle income groups were fairly substantial. Differences between middle, upper-middle, and high socioeconomic groups were smaller. The progression of percentages of pupils having limited vocabularies was from 26.8% in the low group to 18.6%, 12.5%, and 10.6% for each succeeding socioeconomic group to 7.1% for the high socioeconomic group. A somewhat similar progression obtained for the proportions of pupils having poor grammar: 28.1% in the low group followed by 21.8%, 14.6%, 13.7% to 9.5% for the high socioeconomic group.

Communicative Responsiveness

Inadequate responsiveness in situations requiring oral communication was related to socioeconomic background of the pupils as was infrequent eye contact while speaking, though the relation was not as marked as it was for the language characteristics discussed above. In the case of communicative responsiveness, the largest difference in proportions of pupils occurred between the low and the lower-middle groups, with a smaller difference between the lower-middle and middle socioeconomic groups. Differences between succeeding groups thereafter were very small. The proportions of pupils with inadequate communicative responsiveness from low to high socioeconomic groups were 19.9%, 15.6%, 12.7%, 11.4%, and 10.6%.

Infrequent eye contact while speaking was also related to the socioeconomic background of the pupils to some extent. It was not as frequently observed as inadequate communicative responsiveness. The proportion of pupils with infrequent eye contact was higher in the low socioeconomic group than in the other groups. Differences among the other groups were negligible. While 15.3% of the pupils in the low socioeconomic group had infrequent eye contact, the percentages of pupils in the other groups ranged from 9.4% in the lower-middle socioeconomic group to 7.2% in the high group.

SECTION F

ORGANIZATION OF TABLES

Socioeconomic Status

TABLE F.1

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by identification through speech screening or referral including source of referral--teacher, parents, self, administrator, health or guidance personnel, other agencies--within low, lower middle, middle, upper middle, and high socioeconomic status.

	Socioeconomic Status											
	Low		Lower Middle		Middle		Upper Middle		High		Total	
Source of Identification	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Speech Screening	169	7.2	151	7.9	179	9.5	235	10.4	110	7.7	844	8.6
Referral	2174	92.8	1769	92.1	1709	90.5	2034	89.6	1323	92.3	9009	91.4
Teacher	1487	(68.4)	1247	(70.5)	1219	(71.3)	1403	(69.0)	922	(69.7)	6278	(69.7)
Parents	40	(1.8)	39	(2.2)	70	(4.1)	100	(4.9)	83	(6.2)	332	(3.7)
Self	34	(1.6)	31	(1.7)	29	(1.7)	38	(1.9)	29	(2.2)	161	(1.8)
Administrator	25	(1.2)	10	(.6)	16	(.9)	33	(1.6)	13	(1.0)	97	(1.1)
Guidance Personnel	31	(1.4)	28	(1.6)	24	(1.4)	22	(1.1)	17	(1.3)	122	(1.3)
Health Personnel	192	(8.8)	145	(8.2)	124	(7.3)	136	(6.7)	85	(6.4)	682	(7.6)
Other	365	(16.8)	269	(15.2)	227	(13.3)	302	(14.8)	174	(13.2)	1337	(14.8)
TOTAL	2343	100.0	1920	100.0	1888	100.0	2269	100.0	1433	100.0	9853	100.0

TABLE F.2

Distribution of children receiving speech and hearing services in 38 Los Angeles County School districts by identification through speech screening or referral including source of referral--teacher, parents, self, administrator, health or guidance personnel, other agencies--within low, lower middle, middle, upper middle, and high socioeconomic status.

	Socioeconomic Status											
Source of Identification	Low Number	%	Lower Middle Number	%	Middle Number	%	Upper Middle Number	%	High Number	%	Total Number	%
Speech Screening	75	27.3	464	31.9	621	31.3	975	38.1	248	36.5	2383	34.3
Referral	200	72.7	992	68.1	1364	68.7	1583	61.9	432	63.5	4571	65.7
Teacher	150	(75.0)	799	(80.6)	1105	(81.0)	1195	(75.5)	300	(69.4)	3549	(77.6)
Parents	1	(.5)	36	(3.6)	44	(3.2)	107	(6.7)	21	(4.9)	209	(4.6)
Self	10	(5.0)	38	(3.8)	56	(4.1)	73	(4.6)	15	(3.5)	192	(4.2)
Administrator	1	(.5)	20	(2.0)	8	(.6)	17	(1.1)	2	(.5)	48	(1.1)
Guidance Personnel	5	(2.5)	20	(2.0)	7	(.5)	17	(1.1)	26	(6.0)	75	(1.6)
Health Personnel	3	(1.5)	7	(.7)	10	(.8)	20	(1.3)	3	(.7)	43	(.9)
Other	30	(15.0)	72	(7.3)	134	(9.8)	154	(9.7)	65	(15.0)	455	(10.0)
TOTAL	275	100.0	1456	100.0	1985	100.0	2558	100.0	680	100.0	6954	100.0

TABLE F.3

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by low, lower middle, middle, upper middle, and high socioeconomic status within different sources of identification--speech screening or referral by teachers, parents, self, administrators, health or guidance personnel, or other agencies.

Source of Identification	Socioeconomic Status Low Number	%	Lower Middle Number	%	Middle Number	%	Upper Middle Number	%	High Number	%	Total Number	%
Speech Screening	169	20.0	151	17.9	179	21.2	235	27.9	110	13.0	844	100.0
Referral	2174	24.1	1769	19.6	1709	19.0	2034	22.6	1322	14.7	9009	100.0
Teacher	1487	23.7	1247	19.9	1219	19.4	1403	22.3	922	14.7	6278	100.0
Parents	40	12.1	39	11.7	70	21.1	100	30.1	83	25.0	332	100.0
Self	34	21.1	31	19.3	29	18.0	38	23.6	29	18.0	161	100.0
Administrator	25	25.8	10	10.3	16	16.5	33	34.0	13	13.4	97	100.0
Guidance Personnel	31	25.4	28	23.0	24	19.7	22	18.0	17	13.9	122	100.0
Health Personnel	192	28.1	145	21.3	124	18.2	136	19.9	85	12.5	682	100.0
Other	365	27.3	269	20.1	227	17.0	302	22.6	174	13.0	1337	100.0
TOTAL	2343	23.8	1920	19.5	1888	19.2	2269	23.0	1433	14.5	9853	100.0

TABLE F.4

Distribution of children receiving speech and hearing services in 38 Los Angeles County School Districts by low, lower middle, middle, upper middle, and high socioeconomic status within different sources of identification--speech screening or referral by teachers, parents, self, administrators, health or guidance personnel, or other agencies.

Source of Identification	Socioeconomic Status										Total	
	Low		Lower Middle		Middle		Upper Middle		High			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Speech Screening	75	3.1	464	19.5	621	26.1	975	40.9	248	10.4	2383	100.0
Referral	200	4.4	992	21.7	1364	29.8	1583	34.6	432	9.5	4571	100.0
Teacher	150	4.2	799	22.5	1105	31.1	1195	33.7	300	8.5	3549	100.0
Parents	1	.5	36	17.2	44	21.1	107	51.2	21	10.0	209	100.0
Self	10	5.2	38	19.8	56	29.2	73	38.0	15	7.8	192	100.0
Administrator	1	2.1	20	41.7	8	16.6	17	35.4	2	4.2	48	100.0
Guidance Personnel	5	6.7	20	26.6	7	9.3	17	22.7	26	34.7	75	100.0
Health Personnel	3	7.0	7	16.3	10	23.2	20	46.5	3	7.0	43	100.0
Other	30	6.6	72	15.8	134	29.5	154	33.8	65	14.3	455	100.0
TOTAL	275	4.0	1456	20.9	1985	28.5	2558	36.8	680	9.8	6954	100.0

TABLE F.5

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by intelligence quotients within low, lower middle, middle, upper middle, and high socioeconomic groups.

Intelligence Quotients	Socioeconomic Status Low Number	%	Lower Middle Number	%	Middle Number	%	Upper Middle Number	%	High Number	%	Total Number	%
75 or Less	372	20.3	196	13.1	144	9.6	87	4.9	41	3.4	840	10.8
76 - 90	676	36.8	423	28.3	322	21.3	272	15.4	130	10.9	1823	23.4
91 - 110	637	34.7	626	41.8	661	43.8	763	43.1	467	39.3	3154	40.4
111 - 130	134	7.3	214	14.3	328	21.7	546	30.8	436	36.7	1658	21.2
131 or More	16	.9	37	2.5	54	3.6	102	5.8	115	9.7	324	4.2
TOTAL	1835	100.0	1496	100.0	1509	100.0	1770	100.0	1189	100.0	7799	100.0

TABLE F.6

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by intelligence quotients within low, lower middle, middle, upper middle, and high socioeconomic groups.

Intelligence Quotients	Socioeconomic Status											
	Low		Lower Middle		Middle		Upper Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
75 or Less	16	18.6	54	10.9	44	6.1	44	4.5	12	4.2	170	6.6
76 - 90	28	32.6	148	29.8	155	21.7	163	16.6	20	7.1	514	20.0
91 - 110	40	46.5	217	43.6	344	48.1	468	47.6	122	43.1	1191	46.5
111 - 130	2	2.3	67	13.5	153	21.4	257	26.1	96	33.9	575	22.4
131 or More	--	--	11	2.2	19	2.7	51	5.2	33	11.7	114	4.5
TOTAL	86	100.0	497	100.0	715	100.0	983	100.0	283	100.0	2564	100.0

TABLE F.7

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by low, lower middle, middle, upper middle, and high socioeconomic status within intelligence quotient levels.

	Socioeconomic Status											
	Low		Lower Middle		Middle		Upper Middle		High		Total	
Intelligence Quotients	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
75 or Less	372	44.3	196	23.3	144	17.1	87	10.4	41	4.9	840	100.0
76 - 90	676	37.1	423	23.2	322	17.7	272	14.9	130	7.1	1823	100.0
91 - 110	637	20.2	626	19.8	661	21.0	763	24.2	467	14.8	3154	100.0
111 - 130	134	8.1	214	12.9	328	19.8	546	32.9	436	26.3	1658	100.0
131 or Above	16	4.9	37	11.4	54	16.7	102	31.5	115	35.5	324	100.0
TOTAL	1835	23.5	1496	19.2	1509	19.4	1770	22.7	1189	15.2	7799	100.0

TABLE F.8

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by low, lower middle, middle, upper middle, and high socioeconomic status within intelligence quotient levels.

Intelligence Quotients	Socioeconomic Status Low Number	%	Lower Middle Number	%	Middle Number	%	Upper Middle Number	%	High Number	%	Total Number	%
75 or Less	16	9.4	54	31.8	44	25.9	44	25.9	12	7.0	170	100.0
76 - 90	28	5.4	148	28.8	155	30.2	163	31.7	20	3.9	514	100.0
91 - 110	40	3.4	217	18.2	344	28.9	468	39.3	122	10.2	1191	100.0
111 - 130	2	.3	67	11.7	153	26.6	257	44.7	96	16.7	575	100.0
131 or More	--	--	11	9.7	19	16.7	51	44.7	33	28.9	114	100.0
TOTAL	86	3.4	497	19.4	715	27.9	983	38.3	283	11.0	2564	100.0

TABLE F.9

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by below average, average, and above average ratings in reading readiness and reading achievement within low, lower middle, middle, upper middle, and high socioeconomic groups.

	Socioeconomic Status											
	Low		Lower Middle		Middle		Upper Middle		High		Total	
Reading Ratings	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Readiness												
Below Average	396	60.8	235	50.4	167	45.3	139	37.7	63	24.1	1000	47.2
Average	208	32.0	149	32.0	133	36.0	125	33.9	102	38.9	717	33.9
Above Average	47	7.2	82	17.6	69	18.7	105	28.4	97	37.0	400	18.9
TOTAL	651	100.0	466	100.0	369	100.0	369	100.0	262	100.0	2117	100.0
Achievement												
Below Average	759	63.6	550	56.0	405	44.5	396	40.3	189	25.3	2299	47.7
Average	332	27.8	306	31.2	328	36.0	324	33.0	302	40.4	1592	33.1
Above Average	102	8.6	126	12.8	177	19.5	262	26.7	257	34.3	924	19.2
TOTAL	1193	100.0	982	100.0	910	100.0	982	100.0	748	100.0	4815	100.0

TABLE F.10

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by below average, average, and above average ratings in reading readiness and reading achievement within low, lower middle, middle, upper middle, and high socioeconomic groups.

	Socioeconomic Status											
	Low		Lower Middle		Middle		Upper Middle		High		Total	
Reading Ratings	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Readiness												
Below Average	41	50.6	200	48.8	160	34.1	256	32.2	48	19.2	705	35.2
Average	27	33.3	125	30.5	152	32.4	289	36.3	91	36.4	684	34.1
Above Average	13	16.1	85	20.7	156	33.5	251	31.5	111	44.4	616	30.7
TOTAL	81	100.0	410	100.0	468	100.0	796	100.0	250	100.0	2005	100.0
Achievement												
Below Average	89	61.8	332	54.5	335	40.8	460	38.1	90	24.9	1306	41.6
Average	40	27.8	202	33.2	289	35.2	395	32.7	130	36.0	1056	33.6
Above Average	15	10.4	75	12.3	197	24.0	352	29.2	141	39.1	780	24.8
TOTAL	144	100.0	609	100.0	821	100.0	1207	100.0	361	100.0	3142	100.0

TABLE F.11

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by low, lower middle, middle, upper middle, and high socioeconomic status within below average, average, and above average reading readiness and reading achievement groups.

	Socioeconomic Status											
	Low		Lower Middle		Middle		Upper Middle		High		Total	
Reading Ratings	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Readiness												
Below Average	396	39.6	235	23.5	167	16.7	139	13.9	63	6.3	1000	100.0
Average	208	29.0	149	20.8	133	18.6	125	17.4	102	14.2	717	100.0
Above Average	47	11.8	82	20.5	69	17.2	105	26.2	97	24.3	400	100.0
TOTAL	651	30.8	466	22.0	369	17.4	369	17.4	262	12.4	2117	100.0
Achievement												
Below Average	759	33.0	550	23.9	405	17.6	396	17.3	189	8.2	2299	100.0
Average	332	20.9	306	19.2	328	20.6	324	20.3	302	19.0	1592	100.0
Above Average	102	11.0	126	13.6	177	19.2	262	28.4	257	27.8	924	100.0
TOTAL	1193	24.8	982	20.4	910	18.9	982	20.4	748	15.5	4815	100.0

TABLE F.12

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by low, lower middle, middle, upper middle, and high socioeconomic status within below average, average, and above average reading readiness and reading achievement groups.

Reading Ratings	Socioeconomic Status											
	Low		Lower Middle		Middle		Upper Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Readiness												
Below Average	41	5.8	200	28.4	160	22.7	256	36.3	48	6.8	705	100.0
Average	27	3.9	125	18.3	152	22.2	289	42.3	91	13.3	684	100.0
Above Average	13	2.1	85	13.8	156	25.3	251	40.8	111	18.0	616	100.0
TOTAL	81	4.0	410	20.5	468	23.3	796	39.7	250	12.5	2005	100.0
Achievement												
Below Average	89	6.8	332	25.4	335	25.7	460	35.2	90	6.9	1306	100.0
Average	40	3.8	202	19.1	289	27.4	395	37.4	130	12.3	1056	100.0
Above Average	15	1.9	75	9.6	197	25.3	352	45.1	141	18.1	780	100.0
TOTAL	144	4.6	609	19.4	821	26.1	1207	38.4	361	11.5	3142	100.0

TABLE F.13

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by below average, average, and above average ratings in arithmetic fundamentals and arithmetic reasoning within low, lower middle, middle, upper middle, and high socioeconomic groups.

	Socioeconomic Status											
Arithmetic	Low		Lower Middle		Middle		Upper Middle		High		Total	
Ratings	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Fundamentals												
Below Average	603	58.9	356	48.1	256	39.8	251	33.0	144	22.2	1610	42.2
Average	309	30.2	263	35.5	245	38.1	254	33.4	267	41.3	1338	35.1
Above Average	111	10.9	121	16.4	142	22.1	256	33.6	236	36.5	866	22.7
TOTAL	1023	100.0	740	100.0	643	100.0	761	100.0	647	100.0	3814	100.0
Reasoning												
Below Average	594	61.2	362	50.8	238	39.7	237	32.9	134	21.3	1565	43.1
Average	274	28.2	237	33.2	214	35.7	224	31.1	237	37.8	1186	32.6
Above Average	103	10.6	114	16.0	148	24.6	260	36.0	257	40.9	882	24.3
TOTAL	971	100.0	713	100.0	600	100.0	721	100.0	628	100.0	3633	100.0

TABLE F.14

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by below average, average, and above average ratings in arithmetic fundamentals and arithmetic reasoning within low, lower middle, middle, upper middle, and high socioeconomic groups.

Arithmetic Ratings	Socioeconomic Status											
	Low		Lower Middle		Middle		Upper Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Fundamentals												
Below Average	56	54.9	196	49.2	176	34.7	309	32.6	57	21.8	794	35.8
Average	35	34.3	156	39.2	216	42.6	400	42.2	114	43.7	921	41.6
Above Average	11	10.8	46	11.6	115	22.7	239	25.2	90	34.5	501	22.6
TOTAL	102	100.0	398	100.0	507	100.0	948	100.0	261	100.0	2216	100.0
Reasoning												
Below Average	50	58.2	172	53.2	161	36.8	290	33.8	59	25.5	732	37.8
Average	26	30.2	111	34.4	158	36.2	339	39.5	91	39.4	725	37.5
Above Average	10	11.6	40	12.4	118	27.0	229	26.7	81	35.1	478	24.7
TOTAL	86	100.0	323	100.0	437	100.0	858	100.0	231	100.0	1935	100.0

TABLE F.15

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by low, lower middle, middle, upper middle, and high socioeconomic status within below average, average, and above average arithmetic fundamentals and arithmetic reasoning groups.

Arithmetic Ratings	Socioeconomic Status											
	Low		Lower Middle		Middle		Upper Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Fundamentals												
Below Average	603	37.5	356	22.1	256	15.9	251	15.6	144	8.9	1610	100.0
Average	309	23.1	263	19.6	245	18.3	254	19.0	267	20.0	1338	100.0
Above Average	111	12.8	121	14.0	142	16.4	256	29.5	236	27.3	866	100.0
TOTAL	1023	26.8	740	19.4	643	16.9	761	19.9	647	17.0	3814	100.0
Reasoning												
Below Average	594	38.0	362	23.1	238	15.2	237	15.1	134	8.6	1565	100.0
Average	274	23.1	237	20.0	214	18.0	224	18.9	237	20.0	1186	100.0
Above Average	103	11.7	114	12.9	148	16.8	260	29.5	257	29.1	882	100.0
TOTAL	971	26.7	713	19.6	600	16.5	721	19.9	628	17.3	3633	100.0

TABLE F.16

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by low, lower middle, middle, upper middle, and high socioeconomic status within below average, average, and above average arithmetic fundamentals and arithmetic reasoning groups.

	Socioeconomic Status											
Arithmetic Ratings	Low Number	%	Lower Middle Number	%	Middle Number	%	Upper Middle Number	%	High Number	%	Total Number	%
Fundamentals												
Below Average	56	7.0	196	24.7	176	22.2	309	38.9	57	7.2	794	100.0
Average	35	3.8	156	16.9	216	23.5	400	43.4	114	12.4	921	100.0
Above Average	11	2.2	46	9.2	115	22.9	239	47.7	90	18.0	501	100.0
TOTAL	102	4.6	398	18.0	507	22.9	948	42.8	261	11.7	2216	100.0
Reasoning												
Below Average	50	6.8	172	23.5	161	22.0	290	39.6	59	8.1	732	100.0
Average	26	3.6	111	15.3	158	21.8	339	46.7	91	12.6	725	100.0
Above Average	10	2.1	40	8.4	118	24.7	229	47.9	81	16.9	478	100.0
TOTAL	86	4.5	323	16.7	437	22.6	858	44.3	231	11.9	1935	100.0

TABLE F.17

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by occlusion and condition of teeth within low, lower middle, middle, upper middle, and high socioeconomic groups.

Occlusion and Condition of Teeth	Socioeconomic Status Low Number	%	Lower Middle Number	%	Middle Number	%	Upper Middle Number	%	High Number	%	Total Number	%
Occlusion												
Adequate	1806	76.6	1493	77.6	1474	78.3	1774	78.0	1087	76.0	7634	77.3
Inadequate	553	23.4	431	22.4	409	21.7	501	22.0	344	24.0	2238	22.7
Open Bite	222	(40.2)	135	(31.3)	104	(25.4)	120	(23.9)	75	(21.8)	656	(29.3)
Over Jet	172	(31.1)	154	(35.7)	193	(47.2)	241	(48.1)	169	(49.1)	929	(41.5)
Under Jet	35	(6.3)	27	(6.3)	15	(3.7)	32	(6.4)	12	(3.5)	121	(5.4)
Cross Bite	29	(5.2)	52	(12.1)	42	(10.3)	33	(6.6)	33	(9.6)	189	(8.5)
Other	95	(17.2)	63	(14.6)	55	(13.4)	75	(15.0)	55	(16.0)	343	(15.3)
TOTAL	2359	100.0	1924	100.0	1883	100.0	2275	100.0	1431	100.0	9872	100.0
Condition of Teeth												
Adequate	1628	68.7	1356	70.6	1393	73.6	1742	76.8	1138	78.8	7257	73.3
Inadequate	741	31.3	566	29.4	500	26.4	527	23.2	306	21.2	2640	26.7
Teeth Missing	125	(16.9)	116	(20.5)	150	(30.0)	146	(27.7)	95	(31.1)	632	(23.9)
Deciduous	107	[85.6]	101	[87.1]	134	[89.3]	134	[91.8]	84	[88.4]	560	[88.6]
Permanent	18	[14.4]	15	[12.9]	16	[10.7]	12	[8.2]	11	[11.6]	72	[11.4]
Malpositioned	121	(16.3)	123	(21.7)	115	(23.0)	150	(28.5)	105	(34.3)	614	(23.3)
Caries	291	(39.3)	160	(28.3)	98	(19.6)	99	(18.8)	50	(16.3)	698	(26.4)
Other	204	(27.5)	167	(29.5)	137	(27.4)	132	(25.0)	56	(18.3)	696	(26.4)
TOTAL	2369	100.0	1922	100.0	1893	100.0	2269	100.0	1444	100.0	9897	100.0

TABLE F.18

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by occlusion and condition of teeth within low, lower middle, middle, upper middle, and high socioeconomic groups.

Occlusion and Condition of Teeth	Socioeconomic Status											
	Low		Lower Middle		Middle		Upper Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Occlusion												
Adequate	205	77.1	1192	80.8	1590	78.9	2039	76.7	541	79.1	5567	78.4
Inadequate	61	22.9	284	19.2	424	21.1	618	23.3	143	20.9	1530	21.6
Open Bite	10	(16.4)	89	(31.3)	135	(31.8)	138	(22.4)	52	(36.4)	424	(27.7)
Over Jet	32	(52.5)	116	(40.9)	158	(37.3)	302	(48.9)	69	(48.2)	677	(44.3)
Under Jet	4	(6.5)	10	(3.5)	26	(6.1)	30	(4.8)	5	(3.5)	75	(4.9)
Cross Bite	--	(--)	20	(7.0)	46	(10.9)	57	(9.2)	4	(2.8)	127	(8.3)
Other	15	(24.6)	49	(17.3)	59	(13.9)	91	(14.7)	13	(9.1)	227	(14.8)
TOTAL	266	100.0	1476	100.0	2014	100.0	2657	100.0	684	100.0	7097	100.0
Condition of Teeth												
Adequate	188	67.6	1015	68.1	1538	76.2	2024	76.1	558	81.3	5323	74.6
Inadequate	90	32.4	476	31.9	480	23.8	637	23.9	128	18.7	1811	25.4
Teeth Missing	18	(20.0)	148	(31.1)	149	(31.0)	258	(40.5)	53	(41.4)	626	(34.6)
Deciduous	15	[83.3]	133	[89.9]	134	[89.9]	211	[81.8]	51	[96.2]	544	[86.9]
Permanent	3	[16.7]	15	[10.1]	15	[10.1]	47	[18.2]	2	[3.8]	82	[13.1]
Malpositioned	14	(15.5)	85	(17.8)	94	(19.6)	136	(21.4)	45	(35.2)	374	(20.6)
Caries	34	(37.8)	128	(26.9)	79	(16.5)	104	(16.3)	8	(6.2)	353	(19.5)
Other	24	(26.7)	115	(24.2)	158	(32.9)	139	(21.8)	22	(17.2)	458	(25.3)
TOTAL	278	100.0	1491	100.0	2018	100.0	2661	100.0	686	100.0	7134	100.0

TABLE F.19

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by low, lower middle, middle, upper middle, and high socioeconomic levels within categories of dental occlusion and condition of teeth.

Occlusion and Condition of Teeth	Socioeconomic Status Low Number	 %	 Lower Middle Number	 %	 Middle Number	 %	 Upper Middle Number	 %	 High Number	 %	 Total Number	 %
Occlusion												
Adequate	1806	23.7	1493	19.6	1474	19.3	1774	23.2	1087	14.2	7634	100.0
Inadequate	553	24.7	431	19.2	409	18.3	501	22.4	344	15.4	2238	100.0
Open Bite	222	33.8	135	20.6	104	15.9	120	18.3	75	11.4	656	100.0
Over Jet	172	18.5	154	16.6	193	20.8	241	25.9	169	18.2	929	100.0
Under Jet	35	28.9	27	22.3	15	12.4	32	26.5	12	9.9	121	100.0
Cross Bite	29	15.3	52	27.5	42	22.2	33	17.5	33	17.5	189	100.0
Other	95	27.7	63	18.4	55	16.0	75	21.9	55	16.0	343	100.0
TOTAL	2359	23.9	1924	19.5	1883	19.1	2275	23.0	1431	14.5	9872	100.0
Condition of Teeth												
Adequate	1628	22.4	1356	18.7	1393	19.2	1742	24.0	1138	15.7	7257	100.0
Inadequate	741	28.1	566	21.4	500	18.9	527	20.0	306	11.6	2640	100.0
Teeth Missing	125	19.8	116	18.4	150	23.7	146	23.1	95	15.0	632	100.0
Deciduous	107	19.1	101	18.1	134	23.9	134	23.9	84	15.0	560	100.0
Permanent	18	25.0	15	20.8	16	22.2	12	16.7	11	15.3	72	100.0
Malpositioned	121	19.7	123	20.1	115	18.7	150	24.4	105	17.1	614	100.0
Caries	291	41.7	160	22.9	98	14.0	99	14.2	50	7.2	698	100.0
Other	204	29.3	167	24.0	137	19.7	132	19.0	56	8.0	696	100.0
TOTAL	2369	24.0	1922	19.4	1893	19.1	2269	22.9	1444	14.6	9897	100.0

TABLE F.20

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by low, lower middle, middle, upper middle, and high socioeconomic levels within categories of dental occlusion and condition of teeth.

Occlusion and Condition of Teeth	Socioeconomic Status											
	Low		Lower Middle		Middle		Upper Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Occlusion												
Adequate	205	3.7	1192	21.4	1590	28.6	2039	36.6	541	9.7	5567	100.0
Inadequate	61	4.0	284	18.6	424	27.7	618	40.4	143	9.3	1530	100.0
Open Bite	10	2.4	89	21.0	135	31.8	138	32.5	52	12.3	424	100.0
Over Jet	32	4.7	116	17.1	158	23.4	302	44.6	69	10.2	677	100.0
Under Jet	4	5.3	10	13.3	26	34.7	30	40.0	5	6.7	75	100.0
Cross Bite	--	--	20	15.7	46	36.2	57	44.9	4	3.2	127	100.0
Other	15	6.6	49	21.6	59	26.0	91	40.1	13	5.7	227	100.0
TOTAL	266	3.8	1476	20.8	2014	28.4	2657	37.4	684	9.6	7097	100.0
Condition of Teeth												
Adequate	188	3.5	1015	19.1	1538	28.9	2024	38.0	558	10.5	5323	100.0
Inadequate	90	5.0	476	26.3	480	26.5	637	35.2	128	7.0	1811	100.0
Teeth Missing	18	2.9	148	23.6	149	23.8	258	41.2	53	8.5	626	100.0
Deciduous	15	2.8	133	24.4	134	24.6	211	38.8	51	9.4	544	100.0
Permanent	3	3.7	15	18.3	15	18.3	47	57.3	2	2.4	82	100.0
Malpositioned	14	3.8	85	22.7	94	25.1	136	36.4	45	12.0	374	100.0
Caries	34	9.6	128	36.2	79	22.4	104	29.5	8	2.3	353	100.0
Other	24	5.2	115	25.1	158	34.5	139	30.4	22	4.8	458	100.0
TOTAL	278	3.9	1491	20.9	2018	28.3	2661	37.3	686	9.6	7134	100.0

TABLE F.21

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by acceptability of length of responses, vocabulary, and grammar within low, lower middle, middle, upper middle, and high socioeconomic groups.

Language Characteristic	Socioeconomic Status											
	Low		Lower Middle		Middle		Upper Middle		High		Total	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Response Length												
Adequate	1810	76.1	1562	80.4	1542	81.0	1956	85.7	1276	87.6	8146	81.8
Inadequate	567	23.9	381	19.6	361	19.0	327	14.3	181	12.4	1817	18.2
TOTAL	2377	100.0	1943	100.0	1903	100.0	2283	100.0	1457	100.0	9963	100.0
Vocabulary												
Acceptable	1717	72.4	1555	80.3	1605	84.9	2067	90.9	1360	93.3	8304	83.6
Limited	653	27.6	381	19.7	285	15.1	207	9.1	98	6.7	1624	16.4
TOTAL	2370	100.0	1936	100.0	1890	100.0	2274	100.0	1458	100.0	9928	100.0
Grammar												
Acceptable	1700	72.5	1519	79.7	1559	83.4	1998	88.9	1331	92.2	8107	82.6
Poor	646	27.5	388	20.3	311	16.6	249	11.1	113	7.8	1707	17.4
TOTAL	2346	100.0	1907	100.0	1870	100.0	2247	100.0	1444	100.0	9814	100.0

TABLE F.22

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by acceptability of length of responses, vocabulary, and grammar within low, lower middle, middle, upper middle, and high socioeconomic groups.

	Socioeconomic Status											
Language	Low		Lower Middle		Middle		Upper Middle		High		Total	
Characteristic	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Response Length												
Adequate	233	83.8	1173	78.8	1753	86.5	2281	85.2	596	86.1	6036	84.3
Inadequate	45	16.2	315	21.2	273	13.5	397	14.8	96	13.9	1126	15.7
TOTAL	278	100.0	1488	100.0	2026	100.0	2678	100.0	692	100.0	7162	100.0
Vocabulary												
Acceptable	215	79.3	1213	82.8	1804	89.8	2343	88.2	634	92.0	6209	87.6
Limited	56	20.7	252	17.2	204	10.2	314	11.8	55	8.0	881	12.4
TOTAL	271	100.0	1465	100.0	2008	100.0	2657	100.0	689	100.0	7090	100.0
Grammar												
Acceptable	168	66.4	1072	76.1	1712	87.3	2184	84.0	596	86.9	5732	83.0
Poor	85	33.6	336	23.9	249	12.7	415	16.0	90	13.1	1175	17.0
TOTAL	253	100.0	1408	100.0	1961	100.0	2599	100.0	686	100.0	6907	100.0

TABLE F.23

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by low, lower middle, middle, upper middle, and high socioeconomic status within classifications of acceptability of length of responses, vocabulary, and grammar.

Language Characteristic	Socioeconomic Status										Total	
	Low		Lower Middle		Middle		Upper Middle		High			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Response Length												
Adequate	1810	22.2	1562	19.2	1542	18.9	1956	24.0	1276	15.7	8146	100.0
Inadequate	567	31.2	381	21.0	361	19.9	327	18.0	181	9.9	1817	100.0
TOTAL	2377	23.9	1943	19.5	1903	19.1	2283	22.9	1457	14.6	9963	100.0
Vocabulary												
Acceptable	1717	20.7	1555	18.7	1605	19.3	2067	24.9	1360	16.4	3804	100.0
Limited	653	40.2	381	23.5	285	17.6	207	12.7	98	6.0	1624	100.0
TOTAL	2370	23.9	1936	19.5	1890	19.0	2274	22.9	1458	14.7	9928	100.0
Grammar												
Acceptable	1700	21.0	1519	18.7	1559	19.2	1998	24.7	1331	16.4	8107	100.0
Poor	646	37.9	388	22.7	311	18.2	249	14.6	113	6.6	1707	100.0
TOTAL	2346	23.9	1907	19.4	1870	19.1	2247	22.9	1444	14.7	9814	100.0

TABLE F.24

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by low, lower middle, middle, upper middle, and high socioeconomic status within classifications of acceptability of length of responses, vocabulary, and grammar.

	Socioeconomic Status											
	Low		Lower Middle		Middle		Upper Middle		High		Total	
Language Characteristic	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Response Length												
Adequate	233	3.9	1173	19.4	1753	29.0	2281	37.8	596	9.9	6036	100.0
Inadequate	45	4.0	315	28.0	273	24.2	397	35.3	96	8.5	1126	100.0
TOTAL	278	3.9	1488	20.8	2026	28.3	2678	37.4	692	9.6	7162	100.0
Vocabulary												
Acceptable	215	3.5	1213	19.5	1804	29.1	2343	37.7	634	10.2	6209	100.0
Limited	56	6.4	252	28.6	204	23.2	314	35.6	55	6.2	881	100.0
TOTAL	271	3.8	1465	20.7	2008	28.3	2657	37.5	689	9.7	7090	100.0
Grammar												
Acceptable	168	2.9	1072	18.7	1712	29.9	2184	38.1	596	10.4	5732	100.0
Poor	85	7.2	336	28.6	249	21.2	415	35.3	90	7.7	1175	100.0
TOTAL	253	3.7	1408	20.4	1961	28.4	2599	37.6	686	9.9	6907	100.0

TABLE F.25

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by adequacy of responsiveness and eye contact within low, lower middle, middle, upper middle, and high socioeconomic groups.

	Socioeconomic Status											
	Low		Lower Middle		Middle		Upper Middle		High		Total	
Behavior	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Responsiveness												
Adequate	1902	79.6	1617	83.2	1625	85.3	2032	88.8	1316	90.1	8492	85.0
Inadequate	487	20.4	326	16.8	280	14.7	256	11.2	144	9.9	1493	15.0
TOTAL	2389	100.0	1943	100.0	1905	100.0	2288	100.0	1460	100.0	9985	100.0
Eye Contact												
Adequate	1982	83.6	1702	88.3	1670	88.1	2025	89.2	1357	93.7	8736	88.1
Infrequent	390	16.4	225	11.7	226	11.9	246	10.8	91	6.3	1178	11.9
TOTAL	2372	100.0	1927	100.0	1896	100.0	2271	100.0	1448	100.0	9914	100.0

TABLE F.26

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by adequacy of responsiveness and eye contact within low, lower middle, middle, upper middle, and high socioeconomic groups.

	Socioeconomic Status											
	Low		Lower Middle		Middle		Upper Middle		High		Total	
Behavior	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Responsiveness												
Adequate	238	84.7	1303	85.9	1825	89.1	2394	88.5	611	87.8	6371	87.9
Inadequate	43	15.3	213	14.1	224	10.9	312	11.5	85	12.2	877	12.1
TOTAL	281	100.0	1516	100.0	2049	100.0	2706	100.0	696	100.0	7248	100.0
Eye Contact												
Adequate	257	94.1	1397	93.6	1894	93.7	2517	93.6	633	90.8	6698	93.4
Infrequent	16	5.9	95	6.4	127	6.3	171	6.4	64	9.2	473	6.6
TOTAL	273	100.0	1492	100.0	2021	100.0	2688	100.0	697	100.0	7171	100.0

TABLE F.27

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by low, lower middle, middle, upper middle, and high socioeconomic status within classifications of adequacy of responsiveness and eye contact.

	Socioeconomic Status											
	Low		Lower Middle		Middle		Upper Middle		High		Total	
Behavior	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Responsiveness												
Adequate	1902	22.4	1617	19.1	1625	19.1	2032	23.9	1316	15.5	8492	100.0
Inadequate	487	32.6	326	21.8	280	18.8	256	17.2	144	9.6	1493	100.0
TOTAL	2389	23.9	1943	19.5	1905	19.1	2288	22.9	1460	14.6	9985	100.0
Eye Contact												
Adequate	1982	22.7	1702	19.5	1670	19.1	2025	23.2	1357	15.5	8736	100.0
Infrequent	390	33.1	225	19.1	226	19.2	246	20.9	91	7.7	1178	100.0
TOTAL	2372	23.9	1927	19.5	1896	19.1	2271	22.9	1448	14.6	9914	100.0

TABLE F.28

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by low, lower middle, middle, upper middle, and high socioeconomic status within classifications of adequacy of responsiveness and eye contact.

	Socioeconomic Status											
	Low		Lower Middle		Middle		Upper Middle		High		Total	
Behavior	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Responsiveness												
Adequate	238	3.7	1303	20.5	1825	28.6	2394	37.6	611	9.6	6371	100.0
Inadequate	43	4.9	213	24.3	224	25.5	312	35.6	85	9.7	877	100.0
TOTAL	281	3.9	1516	20.9	2049	28.3	2706	37.3	696	9.6	7248	100.0
Eye Contact												
Adequate	257	3.8	1397	20.9	1894	28.3	2517	37.6	633	9.4	6698	100.0
Infrequent	16	3.4	95	20.1	127	26.8	171	36.2	64	13.5	473	100.0
TOTAL	273	3.8	1492	20.8	2021	28.2	2688	37.5	697	9.7	7171	100.0

SECTION G

DISCUSSION

Miscellaneous Variables

Intelligence and Academic Achievement

The relation between intelligence and academic achievement in reading, arithmetic fundamentals, and arithmetic reasoning was explored to determine whether achievement in areas requiring reading showed more impairment than an area relatively independent of reading achievement. That is, it was expected that a speech- and hearing-handicapped population had language disabilities that might be reflected in lower achievement in reading and possibly arithmetic reasoning, for which the tests involve reading, and arithmetic fundamentals, which is independent of reading ability. Differences in achievement in these three areas within groups defined by intelligence would indicate whether the population of speech- and hearing-handicapped pupils was especially disabled in a particular area.

For the group of pupils with IQs of 75 or less, similar proportions had below average, average, and above average ratings in all three areas. Some differences were found in the other IQ groups among relative proportions of pupils having particular achievement ratings, though in all comparisons, differences were small.

Slightly higher proportions of the pupils in all IQ groups had below average achievement in reading in comparison with arithmetic fundamentals and reasoning, except in the 76 to 90 IQ group. In this group, the proportions of pupils with below average achievement in reading and arithmetic were similar, with a smaller proportion having below average achievement in arithmetic fundamentals.

The proportions of pupils with average achievement were similar for reading and arithmetic reasoning and were smaller than the proportions of pupils with average achievement in arithmetic fundamentals in the IQ groups of 76 to 90 and 111 to 130. In the 91 to 110 IQ group, the proportion of pupils with average reading achievement was somewhat smaller than the proportions of pupils who had average achievement in arithmetic fundamentals and reasoning. Approximately equal proportions of pupils in the 131 and above group had average achievement in all three areas.

In IQ groups above 75, somewhat smaller proportions of the pupils had above average reading achievement when compared with the proportions who were above average in arithmetic reasoning and fundamentals. The proportions of pupils with above average achievement in arithmetic fundamentals and reasoning were similar in the IQ group of 79 to 90 and 131 and above. In the IQ groups of 91 to 110 and 111 to 130, slightly higher proportions had above average achievement in arithmetic reasoning.

The proportions of pupils with above average achievement in arithmetic fundamentals fell between the proportions for arithmetic reasoning and reading, with the proportions for the latter being the smallest.

In general, a small but consistent tendency was found among pupils with IQs above 75 for reading achievement to be somewhat lower than achievement in arithmetic fundamentals. For the most part, achievement in arithmetic reasoning was slightly lower than for arithmetic fundamentals, but not as low as for reading.

Oral Language and Reading Achievement

Response length, vocabulary, and grammar were examined for the pupils for whom reading achievement was reported. Judgments about these aspects of language were based on the pupils' spontaneous speech. The comparison with reading achievement was made to determine whether deficiencies in oral language were related to deficiencies in reading.

In the combined caseload, 84.8% had acceptable response length, while 15.2% had inadequate response length. The proportions of pupils with inadequate response length decreased from 22% of the pupils with below average reading achievement to 11% of those with average reading achievement and 7% of the pupils with above average reading achievement.

As far as vocabulary was concerned, 86.9% had acceptable vocabularies while 13.1% had limited vocabularies. The proportions of the pupils having limited vocabularies changed, also, as reading achievement progressed from below average to above average. In the below average reading achievement group, 22.0% had limited vocabularies; 7.7% of the pupils with average reading achievement had limited vocabularies; only 2.5% of the pupils with above average reading achievement had limited vocabularies.

Eighty-four per cent of the pupils had acceptable grammar while 16% had poor grammar. The trend was the same as for response length and vocabulary. In the group of pupils with below average reading achievement, 25.4% had poor grammar, while 10.3% of the pupils with average reading achievement and 3.7% of the pupils with above average reading achievement had poor grammar. Differences between the two caseloads were negligible.

Deficiencies in the oral language behaviors examined showed an inverse relation to reading achievement; nonetheless, three-fourths or more of the pupils were judged acceptable in these areas regardless of reading achievement.

Source of Referral and Voice Quality Disorders

The sources of identification of pupils with voice quality disorders were examined to determine the kinds of disorders to which the various sources were most sensitive. The ability of referral sources to identify hoarse voice quality and to some extent, harsh and breathy voice qualtiy is particularly critical in schools where caseloads are largely made up of referrals, as these conditions may stem from laryngeal pathology.

The percentages of pupils with voice quality disorders identified through speech screening and referrals compared with the percentages of pupils with all other disorders exclusive of voice quality disorders were as follows:

Combined Caseload	
Voice Quality Disorders	17.2% speech screening, 82.8% referral
All Other Disorders	19.3% speech screening, 80.7% referral
City Caseload	
Voice Quality Disorders	8.8% speech screening, 91.2% referral
All Other Disorders	8.2% speech screening, 91.8% referral
County Caseload	
Voice Quality Disorders	29.0% speech screening, 71.0% referral
All Other Disorders	35.0% speech screening, 65.0% referral

These data indicate that similar proportions of pupils with voice quality disorders and all other disorders in the combined caseload and in the city caseload were identified through speech screening and referral, but a smaller proportion of pupils with voice quality disorders than with other disorders was identified through screening in the county caseload, where greater emphasis was placed on screening.

In the combined caseload, only 12.9% of the pupils with nasality and "other" voice quality disorders and 15.3% of the pupils with harsh voice quality were identified through screening. Proportions of pupils with breathy, hoarse, and denasal voices and combinations of voice quality disorders varied around 19% and ranged from 18.8% to 20.8%. However, in the city caseload, relatively high proportions of pupils with breathy voice quality and "other" voice quality disorders and relatively low proportions of the pupils with harsh voice quality and denasality were identified through speech screening. In the county caseload, relatively small proportions of the pupils with nasal voice quality and "other" voice quality disorders were identified through screening when compared with the pupils with other kinds of voice quality disorders. The proportion of the pupils with hoarse voice quality was high; nonetheless, the proportion was the same as for pupils with all other disorders.

In the combined caseload and in the city and county caseloads, respectively, teachers referred 67.1%, 63.9%, and 72.9% of all pupils referred for voice quality disorders. In comparison, teachers referred 73.5%, 71.0%, and 78.7%, respectively, of all pupils referred for other disorders exclusive of voice quality disorders. These data indicate that teachers are less sensitive to voice quality disorders than to other kinds of oral communication disorders.

In the combined caseload, the proportions of pupils referred by teachers were similar for the various voice quality disorders, except that the proportion of pupils having "other" voice quality disorders was appreciably lower. In the city caseload teachers referred relatively high proportions of pupils with breathy, harsh, and hoarse voices and a relatively low proportion of pupils with "other" voice quality disorders. In the county caseload, teachers referred relatively high proportions of pupils with nasal and denasal voices and relatively low proportions of pupils with harsh and "other" voice quality disorders and combinations of disorders.

Approximately 13% of the pupils with disorders exclusive of voice quality disorders were referred by unidentified sources--14.6% in the city caseload and 9.2% in the county caseload. In contrast, these sources referred 14.5% of the pupils with voice quality disorders--15.5% in the city and 12.6% in the county caseload. Compared with the proportions of pupils referred having other kinds of voice quality disorders, the proportion of pupils with "other" voice quality disorders was high. The proportions were high in both the city and county caseloads.

Health personnel referred 5.0% of pupils with disorders exclusive of voice quality disorders--7.2% in the city caseload and 0.7% in the county caseload. They referred 6.8% of the pupils with voice quality disorders--9.3% in the city and 2.3% in the county caseload. The proportion of pupils with nasal voices was higher and the proportion of pupils with hoarse voices was lower than proportions of pupils referred with other kinds of voice quality disorders.

The number of pupils with voice quality disorders referred by parents, administrators, guidance personnel, or who were self-referrals was very small. The proportions of pupils with voice quality disorders and all other disorders referred from these sources were similar. There was no marked tendency for pupils referred from these sources to have particular kinds of voice quality disorders.

SECTION G

ORGANIZATION OF TABLES

Miscellaneous

TABLE G.1

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by reading and arithmetic achievement within intelligence quotient levels.

	Intelligence Quotient											
	75 or Less		76-90		91-110		111-130		131 or More		Total	
Test Results	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Reading Achievement												
Below Average	411	89.8	874	75.7	854	42.9	193	19.0	19	9.7	2351	48.8
Average	40	8.7	247	21.4	870	43.7	365	36.0	32	16.2	1554	32.3
Above Average	7	1.5	34	2.9	267	13.4	456	45.0	146	74.1	910	18.9
TOTAL	458	100.0	1155	100.0	1991	100.0	1014	100.0	197	100.0	4815	100.0
Arithmetic												
a. Fundamentals												
Below Average	343	88.6	645	69.4	559	35.2	102	13.6	8	5.4	1657	43.6
Average	34	8.8	219	23.6	745	47.0	271	36.1	21	14.2	1290	34.0
Above Average	10	2.6	65	7.0	283	17.8	378	50.3	119	80.4	855	22.4
TOTAL	387	100.0	929	100.0	1587	100.0	751	100.0	148	100.0	3802	100.0
b. Reasoning												
Below Average	338	90.8	653	73.7	516	34.0	96	13.3	8	5.5	1611	44.3
Average	27	7.3	188	21.2	700	46.2	226	31.4	19	13.1	1160	31.9
Above Average	7	1.9	45	5.1	300	19.8	398	55.3	118	81.4	868	23.8
TOTAL	372	100.0	886	100.0	1516	100.0	720	100.0	145	100.0	3639	100.0

TABLE G.2

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by reading and arithmetic achievement within intelligence quotient levels.

	Intelligence Quotient											
	75 or Less		76-90		91-110		111-130		131 or More		Total	
Test Results	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Reading Achievement												
Below Average	97	89.0	270	74.0	381	42.0	62	13.7	6	6.5	816	42.4
Average	12	11.0	86	23.6	343	38.0	136	30.0	14	15.2	591	30.7
Above Average	--	--	9	2.4	181	20.0	255	56.3	72	78.3	517	26.9
TOTAL	109	100.0	365	100.0	905	100.0	453	100.0	92	100.0	1924	100.0
Arithmetic												
a. Fundamentals												
Below Average	80	87.0	173	65.8	230	34.8	43	11.8	2	2.5	528	36.1
Average	11	12.0	75	28.5	320	48.4	146	40.1	17	21.0	569	39.0
Above Average	1	1.0	15	5.7	111	16.8	175	48.1	62	76.5	364	24.9
TOTAL	92	100.0	263	100.0	661	100.0	364	100.0	81	100.0	1461	100.0
b. Reasoning												
Below Average	73	86.9	173	71.8	204	35.1	40	12.3	2	2.7	492	37.7
Average	10	12.0	55	22.8	257	44.2	118	36.3	13	17.8	453	34.7
Above Average	1	1.1	13	5.4	120	20.7	167	51.4	58	79.5	359	27.6
TOTAL	84	100.0	241	100.0	581	100.0	325	100.0	73	100.0	1304	100.0

TABLE G.3

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by intelligence quotient within reading and arithmetic achievement levels.

	Intelligence Quotient											
	75 or Less		76-90		91-110		111-130		131 or More		Total	
Test Results	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Reading Achievement												
Below Average	411	17.5	874	37.2	854	36.3	193	8.2	19	.8	2351	100.0
Average	40	2.6	247	15.9	870	56.0	365	23.5	32	2.0	1554	100.0
Above Average	7	.8	34	3.8	267	29.3	456	50.1	146	16.0	910	100.0
TOTAL	458	9.5	1155	24.0	1991	41.3	1014	21.1	197	4.1	4815	100.0
Arithmetic												
a. Fundamentals												
Below Average	343	20.7	645	38.9	559	33.7	102	6.2	8	.5	1657	100.0
Average	34	2.6	219	17.0	745	57.8	271	21.0	21	1.6	1290	100.0
Above Average	10	1.2	65	7.6	283	33.1	378	44.2	119	13.9	855	100.0
TOTAL	387	10.2	929	24.4	1587	41.7	751	19.8	148	3.9	3802	100.0
b. Reasoning												
Below Average	338	21.0	653	40.5	516	32.0	96	6.0	8	.5	1611	100.0
Average	27	2.3	188	16.2	700	60.4	226	19.5	19	1.6	1160	100.0
Above Average	7	.8	45	5.2	300	34.6	398	45.8	118	13.6	868	100.0
TOTAL	372	10.2	886	24.3	1516	41.7	720	19.8	145	4.0	3639	100.0

TABLE G.4

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by intelligence quotient within reading and arithmetic achievement levels.

	Intelligence Quotient											
	75 or Less		76-90		91-110		111-130		131 or More		Total	
Test Results	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Reading Achievement												
Below Average	97	12.0	270	33.0	381	46.7	62	7.6	6	.7	816	100.0
Average	12	2.0	86	14.6	343	58.0	136	23.0	14	2.4	591	100.0
Above Average	--	--	9	1.8	181	35.0	255	49.3	72	13.9	517	100.0
TOTAL	109	5.7	365	19.0	905	47.0	453	23.5	92	4.8	1924	100.0
Arithmetic												
a. Fundamentals												
Below Average	80	15.2	173	32.7	230	43.6	43	8.1	2	.4	528	100.0
Average	11	1.9	75	13.2	320	56.2	146	25.7	17	3.0	569	100.0
Above Average	1	.3	15	4.1	111	30.5	175	48.1	62	17.0	364	100.0
TOTAL	92	6.3	263	18.0	661	45.2	364	24.9	81	5.6	1461	100.0
b. Reasoning												
Below Average	73	14.8	173	35.2	204	41.5	40	8.1	2	.4	492	100.0
Average	10	2.2	55	12.1	257	56.7	118	26.1	13	2.9	453	100.0
Above Average	1	.3	13	3.6	120	33.4	167	46.5	58	16.2	359	100.0
TOTAL	84	6.4	241	18.5	581	44.6	325	24.9	73	5.6	1304	100.0

TABLE G.5

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by acceptability of length of responses, vocabulary, and grammar within below average, average, and above average reading achievement groups.

Language Characteristic	Reading Achievement							
	Below Average		Average		Above Average		Total	
	Number	%	Number	%	Number	%	Number	%
Response Length								
Acceptable	1918	77.4	1489	88.7	889	92.4	4296	83.9
Inadequate	561	22.6	189	11.3	73	7.6	823	16.1
TOTAL	2479	100.0	1678	100.0	962	100.0	5119	100.0
Vocabulary								
Acceptable	1903	77.1	1530	91.4	923	96.1	4356	85.4
Limited	566	22.9	144	8.6	37	3.9	747	14.6
TOTAL	2469	100.0	1674	100.0	960	100.0	5103	100.0
Grammar								
Acceptable	1849	75.6	1496	90.8	915	95.9	4260	84.4
Poor	597	24.4	151	9.2	39	4.1	787	15.6
TOTAL	2446	100.0	1647	100.0	954	100.0	5047	100.0

TABLE G.6

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by acceptability of length of responses, vocabulary, and grammar within below average, average, and above average reading achievement groups.

Language Characteristic	Reading Achievement Below Average Number	 %	 Average Number	 %	 Above Average Number	 %	 Total Number	 %
Response Length								
Acceptable	1076	79.1	996	89.2	758	94.0	2830	86.2
Inadequate	284	20.9	120	10.8	48	6.0	452	13.8
TOTAL	1360	100.0	1116	100.0	806	100.0	3282	100.0
Vocabulary								
Acceptable	1080	79.8	1041	93.6	796	99.0	2917	89.2
Limited	273	20.2	71	6.4	8	1.0	352	10.8
TOTAL	1353	100.0	1112	100.0	804	100.0	3269	100.0
Grammar								
Acceptable	969	72.9	961	87.9	762	96.8	2692	83.9
Poor	360	27.1	132	12.1	25	3.2	517	16.1
TOTAL	1329	100.0	1093	100.0	787	100.0	3209	100.0

TABLE G.7

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by below average, average, and above average reading achievement within classifications of acceptability of length of responses, vocabulary, and grammar.

Language Characteristic	Reading Achievement							
	Below Average		Average		Above Average		Total	
	Number	%	Number	%	Number	%	Number	%
Response Length								
Acceptable	1918	44.6	1489	34.7	889	20.7	4296	100.0
Inadequate	561	68.1	189	23.0	73	8.9	823	100.0
TOTAL	2479	48.4	1678	32.8	962	18.8	5119	100.0
Vocabulary								
Acceptable	1903	43.7	1530	35.1	923	21.2	4356	100.0
Limited	566	75.8	144	19.3	37	4.9	747	100.0
TOTAL	2469	48.4	1674	32.8	960	18.8	5103	100.0
Grammar								
Acceptable	1849	43.4	1496	35.1	915	21.5	4260	100.0
Poor	597	75.9	151	19.2	39	4.9	787	100.0
TOTAL	2446	48.5	1647	32.6	954	18.9	5047	100.0

TABLE G.8

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by below average, average, and above average reading achievement within classifications of acceptability of length of responses, vocabulary, and grammar.

Language Characteristic	Reading Achievement							
	Below Average		Average		Above Average		Total	
	Number	%	Number	%	Number	%	Number	%
Response Length								
Acceptable	1076	38.0	996	35.2	758	26.8	2830	100.0
Inadequate	284	62.8	120	26.6	48	10.6	452	100.0
TOTAL	1360	41.4	1116	34.0	806	24.6	3282	100.0
Vocabulary								
Acceptable	1080	37.0	1041	35.7	796	27.3	2917	100.0
Limited	273	77.5	71	20.2	8	2.3	352	100.0
TOTAL	1353	41.4	1112	34.0	804	24.6	3269	100.0
Grammar								
Acceptable	969	36.0	961	35.7	762	28.3	2692	100.0
Poor	360	69.6	132	25.5	25	4.9	517	100.0
TOTAL	1329	41.4	1093	34.1	787	24.5	3209	100.0

TABLE G.9

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by source of identification--speech screening or referral by teachers, parents, self, administrators, health or guidance personnel, or other agencies--within types of voice quality disorders. (This table is completed on the succeeding page.)

Source of Identification	Type of Voice Quality Disorder							
	Breathy		Harsh		Hoarse		Nasal	
	Number	%	Number	%	Number	%	Number	%
Speech Screening	38	14.0	3	3.1	28	8.4	36	8.0
Referral	234	86.0	94	96.9	304	91.6	415	92.0
Teacher	164	(70.1)	67	(71.3)	210	(69.1)	240	(57.8)
Parents	12	(5.1)	1	(1.1)	12	(4.0)	24	(5.8)
Self	8	(3.4)	3	(3.2)	10	(3.3)	11	(2.7)
Administrator	6	(2.6)	1	(1.1)	5	(1.6)	6	(1.4)
Guidance Personnel	4	(1.7)	2	(2.1)	5	(1.6)	6	(1.4)
Health Personnel	13	(5.6)	8	(8.5)	8	(2.6)	58	(14.0)
Other	27	(11.5)	12	(12.7)	54	(17.8)	70	(16.9)
TOTAL	272	100.0	97	100.0	332	100.0	451	100.0

TABLE G.9 (continued)

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by source of identification--speech screening or referral by teachers, parents, self, administrators, health or guidance personnel, or other agencies--within types of voice quality disorders.

Source of Identification	Type of Voice Quality Disorder							
	Denasal		Combination		Other		Total	
	Number	%	Number	%	Number	%	Number	%
Speech Screening	8	5.5	13	8.2	12	11.4	138	8.8
Referral	137	94.5	145	91.8	93	88.6	1422	91.2
Teacher	83	(60.6)	94	(64.8)	50	(53.8)	908	(63.9)
Parents	9	(6.5)	10	(6.9)	3	(3.2)	71	(5.0)
Self	2	(1.5)	5	(3.5)	2	(2.1)	41	(2.9)
Administrator	2	(1.5)	2	(1.4)	5	(5.4)	27	(1.9)
Guidance Personnel	1	(.7)	1	(.7)	2	(2.1)	21	(1.5)
Health Personnel	16	(11.7)	16	(11.0)	14	(15.1)	133	(9.3)
Other	24	(17.5)	17	(11.7)	17	(18.3)	221	(15.5)
TOTAL	145	100.0	158	100.0	105	100.0	1560	100.0

TABLE G.10

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by source of identification--speech screening or referral by teachers, parents, self, administrators, health or guidance personnel, or other agencies--within types of voice quality disorders. (This table is completed on the succeeding page.)

Source of Identification	Type of Voice Quality Disorder							
	Breathy		Harsh		Hoarse		Nasal	
	Number	%	Number	%	Number	%	Number	%
Speech Screening	43	30.1	25	29.1	87	34.1	53	22.3
Referral	100	69.9	61	70.9	168	65.9	185	77.7
Teacher	73	(73.0)	42	(68.9)	121	(72.0)	144	(77.8)
Parents	3	(3.0)	2	(3.3)	5	(3.0)	12	(6.5)
Self	1	(1.0)	1	(1.6)	10	(5.9)	9	(4.9)
Administrator	--	(--)	2	(3.3)	3	(1.8)	1	(.5)
Guidance Personnel	4	(4.0)	2	(3.3)	--	(--)	2	(1.1)
Health Personnel	2	(2.0)	1	(1.6)	3	(1.8)	8	(4.3)
Other	17	(17.0)	11	(18.0)	26	(15.5)	9	(4.9)
TOTAL	143	100.0	86	100.0	255	100.0	238	100.0

TABLE G.10 (continued)

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by source of identification--speech screening or referral by teachers, parents, self, administrators, health or guidance personnel, or other agencies--within types of voice quality disorders.

Source of Identification	Type of Voice Quality Disorder Denasal Number	%	Combination Number	%	Other Number	%	Total Number	%
Speech Screening	45	32.8	56	32.4	11	15.1	320	29.0
Referral	92	67.2	117	67.6	62	84.9	785	71.0
Teacher	72	(78.3)	80	(68.4)	40	(64.5)	572	(72.9)
Parents	4	(4.3)	3	(2.6)	2	(3.2)	31	(4.0)
Self	4	(4.3)	5	(4.2)	4	(6.5)	34	(4.3)
Administrator	1	(1.1)	3	(2.6)	1	(1.6)	11	(1.4)
Guidance Personnel	3	(3.3)	6	(5.1)	3	(4.9)	20	(2.5)
Health Personnel	--	(--)	3	(2.6)	1	(1.6)	18	(2.3)
Other	8	(8.7)	17	(14.5)	11	(17.7)	99	(12.6)
TOTAL	137	100.0	173	100.0	73	100.0	1105	100.0

TABLE G.11

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by type of voice quality disorder within sources of identification--speech screening or referral by teachers, parents, self, administrators, health or guidance personnel, or other agencies. (This table is completed on the succeeding page.)

Source of Identification	Type of Voice Quality Disorder							
	Breathy		Harsh		Hoarse		Nasal	
	Number	%	Number	%	Number	%	Number	%
Speech Screening	38	27.5	3	2.2	28	20.3	36	26.1
Referral	234	16.5	94	6.6	304	21.4	415	29.2
Teacher	164	18.1	67	7.4	210	23.1	240	26.4
Parents	12	16.9	1	1.4	12	16.9	24	33.8
Self	8	19.5	3	7.3	10	24.4	11	26.8
Administrator	6	22.2	1	3.8	5	18.5	6	22.2
Guidance Personnel	4	19.0	2	9.5	5	23.8	6	28.6
Health Personnel	13	9.8	8	6.0	8	6.0	58	43.6
Other	27	12.2	12	5.4	54	24.4	70	31.7
TOTAL	272	17.4	97	6.2	332	21.3	451	28.9

TABLE G.11 (continued)

Distribution of children receiving speech and hearing services in the Los Angeles City Unified School District by type of voice quality disorder within sources of identification--speech screening or referral by teachers, parents, self, administrators, health or guidance personnel, or other agencies.

Source of Identification	Type of Voice Quality Disorder							
	Denasal		Combination		Other		Total	
	Number	%	Number	%	Number	%	Number	%
Speech Screening	8	5.8	13	9.4	12	8.7	138	100.0
Referral	137	9.6	145	10.2	93	6.5	1422	100.0
Teacher	83	9.1	94	10.4	50	5.5	908	100.0
Parents	9	12.7	10	14.1	3	4.2	71	100.0
Self	2	4.9	5	12.2	2	4.9	41	100.0
Administrator	2	7.4	2	7.4	5	18.5	27	100.0
Guidance Personnel	1	4.8	1	4.8	2	9.5	21	100.0
Health Personnel	16	12.0	16	12.0	14	10.6	133	100.0
Other	24	10.9	17	7.7	17	7.7	221	100.0
TOTAL	145	9.3	158	10.1	105	6.8	1560	100.0

TABLE G.12

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by type of voice quality disorder within sources of identification--speech screening or referral by teachers, parents, self, administrators, health or guidance personnel, or other agencies. (This table is completed on the succeeding page.)

	Type of Voice Quality Disorder							
	Breathy		Harsh		Hoarse		Nasal	
Source of Identification	Number	%	Number	%	Number	%	Number	%
Speech Screening	43	13.4	25	7.8	87	27.2	53	16.6
Referral	100	12.7	61	7.8	168	21.4	185	23.6
Teacher	73	12.8	42	7.3	121	21.1	144	25.2
Parents	3	9.7	2	6.4	5	16.1	12	38.7
Self	1	2.9	1	2.9	10	29.4	9	26.5
Administrator	--	--	2	18.1	3	27.3	1	9.1
Guidance Personnel	4	20.0	2	10.0	--	--	2	10.0
Health Personnel	2	11.1	1	5.5	3	16.7	8	44.5
Other	17	17.2	11	11.1	26	26.2	9	9.1
TOTAL	143	12.9	86	7.8	255	23.1	238	21.5

8

TABLE G.12 (continued)

Distribution of children receiving speech and hearing services in 38 Los Angeles County school districts by type of voice quality disorder within sources of identification--speech screening or referral by teachers, parents, self, administrators, health or guidance personnel, or other agencies.

Source of Identification	Type of Voice Quality Disorder							
	Denasal		Combination		Other		Total	
	Number	%	Number	%	Number	%	Number	%
Speech Screening	45	14.1	56	17.5	11	3.4	320	100.0
Referral	92	11.7	117	14.9	62	7.9	785	100.0
Teacher	72	12.6	80	14.0	40	7.0	572	100.0
Parents	4	12.9	3	9.7	2	6.5	31	100.0
Self	4	11.8	5	14.7	4	11.8	34	100.0
Administrator	1	9.1	3	27.3	1	9.1	11	100.0
Guidance Personnel	3	15.0	6	30.0	3	15.0	20	100.0
Health Personnel	--	--	3	16.7	1	5.5	18	100.0
Other	8	8.1	17	17.2	11	11.1	99	100.0
TOTAL	137	12.4	173	15.7	73	6.6	1105	100.0

SECTION H

SOME ASPECTS OF THE CASE RECORD

The relatively high percentage of conditions or characteristics classified in categories designated as "other" indicates that descriptive terms in some sections of the case record need to be expanded. The items on which either large numbers or relatively high percentages of observations were classified as "other" along with the descriptive nomenclature now used were as follows:

Referring Agencies: 13.1% other, N = 1,916 (Table A.24)
Present terms: Teacher, Parents, Self, Administrator, Guidance Personnel, Health Personnel

Consonant Errors: 3.5% other, N = 541 (Tables C.1 and C.2)
Present terms: Omissions, Distortions, Substitutions, Additions

Tongue--Inadequate: 20.7% other, N = 516 (Tables C.24 and C.25)
Present terms: Lack of Mobility, Too Large, Asymmetrical

Malocclusion: 8.5% other, N = 309 (Tables C.16 and C.17)
Present terms: Open Bite, Over Jet, Under Jet, Cross Bite

Teeth--Inadequate: 5% other, N = 211 (Tables C.20 and C.21)
Present terms: Deciduous Teeth Missing, Permanent Teeth Missing, Teeth Malpositioned, Caries

Soft Palate--Inadequate: 56.5% other, N = 104 (Tables C.44 and C.45)
Present terms: Unrepaired Cleft, Submucous Cleft, Repaired Cleft, Prosthesis, Too Short, Poor Mobility, Asymmetric Function

Lips--Inadequate: 9.6% other, N = 80 (Table C.24 and C.25)
Present terms: Repaired Cleft, Cerebral Palsy, Poor Mobility

Voice Quality--Deviant: 4.5% other, N = 42 (C.36 and C.37)
Present terms: Breathy, Harsh, Hoarse, Nasal, Denasal

For the most part, the terms already supplied appear to encompass most of the more common deviations. The very high percentage of unidentified inadequacies of the soft palate and tongue are rather puzzling. The high percentage of unidentified referral sources might be reduced by adding physicians, though it was supposed that referrals from physicians would have been included under referrals from health personnel. Other possibilities here would be the addition of social welface agencies and other speech and hearing clinicians. In one sense, it is rather surprising that more of the voice quality deviations were not classified as "other", as descriptive nomenclature is quite variable for these conditions.

The relatively large number of unidentified inadequacies indicates the need for a further search for descriptive terms among the clinicians who have used the case record.

Some other areas of confusion need to be clarified also. As mentioned previously in Section C, 341 pupils were classified as having articulation disorders, yet they were said to have normal consonant articulation even though in the analysis of articulation errors shown in Table C.5, no instances of articulation errors occurred that did not include consonant errors. The nature of the articulatory behavior that caused these 341 pupils to be classified as having articulation disorders needs to be determined and suitable descriptive nomenclature added to the case record.

Another confusion lies in the datum showing 2,767 had voice quality deviations (Table A.4). Only 163 pupils were classified as having voice disorders, which is not limited to quality deviations alone, and another 1,135 had voice disorders as either a primary, secondary, or tertiary multiple disorder, or 1,469 less than the 2,767 shown in Table A.4.

The entire area of voice and voice quality disorders needs further exploration to determine the basis for the large number of pupils described as having various kinds of defective voice quality as opposed to the small number classified as having voice disorders as expressive speech disorders. The question appears to be concerned with the circumstances under which voice quality deviations are and are not regarded as expressive speech disorders, and under what conditions are the deviations only noted without attempts on the part of clinicians to modify the voice quality.

Still another area in need of clarification has to do with dental conditions. The instructions printed on Part H on the case record indicate that a structure should be marked inadequate only if it interferes with speaking. As mentioned previously in Section F, 1,051 pupils were said to have caries, while 1,242 pupils had missing teeth. These figures are very high in terms of what has been reported previously about the effect of caries on speech. It may be that the data reported on dental conditions represent information reported as health history would be reported and were not meant to imply obstruction to or interference with speech. If, however, the conditions were reported as intended on the case record, the data imply a much closer relation between dental conditions and speaking than has been recognized heretofore, and further study is indicated.

One additional finding deserves discussion. There was no single tabulation that resulted in totals equal to the number of records received. Apparently, even the most basic data are sometimes overlooked. The following indicates some of the areas that might be expected to be completed on any record and the number of records without information:

Age: Los Angeles City Caseload, 229
Los Angeles County Caseload, 258
Combined Caseload, 487

Sex: Los Angeles City Caseload, 208
Los Angeles County Caseload, 217
Combined Caseload, 425

Grade: Los Angeles City Caseload, 137
Los Angeles County Caseload, 240
Combined Caseload, 377

Class Placement: Los Angeles City Caseload, 215
Los Angeles County Caseload, 258
Combined Caseload, 473

Case Identification: Los Angeles City Caseload, 332
Los Angeles County Caseload, 621
Combined Caseload, 953

Expressive Speech Disorder: Los Angeles City Caseload, 290
Los Angeles County Caseload, 485
Combined Caseload, 775

CHAPTER IV

SUMMARY

The purpose of this project was to describe the characteristics of pupils receiving service in school speech and hearing programs. The data collection instrument was a newly developed standard case record.

The Los Angeles City Unified School District and 38 Los Angeles County school districts participated in the study. These districts had a total enrollment of 1,067,886 pupils. The enrollment in the Los Angeles Unified School District was 642,875 pupils. The enrollment in the county districts ranged from 2,892 to 33,443 pupils. The pupil population of the districts was from a broad spectrum of socioeconomic, cultural, and ethnic backgrounds.

The districts represented a wide range of educational policies and practices, each being separate administrative units. Most of the districts included elementary and secondary schools, though 16 of the county districts included elementary schools only.

The entire staff of speech and hearing clinicians in each of the 39 districts participated: 102 clinicians in the Los Angeles City Unified School District and 110 in the 38 county districts, or a total of 212 clinicians. Case records were completed on all of the children enrolled in speech and hearing caseloads throughout the 1966-67 school year. Records were submitted for 10,874 pupils enrolled in the caseload of the city schools and 8,111 pupils in the county schools, or a total of 18,985 pupils.

The participating clinicians met in small groups with the principal investigators to review the record and observe a film which included demonstrations of the way in which the record should be filled out and of some suggestions for testing.

The data are not based on some arbitrary standard for making judgments and observations established by a particular clinician or group of clinicians especially trained and employed to collect data; rather, they represent the characteristics of pupils in caseloads as described by the practicing school clinicians who worked with the pupils on a regular basis.

The data are reported in a series of tables. The first set of tables show the number and percentage of pupils with the major characteristics or behaviors reported. Results are shown for the combined caseload of the 39 districts and for the Los Angeles City Unified School District and the combined county school districts separately. Subsequent tables are concerned with combinations of characteristics or behaviors with the exception of those single factor tables reporting articulation disorders. These tables show the distribution of pupils in the city schools and the combined county schools separately. The total number of pupils varies from table to table, as some information was not available for all pupils.

The following is a summary of the characteristics of the pupils enrolled in the caseloads of speech and hearing clinicians in Los Angeles area schools.

A. General Description

1. The distribution of expressive speech disorders, described by either the single disorder or the primary disorder in the case of multiple disorders, was articulation disorders, 83.3%; stuttering, 10.4%; language disorders, 2.4%; voice disorders, 2.1%; little or no speech, 1.8%.

2. Single Expressive speech disorders were present in 84% of the pupils; 16% had multiple expressive speech disorders.

3. The sex ratio was two males for every female.

4. Nearly 11% of the pupils had regional or foreign dialects. Over half of the dialects were foreign.

5. Most of the pupils were intelligible; 79% were intelligible; 18% were partially intelligible; 3% were unintelligible.

6. In oral communication situations, 17% of the pupils made inadequate responses, usually because of briefness; 17% had poor grammar; 15% had limited vocabularies.

7. Undesirable oral habits, such as thumb sucking and nail biting, were the most common of the deviations in behaviors associated with oral communication. They were present in 16% of the pupils, while infrequent eye contact was present in 9.5%.

8. Hearing information was reported for only 73% of the pupils. Of the group for whom information was reported, 10% had hearing losses.

9. Twenty-two per cent of the pupils had malocclusion; 26% had other kinds of dental defects. Difficulty with the tongue was the next most common inadequacy of the peripheral oral mechanism and was present in 15% of the pupils.

10. Health histories were reported for only 54% of the pupils. On the bases of the reports submitted, the incidence of serious early illnesses, allergies, and asthma was unusually high.

11. The distribution of pupils by socioeconomic status as determined by annual family income reported for census tracts was as follows: low, 15%; lower-middle, 20%; middle, 23%; upper-middle, 29%; high, 13%.

12. Most of the pupils had siblings; 4% were only children.

13. Eighty per cent of the pupils lived with their natural parents; 8.8% did not have fathers; 0.7% did not have mothers; 0.4% had no parents.

14. Information about speech problems among relatives was reported for only half of the caseload. Of the pupils for whom information was supplied, 40% had relatives with speech problems. Two males had relatives with speech problems for every female having relatives with speech problems.

15. Information on intelligence test scores was reported for approximately 95% of the pupils in the city sample and 40% of the pupils in the county sample. In the combined caseload, 10% of the pupils had IQs of 75 or less; 86% had IQs from 76 to 130; 4% had IQs of 131 or above.

16. Approximately 45% of the pupils were below average in reading readiness and achievement in reading, arithmetic fundamentals and reasoning. About one-third of the pupils were average, while a little over one-fifth were above average. Achievement was slightly better in arithmetic than in reading. Reading achievement was slightly lower for males than for females.

17. The range in age was from three to 21 years. The sex ratio was constant throughout the age range except in the older group from 16 years on. For this group, the sex ratio changed to 1.6 males for every female.

18. Distribution by class placement was preschool, 0.5%; kindergarten through third grade, 57%; fourth through sixth grade, 25%; seventh through ninth grade, 11%; tenth through twelfth grade, 5%. The remaining pupils were in ungraded classes.

19. Less than 1% of the pupils were not yet in school; 94% were in regular classes; 5.5% were in special classes, primarily classes for the educable mentally retarded.

20. Only 19% of the pupils were identified through speech screening; 81% were referred. Referrals were mostly from teachers whose referrals decreased with age and dropped sharply for the 12-year-olds and again decreased with age thereafter. Referrals from unidentified sources increased sharply for the 12-year-olds. Referrals from unidentified sources increased gradually with age. Referrals from other sources were negligible.

21. Half of the pupils had had one or more years of previous therapy in school. More males than females had had previous school therapy. Only 3% of the pupils had had therapy outside of school.

B. Single Expressive Speech Disorders

1. Single expressive speech disorders were present in 84% of the pupils.

2. The distribution of single expressive speech disorders was articulation, 88.9%; stuttering, 8.4%; voice disorders, 1.0%; language disorders, 0.9%; little or no speech, 0.8%.

3. The sex ratio was two males for every female.

4. Articulation Disorders

    a. Articulation disorders decreased steadily with age.

    b. For all pupils making articulation errors, the mean score for the 50 items included in the Templin-Darley test was 35.0 with a standard deviation of 10.17. Means at each age level were below the Templin-Darley cut-off scores except for one group of four-year-olds and two 20-year-olds.

    c. The mean score for the 43-item phonetic inventory was 38.1 with a standard deviation of 4.07. Compared by age levels, means of the 50-item test indicated better articulation skill among older pupils than was indicated by the phonetic inventory.

    d. For all sounds, the mean number of errors per pupil on vowels and diphthongs, consonants, and blends were 2.06, 10.35, and 12.4, respectively.

e. Most of the vowel errors were on /ɝ/, /ɚ/, and /ju/.

f. The most frequently misarticulated consonants were /s/, /z/, /θ/, /r/, /ʃ/, /tʃ/, and /ð/. Frequency of errors was related to the postulated order of sound development in the most general way only.

g. Most consonant errors were substitution errors followed by distortions and then omission errors. Distortion errors were highest on the groups of sounds most frequently misarticulated. Substitution errors followed no particular pattern.

h. Errors were distributed about equally over initial, medial, and final positions.

i. Errors on triple blends were only slightly higher than on double blends. More errors were made on /s/-blends than on /r/-blends. more errors were made on /r/-blends than on /l/-blends. Frequency of errors was not related to the postulated order of blend development.

j. In spontaneous speech, 76% of the pupils made consistent errors; 24% made inconsistent errors. Pupils with articulation as a single disorder made more consistent errors than pupils having articulation disorders combined with other disorders.

5. Stuttering

a. The sex ratio for stuttering was four males for every female.

b. The number of pupils with stuttering disorders increased steadily with age.

c. Infrequent eye contact and distracting mannerisms occurred more often among pupils who stuttered than among pupils with other disorders. They were most prevalent among the older group of stutterers.

d. More pupils who stuttered had undesirable oral habits such as thumb sucking, nail biting, and so forth than pupils with other disorders.

6. Voice Disorders

a. Voice Quality

1. More than twice the number of pupils with voice disorders had voice quality deviations.

2. Nasality was the most common voice quality deviation. It was related to both sex and age. Nasality occurred more often among the older pupils from 12 years on.

3. Hoarse voice quality was the second most common voice quality deviation. Hoarseness was related to both age and sex. More males than females were hoarse. Hoarseness occurred more often in age groups under 11 years.

4. Breathy voice quality tended to be related to both age and sex. More females than males had breathy quality. Breathiness was more prevalent among the older pupils.

5. Denasality was more common in the group from eight to 12 years old. It was not related to sex.

6. Harsh voice quality was relatively rare. Only slightly more males than females had harsh voice quality.

b. Other Voice Deviations

1. Pitch disorders were present in 8% of the pupils. Pitch was usually too high.

2. Loudness deviations were present in 13% of the pupils. More males than females had loudness deviations. The most frequent complaint was lack of loudness.

3. Rate deviations were present in 15% of the pupils. Rate was usually either too rapid or uneven.

7. Language Disorders

   a. Language disorders remained constant with age from five years on.

8. Little or No Speech

   a. The sex ratio for little or no speech was equal. Little or no speech remained fairly constant in age groups from five years on.

C. Multiple Expressive Speech Disorders

1. Multiple expressive speech disorders were present in 16% of the pupils. Of this group, 88% had two disorders; 12% had three or more disorders.

2. Articulation was one of the disorders in nine out of ten cases of multiple disorders.

3. Voice and language disorders and little or no speech occurred more often with other disorders than as single disorders.

4. Voice disorders were usually regarded as secondary rather than primary disorders.

5. The sex ratio was 2.5 males for every female.

6. Over-all, multiple disorders were more common among older pupils.

   a. Articulation disorders combined with stuttering increased rather sharply with age to the 18-year group.

   b. Articulation combined with voice disorders also increased with age, though not to the same extent as articulation disorders combined with stuttering.

   c. Articulation disorders combined with little or no speech or language disorders remained fairly constant with age from six years on.

   d. Voice disorders combined with stuttering was higher in the 13- to 17-year group.

7. More of the pupils with multiple speech disorders had poor intelligibility, inadequate response length, limited vocabularies, poor grammar, and below average achievement in reading and arithmetic.

8. Slightly more pupils with multiple disorders had mixed lateral preference and fewer had right preference. Left preference was the same as for the pupils with other disorders.

D. Characteristics Associated with Socioeconomic Status

1. Response length, vocabulary, and grammar in spontaneous speech as well as communicative responsiveness and eye contact varied with socioeconomic background. The number of pupils with adequate or acceptable performance increased from low to high. Both intelligence and achievement in reading and arithmetic varied directly with socioeconomic status.

2. Defective dental conditions except malocclusion also increased as socioeconomic status increased from low to high. Malocclusion was present in about equal proportions in all socioeconomic groups; however, open bite decreased as socioeconomic status increased, but mesiocclusion increased as socioeconomic status increased.

3. Case identification varied with socioeconomic status. More pupils identified through screening were in the higher socioeconomic groups. Referrals by parents increased as socioeconomic status increased; however, the total number referred by parents was very small. Health personnel and unidentified referral sources tended to refer slightly more pupils with low socioeconomic backgrounds.

4. The youngest group of pupils tended to be from the upper-middle socioeconomic group, while more of the older pupils were from the two lowest socioeconomic groups.

E. Language Related Characteristics

1. With intelligence held constant, achievement was poorer in reading than in arithmetic fundamentals. Achievement in arithmetic reasoning was slightly better than in reading, but not as good as in arithmetic fundamentals.

2. Inadequate response length, limited vocabulary, and poor grammar in spontaneous speech tended to be associated with below average reading achievement.

F. Identification of Pupils with Voice Quality Deviations

1. Similar proportions of pupils with voice qualtiy disorders and speech disorders exclusive of voice quality disorders were identified through speech screening in the city schools where 8% of the caseload was identified through screening. In the county schools, where 34% of the caseload was identified through screening, fewer of the pupils with voice quality disorders were identified through screening than pupils with other kinds of speech disorders.

2. The majority of pupils with voice quality disorders were referred by teachers without emphasis on particular kinds of voice quality disorders. Health personnel and unidentified sources referred slightly higher proportions of pupils with voice quality disorders than with other kinds of disorders. These latter differences were too small to warrant generalizing.

REFERENCES

1. Bass, Adalee. "The Remission of Articulatory Errors of Kindergarten Children." Unpublished Master's thesis, Sacramento State College. 1968.

2. Bingham, Dale S.; Van Hattum, Rolland J.; Faulk, Margaret E; and Taussig, Eleanor. "Program Organization and Management," *Journal of Speech and Hearing Disorders Monograph Supplement*. 8, June, 1961. p. 33-49.

3. Census Tract Street Index of Los Angeles County. Los Angeles County Department of Mental Health. October, 1965.

4. Davis, Irene Poole. Cited in Wendell Johnson and others, *Diagnostic Methods in Speech Pathology*. New York: Harper and Row. 1963. p. 102.

5. Eagles, Eldon L.; Wishik, Samuel M.; and Doerfler, Leo G. *Hearing Sensitivity and Related Factors in Children*. St. Louis, Missouri: The Laryngoscope. 1963.

6. Hall, Margaret. Cited in Margaret Hall Powers, "Functional Disorders of Articulation--Symptomatology and Etiology," Chapter 23 in Lee Edward Travis (Editor), *Handbook of Speech Pathology*. New York: Appleton-Century-Crofts, Inc. 1957. p. 707-768.

7. Pendergast, Kathleen; and others. "An Articulation Study of 15,255 Seattle First Grade Children with and without Kindergarten," *Exceptional Children*. 32, April, 1966. p. 541-547.

8. Roe, Vivian, and Milisen, Robert. "The Effect of Maturation upon Defective Articulation in Elementary Grades," *Journal of Speech Disorders*. 7, March, 1942. p. 37-50.

9. Sayler, Helen K. "The Effect of Maturation upon Defective Articulation in Grades Seven through Twelve," *Journal of Speech and Hearing Disorders*. 14, September, 1949. p. 202-207.

10. Snow, Katherine. "A Detailed Analysis of Articulation Responses of 'Normal' First Grade Children," *Journal of Speech and Hearing Research*. 6, September, 1963. p. 277-290.

11. Snow, Katherine. "Articulation Proficiency in Relation to Certain Dental Abnormalities," *Journal of Speech and Hearing Disorders*. 26, August, 1961. p. 209-212. Excerpt (page 148) reprinted by permission of publisher, author and/or copyright owner.

12. Templin, Mildred C. *Certain Language Skills in Children*. Institute of Child Welfare Monograph Series, No. 26. Minneapolis: University of Minnesota Press. 1957.

13. Templin, Mildred C., and Darley, Frederic L. *The Templin-Darley Tests of Articulation.* Iowa City, Iowa: University of Iowa Bureau of Education Research and Service, Division of Extension and University Services. 1960.

14. United States Bureau of the Census. *Censuses of Population and Housing--1960; Census Tracts: Los Angeles-Long Beach, California, Standard Metropolitan Statistical Area.*

15. Van Riper, Charles. *Speech Correction Principles and Methods.* Second Edition. New York: Prentice-Hall, Inc. 1947.

16. Van Riper, Charles. *Speech Correction Principles and Methods.* Fourth Edition. Englewood Cliffs, New Jersey. 1963.

17. Wellman, Beth L.; Case, Ida Mae; and Bradbury, Dorothy E. Cited in Wendell Johnson and others, *Diagnostic Methods in Speech Pathology.* New York: Harper and Row. 1963. p. 101.

APPENDIX A

ABSTRACT OF CASE RECORDS

(STANDARD CASE RECORD)

(Original Size: 8 3/8" x 10 7/8")

LAST NAME FIRST MIDDLE

PARENTS (GUARDIANS) LAST NAME FIRST

BIRTHDATE AGE M F SEX

LAST NAME

FIRST

MIDDLE

Speech and Hearing
Abstract of Case Records

School Districts in Los Angeles County

Date 1ST YEAR (BLACK) / 2ND YEAR (RED) / 3RD YEAR (GREEN)

COMPLETE ADDRESS (STREET NO.) (STREET NAME—INDICATE AVE., BLVD., ST., ETC. AND N., S., W. OR E.) ZIP CODE
CITY COUNTY PHONE
SCHOOL DISTRICT SCHOOL S-H SPECIALIST

COMPLETE ADDRESS (STREET NO.) (STREET NAME—INDICATE AVE., BLVD., ST., ETC. AND N., S., W. OR E.) ZIP CODE
CITY COUNTY PHONE
SCHOOL DISTRICT SCHOOL S-H SPECIALIST

COMPLETE ADDRESS (STREET NO.) (STREET NAME—INDICATE AVE., BLVD., ST., ETC. AND N., S., W. OR E.) ZIP CODE
CITY COUNTY PHONE
SCHOOL DISTRICT SCHOOL S-H SPECIALIST

		SCHEDULE		NUMBER OF SESSIONS		
		SESSIONS PER WEEK	LENGTH IN MINUTES	PRESENT	ABSENT	
1ST YEAR	GROUP					Starting Date
	INDIVIDUAL					Closing Date
2ND YEAR	GROUP					Starting Date
	INDIVIDUAL					Closing Date
3RD YEAR	GROUP					Starting Date
	INDIVIDUAL					Closing Date

COLOR CODE: 1ST YEAR, USE BLACK INK; 2ND YEAR, USE RED INK; 3RD YEAR, USE GREEN INK.

PART A. Identification Data

1. TYPE OF CLASS
(CHECK)

a Regular Class ____

b Special Class ____

- Aurally Handicapped ____
- Cerebral Palsy ____
- Other Orthopedically Handicapped ____
- Aphasic ____
- Educable M.R. ____
- Trainable M.R. ____
- Educationally Handicapped ____
- Visually Handicapped ____
- Gifted ____
- Individual Instruction-Home ____
- Individual Instruction-Institution ____

c. Pre-school ____

2. GRADE LEVEL
(CIRCLE)

Preschool
K
1
2
3
4
5
6
7
8
9
10
11
12

Multigrade
K-3
4-6
7-9
10-12

Ungraded
Lower
Middle
Upper

3. HISTORY SPEECH-HEARING THERAPY
(CHECK)

No Previous Therapy ____
Current Therapy—Outside Agency ____ ____ ____
Years Previous Therapy—School ____ ____ ____
Years Previous Therapy—Outside Agency ____ ____ ____

4. TEST RESULTS
(WITHIN PAST 2 YEARS)
(CHECK)

Reading Readiness DATE ____
- Below Average ____
- Average ____
- Above Average ____

Reading Achievement DATE ____
- Below Grade Level ____
- At Grade Level ____
- Above Grade Level ____

Arithmetic Achievement DATE ____

a. Fundamentals
- Below Grade Level ____
- At Grade Level ____
- Above Grade Level ____

b. Reasoning
- Below Grade Level ____
- At Grade Level ____
- Above Grade Level ____

Intelligence Tests

____ IQ ____ TEST ____ DATE
____ IQ ____ TEST ____ DATE
____ IQ ____ TEST ____ DATE

5. CASE INDENTIFICATION
(CIRCLE)

a. Screening

b. Referral
- Teacher
- Parents
- Self
- Administrator
- Guidance Personnel
- Health Personnel
- Other ____

COLOR CODE: 1ST YEAR, USE BLACK INK; 2ND YEAR, USE RED INK; 3RD YEAR, USE GREEN INK.

PART B. Family Information

1. PARENTS IN HOME
(CIRCLE TWO)

Mother	Father
Natural	Natural
Adoptive	Adoptive
Step	Step
Foster	Foster
Grand	Grand
None	None

2. SIBLINGS AND OTHERS IN HOME
(FILL IN)

Order of Student's Birth ______

Student Is a Twin ______

Number of Siblings ______

No. of Other Children (Not Sibs) in Home ______

No. Adults Besides Parents in Home ______

3. LANGUAGES SPOKEN IN HOME
(CHECK OR FILL IN)

No Information ______

English Only ______

Other ______

4. SPEECH PROBLEMS IN FAMILY

Yes ______ No ______ No Information ______

Relationship to Student	Problem

PART C. General Health History
(CHECK EACH ITEM THAT APPLIES)
(Also, check if this type of information is not available.)

1. HEALTH HISTORY

	Yes	No	No Information
Frequent Colds			
Frequent Sore Throats			
Frequent Ear Infections			
High Temperatures			
Serious Early Illness			
Convulsions—Seizures			
Heart Condition			
Diabetes			
Allergies			
Asthma			
Skull Fracture			
Premature Birth			
Difficult Birth			
Birth Injury			

2. PHYSICIAN OR DENTIST DIAGNOSIS
(Made by physicians or dentists.)

	Yes	No	No Information
Tongue Thrust			
Cleft Lip			
Cleft Palate			
Spasticity			
Athetosis			
Other Paralysis			
Laryngeal Pathology			
Hearing Pathology			
Visual Pathology			
Neurologic Disorder			

COLOR CODE: 1ST YEAR, USE BLACK INK; 2ND YEAR, USE RED INK; 3RD YEAR, USE GREEN INK.

PART C. (cont'd)

3. MEDICAL, DENTAL OR OTHER TREATMENT

Referral Needed

Teeth ________

Palate ________

Lips ________

Ears ________

Nose ________

Throat ________

Muscular Function ________

Eyes ________

Behavior ________

Recommendations by other professions

	Not Recommended	Recommended	In Progress	Completed	Source of Information (FILL IN)
Orthodontia					
Tonsils Removed					
Adenoids Removed					
Laryngeal Surgery					
Cleft Lip Surgery					
Cleft Palate Surgery					
Treatment for Ears					
Physical Therapy					
Braces (Extremities)					
Hearing Aid					
Oral Prosthesis					
Glasses					
Psychiatric					
Psychologic					

PART D. Hearing Information

1. HEARING STATUS

No hearing loss ________ Passed screening test ________ Date ________ 1ST YEAR (BLACK) / 2ND YEAR (RED) / 3RD YEAR (GREEN)

Hearing loss present ________ Previous loss (no longer present) ________

2. TEST RESULTS

Threshold ________ Screening at ________ dB

		250	500	1000	2000	4000	8000
AC	R						
	L						

BC	R						ASA ___
	L						ISO ___

SRT ______ dB PB ______ % at ______ SL

Date ________ Test by: Audiometrist, Nurse, Otologist, S-H Specialist, Aud. Clinic

Threshold ________ Screening at ________ dB

		250	500	1000	2000	4000	8000
AC	R						
	L						

BC	R						ASA ___
	L						ISO ___

SRT ______ dB PB ______ % at ______ SL

Date ________ Test by: Audiometrist, Nurse, Otologist, S-H Specialist, Aud. Clinic

3. AMPLIFICATION

Make, model of aid ________ Setting ________ Ear(s) ________

Wears full time ________ part time ________ PB (aided) ________ %

Group aid/auditory trainer ________ Make, model ________

Output setting L ________ R ________ Frequency response setting L ________ R ________

COLOR CODE: 1ST YEAR, USE BLACK INK; 2ND YEAR, USE RED INK; 3RD YEAR, USE GREEN INK.

PART E. Spontaneous Speech

(If normal or adequate, circle normal; if deviant, circle deviant, etc., as well as the condition that makes it deviant.)

1. **Articulation**
   - a. Vowels
     - Normal
     - Deviant
   - b. Consonants
     - Normal
     - Deviant
       - Omissions
       - Distortions
       - Substitutions
       - Additions
   - c. Errors
     - Consistent
     - Inconsistent
2. **Dialect**
   - Normal
   - Deviant
     - Regional
     - Foreign
3. **Intelligibility**
   - Intelligible
   - Partially intelligible
   - Unintelligible
4. **Fluency**
   - Normal fluency
   - Nonfluent
     - Word-phrase repetition
     - Syllable repetition
     - Prolongations
     - Interjections
     - Unvocalized intervals
     - Other______________
5. **Voice Quality**
   - Normal
   - Deviant
     - Breathy
     - Harsh
     - Hoarse
     - Nasal
     - Denasal
     - Other______________
6. **Pitch**
   - Normal
   - Deviant
     - Too high
     - Too low
     - Monotonous
     - Other______________
7. **Loudness**
   - Normal
   - Deviant
     - Too loud
     - Too soft
     - Monotonous
     - Other______________
8. **Rate**
   - Normal
   - Deviant
     - Too rapid
     - Too slow
     - Jerky
     - Other______________
9. **Language**
   - a. Length of responses
     - Acceptable
     - Inadequate
       - Little or no verbal response
       - Brief responses
       - Excessive verbal output
   - b. Vocabulary
     - Acceptable
     - Limited
   - c. Grammar
     - Acceptable
     - Poor

PART F. Communicative Responsiveness

(CIRCLE)

1. **Responsiveness**
   - Adequate
   - Deviant
     - Unresponsive
     - Primarily relates nonverbally
     - Slowness in responding
     - Irrelevant responses
     - Bizarre responses
     - Other______________
2. **Eye Contact**
   - Adequate
   - Infrequent

PART G. Observed Physical Behaviors

(CIRCLE)

1. **Drooling**
   - None
   - Present
2. **Undesirable Oral Habits** (Sucking, biting, chewing of lips, nails, finger, objects, etc.)
   - None observed
   - Present
3. **Facial Grimaces and Tics**
   - None observed
   - Present
4. **Gross Bodily Movements & Mannerisms**
   - Normal
   - Deviant
5. **Hand Usage**
   - Right
   - Left
   - Ambidextrous
6. **Foot Usage**
   - Right
   - Left
   - Mixed
7. **Eye Usage**
   - Right
   - Left
   - Mixed

COLOR CODE: 1ST YEAR, USE BLACK INK; 2ND YEAR, USE RED INK; 3RD YEAR, USE GREEN INK.

PART H. Speech Mechanism

Structure and Function For Speech Production Based on S-H Specialist's Exam.

(If a structure does not interfere with speech, circle adequate; otherwise, indicate the condition that causes the inadequacy.)

1. Lips

- Adequate
- Inadequate
  - Repaired Cleft
  - Cerebral Palsy
  - Poor Mobility
  - Other ____________

2. Teeth

- a. Occlusion
  - Adequate
  - Inadequate
    - Open Bite
    - Over Jet
    - Under Jet
    - Cross Bite
    - Other ____________
- b. Condition of Teeth
  - Adequate
  - Inadequate
    - Deciduous Teeth Missing
    - Permanent Teeth Missing
    - Teeth Malpositioned
    - Caries
    - Other ____________

3. Tongue

- Adequate
- Inadequate
  - Lack of Mobility
  - Too Large
  - Asymmetrical
  - Other ____________

4. Hard Palate

- Adequate
  - Normal Structure
  - Repaired Cleft
  - Prothesis
- Inadequate
  - Repaired Cleft
  - Prosthesis
  - Other ____________

5. Soft Palate

- Adequate
  - Normal Structure
  - Repaired Cleft
  - Prosthesis
- Inadequate
  - Unrepaired Cleft
  - Submucous Cleft
  - Repaired Cleft
  - Prosthesis
  - Too Short
  - Poor Mobility
  - Asymmetric Function
  - Other ____________

6. Nasal Cavities

- Adequate
- Inadequate
  - Nasal Obstruction
  - Other ____________

7. Breathing Mechanism

- a. Condition
  - Normal
  - Partial Paralysis
- b. Breathing for Speech
  - Adequate
  - Inadequate
    - Shallow
    - Jerky
    - Mouth Breathing
    - Speaking on Inhalation
    - Other ____________
- c. Type
  - Thoracic
  - Abdominal
  - Clavicular

PART I. Expressive Speech or Language Disorder

(Check a **single** disorder under that category only. If student has **multiple** disorder, check the most disabling one under "primary," the second most disabling one under "secondary," etc.)

Severity Scale: 1–mild; 2–moderate, 3–severe.

1. Single Disorder Only

- Little or No Speech ______
- Symbolization–Language Disorder ______
- Articulation ______
- Stuttering–Rhythm ______
- Voice disorder ______
- SEVERITY 1 2 3

2. Multiple Expressive Disorder

- a. Primary Disorder
  - Little or No Speech ______
  - Symbolization–Language Disorder ______
  - Articulation ______
  - Stuttering–Rhythm ______
  - Voice disorder ______
  - SEVERITY 1 2 3
- b. Secondary Disorder
  - Little or No Speech ______
  - Symbolization–Language Disorder ______
  - Articulation ______
  - Stuttering–Rhythm ______
  - Voice disorder ______
  - SEVERITY 1 2 3
- c. Tertiary Disorder
  - Little or No Speech ______
  - Symbolization–Language Disorder ______
  - Articulation ______
  - Stuttering–Rhythm ______
  - Voice Disorder ______
  - SEVERITY 1 2 3

COLOR CODE: 1ST YEAR, USE BLACK INK; 2ND YEAR, USE RED INK; 3RD YEAR, USE GREEN INK.

CASE INFORMATION

(Date all notations)

PART J. Articulation Record

Date 1ST YEAR (BLACK) / 2ND YEAR (RED) / 3RD YEAR (GREEN)

VOWELS

i
ɪ
ɛ
æ
ʌ
ə
ɝ
ɚ
ɑ
ɔ
ʊ
u
ju
oʊ
aʊ
eɪ
aɪ
ɔɪ

CONSONANTS

	Initial	Medial	Final
m			
n			
ŋ			
p			
b			
t			
d			
k			
g			
r			
l			
f			
v			
θ			
ð			
s			
z			
ʃ			
ʒ			
h			
hw			
w			
j			
tʃ			
dʒ			

BLENDS

pr-
br-
tr-
dr-
kr-
gr-
fr-
θr-
ʃr-
pl-
bl-
kl-
gl-
fl-
sm-
sn-
sp-
st-
sk-
sl-
sw-
tw-
kw-
spl-
spr-
str-
skr-
skw-

Key

Correct sound: Leave blank.
Substitutions: Show sound substituted.
Distortions: X
Omissions: –

Note: Double underlined items are from the Templin–Darley 50–Item Screening Test.

Second test given in same school year:
Use same color.
Circle corrected sound ○.
Show new or different type error according to key and enclose □.

COLOR CODE: 1ST YEAR, USE BLACK INK; 2ND YEAR, USE RED INK; 3RD YEAR, USE GREEN INK.

APPENDIX B

INSTRUCTIONS - ABSTRACT OF CASE RECORDS

(Original Size: 5 1/2" x 8 3/8")

Instructions

Speech and Hearing
Abstract of Case Records

School Districts in Los Angeles County

INTRODUCTION

This record form is intended to summarize rather than replace other kinds of records that you keep. It represents a generally-agreed-on minimum amount of information that should be available on each student in the caseload. Its main purpose is to facilitate communication about cases by providing a standard format for the ordering of information. Once you have become accustomed to the form, it is very simple to find the information you want. Students transfer from school to school; new clinicians are employed by school districts; clinicians may be reassigned to different schools. In any of these contingencies, a standard form helps the clinician become familiar with important information about students who have had previous therapy. Because the case record is in the form of a check list, its use should minimize the chances of inadvertently failing to record important observations. It is intended to simplify the recording process.

The record itself may look peculiar at first, but it has been set up in its present format so that the information contained therein can be put into a data retrieval system. Since data retrieval systems are rigid, accepting only the language for which they are programmed, it is important to conform to the language used in the record. Notations or qualifying comments can be entered in the margins.

The record form is intended to be self-explanatory; however, Part I may need the additional explanation to be found in Part I of the instructions. The best use of the instructions is for a reference for only those sections of the record that seem ambiguous. They will, perhaps clarify questions that arise. They are organized by parts and sections within parts for easy reference.

Neither the case record nor the instructions are regarded as being in their final form. As you use them, please note ambiguities and such changes as would improve either or both.

Comments and suggestions should be reported to
Los Angeles City Schools: Miss Esther Herbert
Los Angeles County Schools: Mrs. Nadine H. Coates

There are three reasons why each and every item on the new case record should be filled out: 1) Each section must be evaluated on the basis of use. 2) A systematic evaluation of cases requires that all aspects of his speech behavior and related conditions be observed. 3) Information about the population of children being served needs to be complete. Therefore, PLEASE BE SURE TO FILL OUT EACH AND EVERY ITEM ON THE CASE RECORD ABSTRACT.

INSTRUCTIONS FOR FILLING OUT ABSTRACT OF CASE RECORDS

GENERAL INSTRUCTIONS

Color Code

Records filled out during the 1966-67 school year should be filled out in black ink (ballpoint pen). Red ink is to be used for all entries made during the 1967-68 school year. All entries for the 1968-69 school year are to be made in green ink. The color code permits the same record to be used for a period of three years, but allows changes in status within any subsection of the record to be immediately apparent.

Changes within a School Year

If the status of the child changes with respect to any information entered on the form during a given school year, date the new entry using the color code for that year. For example, if a child is originally in a class for the aurally handicapped, but is transferred at midyear to a regular class, a check would be placed after **Regular Class** and the date (day and month or just the month) would be written after the new entry. Thus, under **TYPE OF CLASS**, two entries appear in the same color, but one entry carries a date making it possible to tell from the record that the original placement has been changed and when. If the change in placement does not occur until the beginning of the following school year, the new entry need not be dated, since the color code carries the chronological information.

The same principle is followed throughout the record for all items except for a modification in Part J, which is explained under that section.

Child's Name

Child's name can be entered in the upper right-hand corner or upper left-hand corner for convenience in filing. Be sure to use first and middle names so there will be no confusion at some later date.

Parent's Name

Use father's full name, not just initials. If the child is living with a stepfather or guardian, use that name rather than the name of the child's natural father.

Birthdate

Write out the birthdate; for example, January 1, 1965.

Age

Enter the child's age to the nearest year and month. Use a hyphen (-) rather than a decimal to separate years and months; for example, 8-3, 10-0, 9-11. Age should be calculated from the date entered at the time the form is filled out. This date will be shown on the cover page in the space provided just above the address.

Date

Enter the date at the time that the record form is filled out.

Address

In order to allow for entering changes of address, school, and so forth, three separate sets of blanks are provided. If the child moves during the first year, the second address should be entered with black ink. If the move does not take place until the second or third year, enter the new information in the appropriate color code. The complete address is necessary since socioeconomic status will be determined by address.

Schedule

Enter the number of sessions per week for which the child is scheduled and the length per session in minutes. The time does not represent the cumulative time per week, but rather the length of the session, such as 20 minutes or 30 minutes per session as the case may be. If a child is scheduled for both group and individual therapy, show the schedule for group and individual therapy separately.

Number of Sessions

The number of sessions present should include all sessions attended by the child during the period from the starting date to the closing date of therapy for that child. Similarly, the number of sessions absent should represent absences on regularly scheduled school days within the limits of the starting and closing dates of therapy for that child.

Starting and Closing Dates

The starting date is determined by the first day of therapy for the child. This date will probably not coincide with the date of the record; it is not expected to.

The closing date is the date of the last day of therapy for the child.

PART A. IDENTIFICATION DATA

A1—TYPE OF CLASS

If the child is enrolled in a regular classroom situation, check that item. If he is enrolled in a special day class, check **Special Class**, as well as the type of special class in which he is enrolled. Individual instruction pertains to subject-matter instruction rather than speech and hearing therapy.

A 2—GRADE LEVEL

If a child is not yet in school, circle **Preschool**; otherwise circle the appropriate grade level. If the child is in a multigraded or ungraded classroom and the grades encompassed are not clearly specified, make the best estimate of his placement and circle the appropriate item.

A 3—HISTORY—SPEECH AND HEARING THERAPY

If the child has had no previous therapy, check that item. If he has had previous therapy in school or with any other agency, including private practice, indicate the number of years that he has received therapy. Round to the nearest half-year. Thus, a child might be shown as having received ½ year of therapy, 1 year, or 1½ years of therapy, or so forth.

A 4—TEST RESULTS

Academic. Show only those test results that have been obtained within the past two years of the beginning date of the school year during which the child is enrolled for therapy. Additional information, such as the name of the test and specific scores, can be noted in the margin.

Intelligence. Information about IQ is not restricted to the preceding two years. In the event that more than three sets of results are available, enter the most recent ones. The name of the test is to be entered in the space provided, since test results are qualified by the nature of the test.

A 5—CASE IDENTIFICATION

If you, the clinician, identified the child through speech screening, circle that item. If the child was referred, circle **Referral** as well as the category of the individual who made the referral. If the choices provided are not adequate, write in after **Other**, the category into which the individual falls who made the referral.

PART B. FAMILY INFORMATION

B 1—PARENTS IN HOME

Circle one item under **Mother** and one item under **Father** so as to represent the nature of the mother and father figures in the home.

B 2—SIBLINGS AND OTHERS IN HOME

Order of Student's Birth. Give the order of student's birth as 1st, 2nd, and so forth. If student is the product of a multiple birth, show his birth order as that of the set of births. If student is a twin (or triplet) and has two older siblings (products of single births), his birth order would be 3rd, for example.

Student Is a Twin. Enter yes or no in the space provided. Should he be a triplet, etc., enter triplet or appropriate the term rather than **Yes** or **No**.

Number of Siblings. The number of siblings entered should be the actual number of siblings living at home.

Number of Other Children (Not Sibs) in Home. If children are living in the home who are not siblings of the student, enter the number of children.

Number of Adults Besides Parents in the Home. Enter the number of adults in the home who are neither the student's parents or sibs.

B 3–LANGUAGES SPOKEN IN HOME

If you do not have definite information about languages spoken in the home, check **No Information.** Check **English Only** if you have definite knowledge that English is the only language spoken. If other languages are spoken in the home, write the language or languages in the blank following the word **Other.**

B 4–SPEECH PROBLEMS IN FAMILY

Check **Yes** or **No** only if you have definite information; otherwise check **No Information.** If others in the family have speech problems, write in the individual's relationship to the student and indicate the nature of the problem. Include not only information about the student's siblings and parents, but more distant relatives as well, when that information is available.

PART C. GENERAL HEALTH HISTORY

C 1–HEALTH HISTORY

Check **Yes** or **No** after each of the items only if you have definite information. If you do not have definite information, check the column labeled **No Information.** In the event that some change occurs after the health history has been first filled in, new entries can be made using the color code. Should conditions change during a given year, so that the entry must be made in the same color, the date (day and month or month only) of the new entry should be shown.

C 2–MEDICAL OR DENTAL DIAGNOSES

This section represents the amount of medical information available on the child and should represent only those diagnoses made by physicians, dentists, or orthodontists. For example, if the child has not been diagnosed as a tongue thruster by a dentist or orthodontist, check **No Information,** even though, in your judgment, he may have this condition.

C 3–MEDICAL, DENTAL, OR OTHER TREATMENT

Referral Needed. Check the appropriate item in the left-hand column if, in your opinion, the child should be referred for examination and possible treatment by appropriate specialists.

Recommendations by Other Professions. If the student has been examined by a specialist, indicate the specialist's recommendation by checking the appropriate column following the nature of the treatment that would be required. Unless a specialist has examined or treated the child, do not fill in items in this section. This section represents decisions made by other professional personnel. If an orthodontist has examined the child, but advised against orthodontia, check **Not Recommended;** if orthodontic treatment is in progress, check **In Progress.**

Source of Information. For each kind of treatment that has been marked, such as orthodontia, indicate the source of information by filling in the blank at the far right. The most common sources of information are Records, Parent Interview, Observation, and Verbal Reports, the latter being divided into Verbal Report-Student, Verbal Report-School Personnel, Verbal Report-Physician, etc. In some cases, observation alone indicates that treatment has been given, as, for example, cleft palate surgery. In the absence of any record of information about the date of surgery and so forth, the source of information would be entered as **Observation.**

PART D. HEARING INFORMATION

D 1–HEARING STATUS

If the child does not have a hearing loss, check that item and show under **Date,** the date on which the screening (or threshold) test was passed.

D 2–TEST RESULTS

Screening Test. In some cases you will have an audiogram that represents the results of a screening test. In that case, fill in the audiogram on the record, indicating that the audiogram represents a screening test made at some specified dB-level, which is to be entered after **Screening at _______ dB.**

Under **Frequency** show each frequency tested and passed by entering a dash (–) in the appropriate cell. If the screening audiogram shows the level of loss at 4,000 or 8,000 Hz, write in the appropriate figure.

Threshold Test. If the audiogram represents a hearing sensitivity (threshold) test, check **Threshold.** Enter the actual sensitivity level in the appropriate boxes.

ASA– ISO. With either screening or threshold audiograms, be sure to indicate whether the calibration is ASA or ISO.

SRT–PB. If the speech reception threshold data are available, enter the binaural SRT in the appropriate blank. Results of discrimination testing should be shown as the per cent correct, and the SL (sensation level) at which the test was administered should be indicated.

Fill in the date of the test, and circle the appropriate category of the individual who administered it.

D 3–AMPLIFICATION

Indicate the make and model of the aid that the child wears and the setting at which he most usually wears it. Indicate the ear on which the aid is fitted by showing **right** or **left** or **binaural** (in the event that the fitting is binaural).

Indicate whether the student wears the aid full time or part time and show the aided discrimination score.

If the child uses a group aid either exclusively or part of the time as a substitute for his own aid, or should he use an individual auditory trainer, so indicate, and include the make and the model of the group aid or trainer. Indicate, also, output and frequency response setting for each ear.

PART E. GENERAL SPEECH BEHAVIOR IN SPONTANEOUS SPEECH

E 1–ARTICULATION–SPONTANEOUS SPEECH

The information included in this section pertains to spontaneous speech. A form for recording an articulation inventory obtained under test conditions is provided on the last page. Vowels in spontaneous speech should be marked as either **Normal** or **Deviant.** Consonants should be marked as either **Normal** or **Deviant.** If deviant, also circle the kinds of deviations observed. Errors should be shown as either **Consistent** or **Inconsistent.**

E 2–DIALECT

If the child uses general American dialect, circle **None.** If some other dialect is present, indicate whether it is **Regional** or **Foreign.**

E 3–INTELLIGIBILITY

Indicate intelligibility by circling the appropriate item.

E 4–FLUENCY

If normal fluency is present, circle that item. **Normal fluency** includes the normal range of fluent and nonfluent patterns. Thus, one might regard a five-year-old as nonfluent but still within normal limits. In that case, **Normal fluency** would be marked on his record. If the child is nonfluent, circle **Nonfluent** as well as those characteristics that describe the particular nonfluency. A space after **Other** is provided for writing in additional descriptive terms.

E 5–VOICE QUALITY

The description of voice quality follows that established by Fairbanks except that **Denasal** is shown as a voice quality rather than as an articulatory problem. In Fairbanks' classification, hoarse voice quality is the combination of breathy and harsh voice qualities.

E 6—PITCH

E 7—LOUDNESS

E 8—RATE

If these attributes are normal, circle **Normal.** If any one of them is deviant, circle **Deviant,** and indicate the condition that makes it deviant. Blanks are provided after **Other,** which can be used for entering additional descriptive terms.

E 9—LANGUAGE

If the length of the verbal responses is adequate for the child's age, circle **Acceptable.** If they are inappropriate, circle **Inadequate** and the condition observed that causes you to judge the response length to be inadequate.

Only a rough estimate of vocabularly can be made in the absence of extensive speech samples under a variety of conditions. Make the best estimate you can about whether the child has an **Acceptable** or a **Limited** vocabulary.

Under **Grammar** mark **Acceptable** if the child uses correct grammar and **Poor** if he makes grammatical errors.

PART F. COMMUNICATIVE RESPONSIVENESS

F 1—RESPONSIVENESS

This section is meant for recording of the child's communicative behavior. Under **Deviant, Unresponsive** means that the child does not respond either verbally or nonverbally. If the child relates well, is interested, and responsive, even though he has little or no verbal output, the item, **Primarily Relates Nonverbally,** should be circled. **Slowness in Responding** represents atypical delay between a request or a question and the child's responses. **Irrelevant Responses** represents usual or common responses but unrelated to the question asked or the topic at hand. **Irrelevant Responses** tends to indicate that the child is inattentive to others or had misunderstood the speaker's message. In contrast, **Bizarre Responses** represents responses that have strange or morbidly unusual content.

F 2—EYE CONTACT

This item represents the extent to which the child maintains appropriate eye contact in the communicative situation.

PART G. OBSERVED PHYSICAL BEHAVIORS

The items in Part G are self-explanatory.

PART H. SPEECH MECHANISM

The structures in Part H are to be evaluated with respect to their effect upon speech. The term **Adequate** is to be circled if the structure functions satisfactorily for speech, even though it may be atypical in some respect. If a structure is defective in some way that interferes with speech, mark it **Inadequate** and also circle the condition that causes it to be inadequate.

Type of Breathing (H.7.c)

Indicate the type of breathing used for speech. This subsection deviates from the adequate-inadequate classification found in the other sections of Part H.

PART I. EXPRESSIVE SPEECH OR LANGUAGE DISORDER

The five categories provided are intended to cover all expressive disorders without inferring causal conditions, since conditions such as cleft palate, hearing loss, cerebral palsy, and so forth do not describe speech characteristics. For example, a child with a cleft palate might have a voice disorder (nasality) and an articulation disorder. A hard-of-hearing child may or may not have voice and articulation defects.

I 1–SINGLE DISORDER

If the child has just one type of speech disorder, a check should be entered after the type of disorder.

I 2–MULTIPLE DISORDER

If the child has two or more types of speech disorders, check the most disabling one, as far as that particular child is concerned, under **Primary Disorder.** Check as the **Secondary Disorder,** the one that you rank second with respect to its disabling effect for the child. The third disorder would be entered under **Tertiary Disorder.** It is possible, of course, that the child might have more than three disorders. If so, add this information in the margin

SEVERITY

The severity scale 1 **(mild),** 2 **(moderate),** 3 **(severe),** is to be used to represent the severity of the disorder with respect to the usual range of the disorder. Thus, a child with multiple disorders might have three disorders, all of which are rated as severe. It is also possible for a primary disorder (rated as such because of its disabling effects) to be less severe than a secondary disorder.

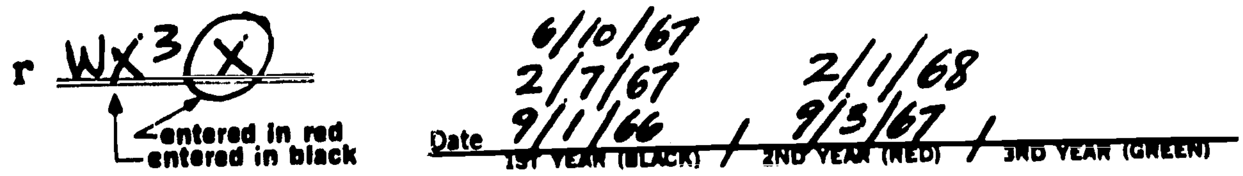
PART J. ARTICULATION RECORD

The format of the articulation record is similar to that of the Templin-Darley Test. All of the sounds that are included in their 50-item screening test are marked so that their norms can be used. A complete phonetic inventory of all sounds as singles is to be recorded, as well as the more important blends.

Repeated Tests—Since more than one articulation test is usually given during the school year, a combination of the color code and other symbols provides a system for following changes in articulatory behavior.

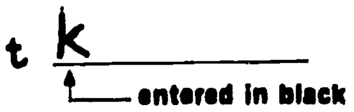
The dates of subsequent tests administered during the same school year are to be entered above the date of the first test, using the color code for that year. If a sound is incorrect on the first test and remains incorrect on subsequent tests during the school year, the original entry remains unchanged. If it is still incorrect the following year, a new entry is made in the appropriate color.

At such time as the sound is correct, the original error is circled. If some subsequent test elicits a new error, that error is to be shown in a square.



Examples:

These entries mean that on the first two tests **(9/1/66** and **2/7/67) w** was substituted for r. By the time of the third test **(6/10/67)** the substitution became a distortion. The superscript **3** indicates the third, rather than the second test. The red entry shows that the sound was still distorted the following year. The distortion was circled to show that the sound was corrected at the time of the second test **(2/1/68).**



A single entry indicates that this error persisted during the year. A test administered on the date of testing for the second year revealed no error, thus no entry is made.

In summary, then, any black entry represents errors during the first year. Any red entry represents errors made during the second year. Any green entry represents errors made during the third year. This kind of code makes it possible to read changes in articulatory errors at a glance.

FINAL REPORT

Project No. 7-0472
Grant No. OEG 0-8-070472-1732

CHARACTERISTICS OF CHILDREN RECEIVING SPEECH AND HEARING SERVICE IN LOS ANGELES AREA SCHOOLS

VOLUME III

Clinician Agreement and Reliability in Judging Articulation, Identifying Hoarse Voice Quality, and Rating Severity of Perceived Hoarseness

Maryjane Rees, Ph.D.

Los Angeles County Superintendent of Schools Office
155 West Washington Boulevard
Los Angeles, California 90026

April, 1969

U.S. Department of
Health, Education, and Welfare

Office of Education
Bureau of Research

FINAL REPORT

Project No. 7-0472
Grant No. OEG 0-8-070472-1732

CHARACTERISTICS OF CHILDREN RECEIVING SPEECH AND HEARING SERVICE IN LOS ANGELES AREA SCHOOLS

VOLUME III

Clinician Agreement and Reliability in Judging Articulation, Identifying Hoarse Voice Quality, and Rating Severity of Perceived Hoarseness

Maryjane Rees, Ph.D.

Los Angeles County Superintendent of Schools Office
155 West Washington Boulevard
Los Angeles, California 90026

April, 1969

U.S. Department of
Health, Education, and Welfare

Office of Education
Bureau of Research

CONTENTS

INTRODUCTION

This report constitutes Volume III of a project being reported in three parts. It contains the results of three studies of clinician agreement and reliability. These studies represent a first step toward identifying critical areas of disagreement in assessing oral communication skills. It is expected that further long-range studies will lead to criterion tests and training materials that can be used to insure attainment of a specified level of uniformity among clinicians in assessing these skills.

The first study in the series was a pilot study involving over 200 clinicians in judging articulation errors and rating consistency of articulation errors in spontaneous speech, severity of articulation disorders, and intelligibility. The second study was concerned with the same variables, but involved only 29 randomly selected clinicians. Data from this study were analyzed in greater detail than those from the pilot study. The third in the series was a study of agreement and reliability in identifying hoarse as opposed to normal voice quality and in rating the severity of hoarseness. In this study, the validity of the clinicians' judgments could be determined, since the results of both laryngoscopic examination and spectrographic analyses were available as independent measures.

Volume II of the report contained detailed descriptions of pupils in the complete caseloads of 212 school clinicians. The clinician population and, therefore, the pupil population was drawn from two samples--the Los Angeles City Unified School District and 38 school districts in Los Angeles County. Thus, the combined samples included districts varying greatly in size and representing many different educational policies and practices. The pupil population came from a broad spectrum of socioeconomic, cultural, and ethnic backgrounds. Data from these two samples are expected to provide a reasonably definitive statement about pupils typically receiving service in school speech and hearing programs.

Volume I contains the results of a workshop for districts that participated in the project. It includes a review of results of the project, discussion of implications of the data for school speech and hearing programs, and identification of areas needing further development and study.

SUMMARY

Clinician Agreement and Reliability in Judging Articulation, Identifying Hoarse Voice Quality, and Rating Severity of Perceived Hoarseness

The purpose of these studies was to identify areas of agreement and disagreement among practicing school clinicians in judging the following: articulation errors, consistency of articulation errors in spontaneous speech, severity of articulation disorders, intelligibility of misarticulated speech, hoarse and normal voice quality, severity of hoarseness.

Two groups of practicing school clinicians participated: a large group of over 225 clinicians and a small group of 29 randomly selected clinicians. Each group was given two trials with the listening tasks. The two trials for the large group were separated by a period of four hours. The two trials for the small group were separated by one week. Each trial consisted of two listening tasks for which separate films (kinescopes) had been made. The listeners first scored the articulation of six speakers as they responded to a 40-item articulation test, which was a shortened version of the Templin-Darley 50-Item Screening Test of Articulation. The listeners scored each of the 240 items heard in the first film as either correct or incorrect.

The listeners then rated the one-minute samples of spontaneous speech produced by each of the same six speakers contained in the second film. Three kinds of ratings were made: consistency of articulation errors, severity of the articulation disorder, and intelligibility. Rating categories used were *consistent* or *inconsistent* for consistency of articulation errors; *mild*, *moderate*, or *severe* for severity of the articulation disorder; and *intelligible*, *partially intelligible*, or *unintelligible* for intelligibility.

The speakers for both films were five males and one female ranging in age from six to 14 years. All speakers had articulation disorders.

The 29 randomly selected school clinicians who participated in the articulation study also served as listeners for the study on hoarse voice quality. Two trials were given, separated by one week. These trials were included in the listening sessions for judging articulation. Each trial consisted of two listening tasks. The first listening task was to identify hoarse and normal voice quality from one-minute tape-recorded speech samples produced by each of 20 speakers. Each sample included a reading of a short passage and some spontaneous speech.

The second listening task was to rate the severity of hoarseness of 10 speakers, who had been unanimously selected by a different group of listeners as having hoarse voice quality. Samples of their speech were also contained in the tape recording used for the identification trials. Samples of the vowels /i/, /ɑ/, and /u/ sustained for approximately five seconds, were added for each speaker to the reading of the short passage and spontaneous speech included in the first tape recording. Severity of hoarseness was rated as mild, moderate, or severe.

The speakers with normal voice quality were three males and seven females ranging in age from seven to 16 years. The speakers with perceived hoarseness were seven males and three females ranging in age from six to 16 years.

Recordings of the sustained vowels were analyzed spectrographically and classified by the Institute of Laryngology and Voice Disorders in Los Angeles. The speakers also underwent indirect laryngoscopy at the Institute. The examinations were performed by the otolaryngologist directing the Institute.

Data from each of the two trials of the large and small groups in judging articulation were analyzed and compared. These comparisons provide only a general indication of similarity in performance, as different measures of central tendency had to be used and between-trial agreement for individual listeners could not be retrieved for the large group.

The measure of central tendency used for the large-group data was the median. This statistic was used because the number of responses differed from item to item within each of the trials. Further, the total number of listeners differed on the first and second trials. The mean number of listeners for the first trial was 265, and 228 on the second trial. Protocols for individual listeners for the two trials could not be matched due to errors in recording identification numbers. The measure of central tendency used for the small-group data was the mean.

The groups were compared for general agreement in judging the 240 responses to the articulation test, number of items on which agreement met specified criteria, agreement on correctly and incorrectly articulated test items, agreement on the six samples of each of the 40 sounds tested, and agreement on the number of correct responses for each of the six speakers. For these analyses, the scoring of the majority of the listeners was used to determine whether a speaker's articulation was correct or incorrect.

The ratings of consistency of articulation errors, severity of the articulation disorder, and intelligibility from each of the trials for each of the groups were also compared.

Data from the small group were analyzed using measures that took into account the number of listeners who changed judgments or ratings on the two trials. Two measures were used. The first was based on consistency per se. As such, it included all ratings that were the same on both trials regardless of the most frequently occuring rating.

The second measure was derived from what was essentially a scoring key. Correct scoring was considered to be the judgment or rating identified by the majority of the listeners whose judgments or ratings were the same on both trials.

In the summary of results that follows, results from the small-group study in judging articulation are shown first, as these data are based on consistency from trial to trial and represent, therefore, the best indication of agreement and reliability. A comparison of the results from each of the trials of the large and small groups is shown next. Finally, results from the study of agreement and reliability in identifying voice quality and severity of hoarseness are summarized. Only the small group of listeners participated in this study.

A. Agreement and Reliability in Judging Articulation--Small-Group Study

1. Mean agreement from trial to trial in scoring the 240 articulation test items as the majority scored them was 82.6%.

2. Agreement was 95% or better on 31.2% of the items. Agreement was 90% or better on 45.9% of the items.

3. Agreement was less than 70% on 21.7% of the items. In some instances the number of listeners who changed ratings from trial to trial was greater than the number who made the same rating on both trials.

4. Agreement was 83.1% on correctly articulated items and 81.4% on incorrectly articulated items.

5. Of the 75 items on which agreement was 95% or better, 68.0% were correctly articulated, and 32.0% were incorrectly articulated. Of the 108 items on which agreement was 90% or better, 60.2% were correctly articulated, and 39.8% were incorrectly articulated.

6. Of the 50 items on which agreement was less than 70%, half were correctly articulated, and half were incorrectly articulated.

7. Mean agreement for the six samples of initial **/j/** was above 95%. Mean agreement on the six samples of five other items was above 90%: final /ʃ/, and initial blends **/kl/**, **/sk/**, **/sn/**, and **/fl/**. Median /ð/, final /tʃ/ and /θ/, and initial **/v/** constituted the remaining 10 sounds on which agreement was higher.

8. Mean agreement on the six samples of six test items was below 70%: initial blends **/ʃr/**, **/pr/**, and **/fr/**; medial **/r/** and **/tʃ/**; and final **/z/**. The remaining four sounds among the 10 test items with the lowest agreement were **/ɝ/**, initial **/r/**, and the initial blends **/spl/** and **/pl/**.

9. The number of correct responses was equivocal for two speakers who each produced one response judged by an equal number of listeners to be correct and incorrect. The number of correct responses out of a possible 40 ranged from 13 to 28 or 29 for individual speakers or a total of from 122 to 124 out of 240 responses.

10. The mean number of items each of the listeners scored the same on the two trials, averaged for the six speakers, was 35.3 or 88.3%. Means for individual listeners ranged from 32.2 (80.4%) to 38.2 (95.4%).

11. The mean number of items each of the listeners scored the same as every other listener, averaged for the six speakers, was 33.0 out of 40 items or 82.5% on the first trial. Means for individual listeners ranged from 29.3 items (73.2%) to 34.4 items (86.0%). On the second trial, the general mean was 33.1 items or 82.8%, and means for individual listeners ranged from 30.1 (75.2%) to 34.7 (86.8%).

12. Within-group listener agreement was similar on both trials. The difference between trials was 0.1; $\underline{t}$ was .67 ($P = .60$); $\underline{r}_S$ was .703 ($P < .01$).

13. Mean agreement in rating consistency of articulation errors in spontaneous speech was 74.7%. Agreement on individual speakers ranged from 65.5% to 82.6%. All speakers were judged to make consistent articulation errors.

14. Mean agreement in rating the severity of the articulation disorder was 67.2%. Agreement on individual speakers ranged from 37.9% to 93.1%. Severity ratings for the six speakers were as follows: one speaker, mild; one speaker, moderate; four speakers, severe.

15. Mean agreement in rating intelligibility was 71.8%. Agreement on individual speakers ranged from 44.8% to 89.7%. Intelligibility ratings for the six speakers were as follows: two speakers, intelligible; three speakers, partially intelligible, one speaker, unintelligible.

16. Mean agreement in rating consistency of articulation errors, severity of the articulation disorder, and intelligibility when all consistent ratings were included was 83.9%, 79.3%, and 87.3%, for the three kinds of ratings, respectively.

17. Ratings of consistency of articulation errors, severity of the articulation disorder, and intelligibility were not related. W was .591 ($P > .05$).

18. Severity of the articulation disorder, intelligibility ratings, and number of correct responses were related. W was .873 ($P < .01$).

B. Agreement and Reliability in Judging Articulation--Large and Small-Group Studies

1. Median Agreement in judging articulation as either correct or incorrect was 88.4% and 90.6% on the first and second trials of the large group. Mean agreement was 89.1% and 88.4% on the first and second trials of the small group.

2. Agreement was 95% or better on 31.6% and 35.0% of the items on the first and second trials of the large group and on 46.7% and 53.9% of the items on the first and second trials of the small group.

3. Agreement was 90% or better on 46.7% and 52.9% of the items on the first and second trials of the large group and on 59.6% and 57.9% of the items on the first and second trials of the small group.

4. Agreement was less than 70% on 19.6% and 18.8% of the items on the first and second trials of the large group and on 16.2% and 13.8% of the items on the first and second trials of the small group.

5. Median agreement was 86.4% and 90.6% on correctly articulated items and 91.2% and 92.4% on incorrectly articulated items on the first and second trials of the large group. Mean agreement was 90.5% and 88.6% on correctly articulated items and 87.6% and 88.1% on incorrectly articulated items on the first and second trials of the small group.

6. On the first trial of the large group, agreement was 95% or better on 76 items of which 39.5% were correctly articulated, and 60.5% were incorrectly articulated. On the second trial, agreement was 95% or better on 84 items of which 35.7% were correctly articulated, and 64.3% were incorrectly articulated. On the first trial of the

small group, agreement was 95% or better on 111 items of which 60.4% were correctly articulated, and 39.6% were incorrectly articulated. On the second trial, agreement was 95% or better on 111 items of which 55.9% were correctly articulated, and 44.1% were incorrectly articulated.

7. On the first trial of the large group, agreement was 90% or better on 112 items of which 41.1% were correctly articulated, and 58.9% were incorrectly articulated. On the second trial, agreement was 90% or better on 127 items of which 42.5% were correctly articulated, and 57.5% were incorrectly articulated. On the first trial of the small group, agreement was 90% or better on 143 items of which 52.5% were correctly articulated, and 47.5% were incorrectly articulated. On the second trial, agreement was 90% or better on 139 items of which 52.5% were correctly articulated, and 47.5% were incorrectly articulated.

8. On the first trial of the large group, agreement was less than 70% on 47 items of which 57.4% were correctly articulated, and 42.6% were incorrectly articulated. On the second trial, agreement was less than 70% on 45 items of which 46.7% were correctly articulated, and 53.3% were incorrectly articulated. On the first trial of the small group, agreement was less than 70% on 38 items of which half were correctly articulated, and half were incorrectly articulated. On the second trial agreement was less than 70% on 33 items of which 54.5% were correctly articulated, and 45.5% were incorrectly articulated.

9. Each of the trials of each of the groups produced a different order of the sounds ranked by agreement. Initial /j/, final /ʃ/ and /**t**ʃ/, and the initial blends /**sk**/ and /**sn**/ were found among the 10 sounds ranking highest on each of the trials for the two groups. Final /**z**/, initial and medial /**r**/, /**ɝ**/, and most of the double blends with /**r**/ were found among the 10 sounds with the lowest ranks.

10. The number of correct responses identified by the large group was the same on both trials for half of the speakers, but was lower on the second trial for half. Results from the small group were the same on both trials for two speakers, while scores for four speakers were different on the two trials. Scores from the first trial of the large group corresponded to scores on the first trial of the small group for one of the six speakers and to scores on the second trial of the small group for another of the six speakers. Scores from the second trial of the large group corresponded to scores from the first trial of the small group for one speaker, but to none of the scores from the second trial of the small group.

11. Ws for agreement in scoring the 40 items for each of the speakers for five experience groups (no previous experience, one year, two to five years, five to 10 years, and 10 or more years) ranged from .82 to .89 on the first trial and from .81 to .90 on the second trial. All Ws were significant at or beyond the 1% level of significance. These results are from the large group only.

12. Spearman rank correlations between trials for agreement in scoring the 40 items for each of the speakers ranged from .67 to .97 for the five experience groups. All r_Ss were significant at or beyond the 1% level. The group in their first year of experience (no previous experience) produced the lowest set of correlations; however, this group was smaller than the other groups. These results are from the large-group study only.

13. All speakers were judged to make consistent articulation errors in spontaneous speech. Mean agreement was 74.5% and 77.5% for the two trials of the large group, and 81.6% and 83.9% for the two trials of the small group.

14. Mean agreement on severity ratings for the speakers was 73.3% and 73.8% on the two trials of the large group, and 75.3% and 79.3% on the two trials of the small group. The extent of agreement varied as a function of speakers. The majority of the listeners in both groups rated one speaker's articulation disorder as mild; one was rated moderate; four were rated as having severe articulation disorders on both trials with but one exception. The majority of the listeners in the large group changed one speaker's rating from severe on the first trial to moderate on the second trial.

15. Mean agreement on intelligibility ratings for the speakers was 77.9% on the first trial of the large group and 77.1% on the second trial. Mean agreement in the small group was 79.9% and 76.4% on the two trials. Agreement on ratings for five speakers was much the same for the large group. In the small group, agreement on one speaker was very low, but very high on another. On both trials, both groups rated the speech of two speakers as intelligible; three speakers were judged to be partially intelligible; one was judged to be unintelligible.

C. Agreement, Reliability, and Validity of Judgments of Voice Quality

1. Mean Agreement in identifying the voice quality of 20 speakers was 78.1%. Mean agreement on speakers identified by the majority as hoarse was 73.8%. Agreement on individual speakers ranged from 27.6% to 100%. Mean

agreement on speakers identified as having normal voice quality was 82.4%. Agreement on individual speakers ranged from 37.9% to 100%.

2. Classification based on perceived voice quality differed from classification of spectrograms for two speakers. One speaker who had Type II (moderate) spectrographic hoarseness was perceived as having normal voice quality. Indirect laryngoscopy showed swelling of the vocal cords. Another speaker's spectrograms showed no hoarseness, but the voice quality was perceived as hoarse.

3. Agreement in rating severity of perceived hoarseness was 46.6%. Agreement on individual speakers ranged from 24.1% to 79.3%. Severity of perceived hoarseness was mild for two speakers, moderate for three speakers, and severe for five speakers.

4. Severity of perceived hoarseness agreed with severity of spectrographic hoarseness for only three of the 10 speakers. For these three speakers, mild, moderate, and severe perceived hoarseness corresponded to Type I (mild), Type II (moderate), and Type IV (severe) spectrographic hoarseness. One speaker whose spectrograms were normal was perceived to be severely hoarse. One speaker whose spectrographic hoarseness was Type II (moderate) was perceived to be mildly hoarse. For the remaining speakers, perceived hoarseness was always more severe than spectrographic hoarseness.

5. Mean consistent agreement in identifying voice quality including consistent judgments that differed from the judgment of the majority was 83.9%. The range of agreement on individual speakers was from 48.3% to 100%.

6. Mean consistent agreement in rating severity of hoarseness including consistent ratings that differed from the majority rating was 62.8% and ranged from 44.8% to 82.8% on individual speakers.

CHAPTER I

THE PROBLEM

Rationale and Statement of the Problem

In order to resolve the problems of appropriate case selection, accurate diagnosis, and efficient therapy in school speech and hearing programs, it is first necessary to be able to classify deviations of oral communicative behavior into meaningful categories that encompass as many relevant observations as possible. It is necessary, also, to accurately and reliably measure oral communicative behaviors. Without accurate measurement the criteria purportedly used for case selection are necessarily inaccurate, variable, and unreliable insofar as the means of identifying individuals in need of service lack accuracy and stability. Without a satisfactory system of classification and without calibrated measuring instruments, there is no way to test hypotheses about case selection or diagnostic and therapy practices that would produce other than equivocal results.

The clinician himself is the measuring instrument for oral communicative behavior. It is well known that clinician agreement and reliability are highly variable. Currently, classification and selection depend on the criteria used by individual clinicians. Until the tools for "calibrating" clinicians to some predetermined level of agreement and reliability are developed and used, no amount of policy making can significantly alter case selection or diagnostic and therapy practices, since the basic problem of accurate and reliable measurement will not be solved.

Most of the pupils enrolled in school speech and hearing programs have articulation disorders, as shown in Volume II of this report. Therefore, any improvement that can be accomplished in the assessment and modification of these disorders would have a major impact on school programs. As a first step in the process of establishing more uniform standards in the assessment of articulation skill, this study proposed to establish the level of agreement and reliability of experienced school clinicians on some specific speech sounds in order to begin identifying those sounds on which agreement and reliability are low and which would, therefore, need to be included in a criterion test for establishing individual clinician's performance relative to a standard. The project was not addressed to the entire range of problems included in the assessment of articulation skill or the design of criterion tests; rather, its purpose was to establish some procedures and obtain some data from which additional studies of broader scope could be designed.

Since judgments about voice quality are known to be quite variable, it seemed desirable to have data from judgments about some voice quality disorder to compare with the data from the study concerned with articulation. There were two reasons for selecting hoarse voice quality. First, hoarse voice is especially critical, since hoarseness may be the first symptom of larynegeal pathology. Second, whereas no independent measures exist for validating correct as opposed to incorrect articulation, hoarse voice quality can be independently verified through laryngoscopic examination and spectrographic analysis. Therefore, a study was undertaken in this area also.

Background of the Problem

Information about agreement and reliability among clinicians in judging articulation errors is available from several different kinds of studies. The most intensive work has been done with scaling techniques. There are six studies published in this area--five on the method of equal-appearing intervals and one on direct magnitude-estimation scaling. One group of studies compared experienced and inexperienced listeners. There are five of these studies, though not all of them had a direct comparison between experience groups as the major purpose. One study specifically designed to test clinician agreement and reliability has been published. A relatively large group of studies are available in which listeners' judgments about articulation errors constitute the criterion measure used for testing hypotheses about various treatment effects on articulation behavior. The estimates of the judges' agreement and reliability give some indication of what is to be expected. Eighteen of these studies have been selected for review here.

Only one study has been published that intensively examined the relation between judged severity of articulation defectiveness in connected speech and articulation test results. Finally, one study has been published the stated purpose of which was similar to ours.

Scaling Methods for Assessing Articulation

The only body of coordinated studies on assessing defective articulation employed scaling by the method of equal-appearing intervals. Most of these studies were produced by Sherman and associates (11, 18, 21, 22). One other study using the method of equal-appearing intervals was published by Stitt and Huntington (34), while Prather (13) studied direct magnitude-estimation scaling.

The method of equal-appearing intervals has been shown to be preferable to the method of successive intervals, which is computationally too laborious to be practical; the method of pair comparisons, which lacks internal consistency when used for judging defective articulation; and the method of constant sums, which produces scale values quite different from those derived from other methods (21). Scale values produced by the method of equal-appearing intervals are highly reliable; Pearson correlation coefficients or intraclass correlations are usually in the high nineties. Nonetheless, agreement on absolute scale values is unsatisfactory unless pooled judgments are used (18, 22, 34). Only

Morrison (11) found the scale values to be precise. In all of these studies the listeners were college students, except in the one by Stitt and Huntington (34). Their listeners were four instructors of college speech improvement courses.

Prather (13) found that direct magnitude-estimation scaling produced reliable results, but as in other scaling methods, the general level of the ratings differed among the four trials given for each of six experimental conditions. Her listeners were 200 students enrolled in an introductory psychology class.

We rejected the equal-appearing intervals method of assessment at the outset for the following reasons. This method requires taped speech samples, which are not feasible as a routine procedure in schools. The noise environment is too high and the fidelity of portable tape recorders regularly available is too low to produce high quality tapes. It requires multiple-listener agreement, which duplicates clinicians' time. Further, considerable time is required for assembling the tapes for listening sessions so that samples are of a reasonably uniform length and are separated by time intervals for rating. Though Sherman and Cullinan (18) found that randomization was unnecessary, some form of randomization is still unavoidable when multiple samples of the same speaker are to be rated, as would be the case in practical application. These requirements make the method procedurally clumsy for use in service settings. Considerable delay necessarily occurs between the time the sample is obtained and the rating is made. Certainly, the method could not be used efficiently for session by session measurement, which we predict will be a standard procedure at some future date.

At best, the method produces reliable *relative* placement of the speech samples along a severity continuum. While this is usually all that is needed for research, since the subject population for most experiments remains constant, relative placement is still limited by the sample from which it is derived. The technicalities of the method are such that judgments have to be spread over the entire range of scale values. Considering the thousands of pupils in school caseloads, the application of the method becomes totally impractical, since any sample to be rated would have to contain the entire range of severity in the population; otherwise, the method is being applied to obtain absolute scale values, which are unreliable as they have been shown to differ from trial to trial (18, 22, 35). Further, absolute measures, not relative measures, are necessary if results are to be communicated beyond the immediate situation. The movement of pupils from school to school and thus, from clinician to clinician, demands measures that can be meaningfully communicated.

Even if these objections could be overcome, the method still produces a global rating that is not sufficiently refined to reflect the numerous behaviors that must be assessed and continuously measured.

Today's educational technology has demonstrated that efficient instruction must be based on behaviorally specified goals and accurate assessment of the learner's behaviors with respect to those goals at the beginning of instruction. Measurement of behavioral change in short increments of time are necessary, for without them methods cannot be evaluated and improved.

Assessment of Articulation by Experienced and Inexperienced Listeners

Though the assertion has been made in two studies (2, 12) and implied in another (8) that naive listeners perform as well as experienced listeners in judging defectiveness of articulation, results from two other investigations do not support the contention.

The results of the study by Burgi and Matthews (2) pertain only to global ratings as do the results of the two unpublished studies they cite in support of their findings. Four groups of listeners were used, all drawn from students enrolled in courses in speech pathology. One group was from a beginning course; two groups, one of which contained teachers attending night classes, were enrolled in "second level" courses; and one group was composed of graduate students.

These investigators concluded that there was no difference between the ratings of trained and untrained listener groups. They reported individual reliability based on intraclass correlations ranging from .23 to .30 for the four groups with differing amounts of listening experience. Reliability of the combined listeners within each of the groups ranged from .68 to .88, and .93 for all groups combined. Pearson correlation coefficients between mean ratings for each pair of listener groups ranged from .56 to .74, and were all significantly greater than zero. In the analysis of variance used, the subjects by listener groups interaction was significant, about which the investigators made this statement: "...this *F* suggests a possible conclusion that some listener groups evaluated subjects quite differently than others did even though all listener groups are similar in their mean ratings." (p. 352.) Regardless of how the results of the analysis of variance are interpreted, the correlations are so low that the measurements obtained from listeners showing so little consistency would be useless for practical application.

Oyer (12) also concluded that experienced (training in speech and hearing therapy) and inexperienced listeners do not differ in ability to recognize articulation errors. He based his conclusion on data from a group of 20 college seniors majoring in speech and hearing therapy and a group of college seniors majoring in elementary education. Three instructors of speech and hearing courses constructed the scoring key, but two keys had to be constructed. One key was based on agreement of two out of three of the instructors; the other was based on items for which agreement was unanimous. Differences between mean scores for the two groups were not significant whether all items were scored or only those items for which the scoring key was based on unanimous agreement of the judges.

Irwin and Mussleman (8) computed within-group agreement for experienced (100 clock hours of clinical experience) and inexperienced listeners. No direct comparisons between groups could be made, since the purpose of the study was to compare two articulation tests. However, internal consistency of the two groups was equivalent. Kendall's coefficient of concordance was .848 and .861 for experienced listeners using the conventional and experimental tests, respectively. W̲ for inexperienced listeners was .867 and .850 for the two tests in the order shown above. Rank correlation coefficients comparing scores on the two tests were .980 for experienced listeners for live testing, .971 for experienced listeners for the tape recording, and .971 for inexperienced listeners for the tape recording. Thus, on the basis of internal consistency, both groups did perform in a similar fashion, though the actual level of the scores themselves was not reported.

Siegel (24) compared two experienced and two inexperienced examiners. Experience was not defined. He concluded that inexperienced examiners could achieve good reliability with minimal training. He concluded, also, that reliability did not guarantee equivalence of scores, as the examiners differed significantly in absolute scores assigned. While it is not justifiable to generalize to a population of experienced or inexperienced examiners from a sample of two, the data from this study have value for subsequent comparisons, since this is the only study using a standard articulation test in wide currency.

The speakers whose articulation errors were scored were institutionalized retardates who were tested with Templin's 50-item test using the word stimuli for three- to five-year-old children. The criterion measure was the number of correct sounds. All trials were made in the live test situation.

Pearson r̲s between pairs of examiners ranged from .80 to .97 on the first trial with 26 subjects, from .85 to .99 on the second trial with 22 subjects, and from .87 to .96 on the third trial with 21 subjects. All correlations were significantly greater than zero. The differences between means for the six combinations of pairs of examiners for each of the three trials were significant at the 1% level with only two exceptions. The range of differences between means was from 2.96 to 14.35 excluding the two differences that were nonsignificant.

The first and second trials included 22 of the same subjects, so the scores could be used to estimate clinician reliability on the assumption that no change in articulation on the part of the subjects occurred within a time interval of one week. Test-retest correlation coefficients for the four examiners were .95 and .98 for the two inexperienced examiners and .98 and .99 for the two experienced examiners. However, the difference between means for the two trials for one of the experienced examiners was significant at the 1% level.

In discussing the results, Siegel pointed out that differences in scoring could have been due to differences among the examiners in evoking responses as well as to differences in scoring standards, as each examiner tested each speaker individually. In repeated testing of the same speaker, innate subject variability is not controlled and could also contribute to the variability of the scores. Both of these considerations are important in any attempt to transfer improved clinician agreement and reliability to actual practice.

Irwin and Krafchick (7) compared three groups of 50 listeners each for ability to identify articulation errors. The groups were composed of clinicians with five or more years of experience, graduating seniors majoring in speech pathology, and classroom teachers. The listeners identified articulation errors from a film of six children responding to an articulation test that required them to produce isolated words, words spoken in trios, and words spoken in phrases.

They found that trained clinicians were significantly better than classroom teachers on measures of sounds correctly identified as misarticulations, sounds incorrectly identified as misarticulations, and correct responses. Eight out of nine comparisons resulted in significant differences. Since these results are based on fairly large samples and since experience was defined in years and represented *practical* experience, these data constitute the best evidence available today about differences between clinicians and untrained listeners. The most tenable conclusion is, therefore, that experience does produce more accurate identification of articulation errors.

Reports of Agreement and Reliability in Judging Articulation

Wright (38) reported an intensive study of clinician agreement and reliability using three clinicians. The clinicians were said to be trained and to be experienced in the particular method of testing used. The author did not indicate whether they were practicing clinicians or students. Further, the scoring system used was a numeric code assigned to descriptive terms, which is quite different from systems generally employed by clinicians today. The numbers were apparently treated as ranks or summed to arrive at total scores.

The implications of these data are tenuous, as the nature and amount of experience of the clinicians were not described; therefore, the population of clinicians to whom the results can be generalized is nebulous. Further, three clinicians are scarcely an adequate sample of any population of clinicians, even were other characteristics defined.

The scoring system used may have affected the results because the dimensions of the scale had not been determined. Nonetheless, the results are reviewed here, since this is one of the few studies from which inferences can be made about some of the details of agreement and reliability.

Three listening trials were given, one in the live testing situation and two from tape recordings of the original test. Agreement between pairs of clinicians within each of the three trials ranged from 77% to 83% (live test), 81% to 84% (Trial 1, tape recording), and 81% to 87% (Trial 2, tape recording). Rank correlations between scores of individual pairs of examiners ranged from .61 to .75 (live test), .65 to .82 (Trial 1, tape recording), and .78 to .94 (Trial 2, tape recording). The Kendall coefficients of concordance for group consistency were .78 for the live test, and .81 and .90 for the two trials with the tape recordings, with 72%, 76%, and 77% exact agreement for the respective trials.

Reliability of individual examiners (self-agreement) based on comparisons between trials ranged from 75% to 82% (live test vs. Trial 1, tape recording), 74% to 83% (live test vs. Trial 2, tape recording), and 84% to 89% (Trial 1 vs. Trial 2, tape recording). Rank correlations ranged from .55 to .75, .71 to .90, and .55 to .72 for the comparisons in the order shown above. The rank correlation coefficients for agreement between trials based on the total score assigned each subject by the listeners as a group were .82 for the live condition versus Trial 1 with the tape recording, .79 for the live test versus Trial 2 with the tape recording, and .95 for the two trials with the tape recording. W for agreement among the three trials was .90. These results demonstrate, at least, extensive intra- and interclinician variability, even though the sample of clinicians is too small to warrant any generalization about the extent of variability among clinicians in general.

The only other estimates of agreement and reliability established for practicing school clinicians are those reported by Ronald Sommers and associates (27, 28, 29, 30, 31, 32, 33) in a series of studies testing hypotheses about variables related to therapy. However, the clinicians were given training so that their scoring of articulation errors would be as accurate and reliable as possible for use as criterion measures. As many as six or more training sessions were given. The data, therefore, represent the agreement achieved as the result of training.

Both the kinds of judgments being made as well as the type of agreement and reliability estimates varied among the studies. The data are summarized in Table I.1. The range in agreement among clinicians for a single trial was from 86.7% to 92.8% for from six to eight clinicians. The modal percentage was 90.5%. Agreement of this magnitude means that one out of every 10 items was scored differently. Though the agreement may be adequate for research purposes, it is not adequate in

TABLE I.1

Within-group and test-retest agreement among practicing school clinicians in judging articulation after training as reported by Sommers and associates in a series of studies about the effects of speech therapy.

Within-Group Agreement	Test-Retest Agreement	Number of Clinicians	Reference
89.8%	93.7%	6	(28)
90.5%	95.7%	8	(31)
89.0%	--	6	(30)
92.8%	--	6	(29)
86.7%	--	6	(33)
88.0% Substitution Errors	--	6	(33)
83.1% Distortion Errors	--	6	(33)
89.6% Omission Errors	--	6	(33)
90.7% Correct vs. Incorrect	--	6	(33)
87.7% Mean Agreement	--	6	(33)
--	90.5%	8	(32)
--	r = .93, Range = .89-.98	8	(32)
84.0%	r = .91, Range = .86-.96	6	(27)

practical situations. Translated to a clinical problem, it would mean the difference between progress and regression when applied to an individual pupil in a situation in which different clinicians might be called upon to make the evaluation.

Test-retest reliability was better than agreement in the two instances in which it was reported in percentages--93.7% and 95.7%. Reliability, as estimated by Pearson rs, was excellent for some clinicians, but low for others. In clinical application, the tester's reliability is critical, since error causes change in articulatory behavior to be either overestimated or underestimated.

Two other studies warrant attention, even though neither was a study of agreement and reliability per se or involved more than two or three clinicians. These studies, one of which was authored by Elbert (5) and the other by Shelton (16), concerned session-by-session testing on sound production tasks. The feasibility of the experimental procedure depended upon stable and reliable measures.

In the first study, the Pearson r for judging 15 sound-production tasks of 60 items each (20 for each of three sounds) based on live sessions versus tape recordings of the same sessions was .93 ($P < .01$). Over-all self-agreement was 88%--85% on /s/-items, 85% on /z/-items, and 93% on /r/-items. Kendall's coefficient of concordance for the examiner and two other listeners on 900 items was .87 ($P < .001$). Mean agreement for pairs of listeners was 85% and ranged from 81% to 89%. In a continuation of the same kind of study (16), the agreement between two examiners was given by a Pearson r of .82 ($P < .01$). The magnitude of the r, even though it is significant, is very low considering the precision of measurement required for the method under study.

The remaining estimates herein reported were based on comparisons necessary for verifying the stability of criterion measures in a variety of studies. The estimates were represented by percentage of agreement or various statistical tests and rarely involved more than two or three listeners. The listening tasks, though all were concerned with defective articulation, usually differed from study to study.

For the most part, the level of agreement is disappointingly low and was of about the same magnitude as agreement reported by Sommers for specially trained listeners. Test-retest reliability was equally discouraging. At least the data serve to substantiate the contention of considerable variation among listeners. The data pertaining to agreement and reliability are summarized in Tables I.2 and I.3, except for the group of studies reported by Sommers, which are summarized in Table I.1.

Jordan (9) appears to have made the only attempt to relate articulation test scores to severity of articulation disorders as judged from spontaneous speech. Using the Templin-Darley 176-Item Articulation

TABLE I.2

Agreement among clinicians in judging articulation errors as reported in 10 studies in which the judgments were used as criterion measures and in two studies about agreement and reliability per se.

Within - Group Agreement	Condition	Number of Clinicians	Reference
88.2%	Tape Recording	7	Carter and Buck (3)
97.0%	Tape Recording	2	Vandemark and Mann (35)
93.0%	Live Testing	2	Winitz (39)
Above 90%	*	2	Siegel and Others (25)
84.7%	Film, Words in Isolation	50	Irwin and Krafchick (7)
79.6%	Film, Words in Trios		
84.0%	Film, Words in Phrases		
72.0%	Live Testing	3	Wright (38)**
76.0%	Tape Recording, T 1		
77.0%	Tape Recording, T 2		
$W = .78$	Live Testing		
$\overline{W} = .81$	Tape Recording, T 1		
$\overline{W} = .90$	Tape Recording, T 2		
$\overline{W} = .848$	Tape Recording, Conventional Test	11	Irwin and Musselman (8)
$\overline{W} = .861$	Tape Recording, Experimental Test		
$\overline{W} = .87$	Tape Recording	3	Elbert and Others (5)
$\overline{r} = .82$	*	2	Shelton and Others (16)
$\overline{r} = .92$***	*	*	Irwin (6)
$\overline{r} = .86$	Live Testing, T 1	2	Siegel (24)**
$\overline{r} = .94$	Live Testing, T 2		
$\overline{r} = .91$	Live Testing, T 3		
$\overline{C} = .729$	Tape Recording	2	Jordan (9)
$\overline{C} = .756$	Tape Recording	2	

*No Information. **Reliability Study. ***Intraclass Correlation.

TABLE I.3

Test-retest reliability in judging articulation errors as reported in three studies in which the judgments were used as criterion measures and from two reliability studies.

Test-Retest Agreement	Condition	Number of Clinicians	Reference
85%, /s/ Items	Live Testing vs.	1	Elbert and Others (5)
85%, /z/ Items	Tape Recording		
93%, /r/ Items			
88% Average			
r = .93			
.82* Type of Error	Tape Recording	1	Wilson (36)
.82* Number of Errors			
C = .80	Tape Recording	1	Jordan (9)
rho = .82 (Comprite)	Live Testing vs.	3	Wright (38)**
rho = .55-.75 (Individuals)	Tape Recording, T 1		
rho = .79 (Comprite)	Live Testing vs.		
rho = .55-.72 (Individuals)	Tape Recording, T 2		
rho = .95 (Comprite)	Tape Recording,		
rho = .71-.90 (Individuals)	T 1 and T 2		
W = .90			
r = .98	Live Testing	1	Siegel (24)**
r = .99	Live Testing	1	

*Statistic Not Indicated. **Reliability Study.

Test, he found that the number of defective sounds produced as singles, the total number of defective sounds (any error regardless of position or location in a blend), and the number of defective items (items as designated in the test) correlated most highly with judged severity of defectiveness in connected speech as established by graduate students in speech pathology using the method of equal-appearing intervals. Pearson correlation coefficients were .78, .75, and .72 for number of defective sounds as singles, total number of defective sounds, and number of defective items, respectively. Though apparently a positive relation exists, it is certainly not strong enough for individual prediction, which is what is needed in clinical applications.

The Ohio Films for Measuring Proficiency in Recognizing Misarticulations

The stated purpose of the Irwin and Krafchick (7) study was to develop "... a valid and reliable audio-visual test for measuring the proficiency of the clinician or researcher in the recognition of misarticulations." (p. 282.) Since their stated purpose is so closely related to the purpose of this project, the study is reviewed in detail.

These investigators developed alternate forms (A and B) of a film of six children responding to an articulation test. The same six speakers were used in both films, which differed only in the word lists used. Three groups of 50 listeners each identified articulation errors under two conditions--audio-visual and audio-only. The alternate form (B) of the film was scored with the audio-visual condition only. The three trials with the films were consecutive, separated by five-minute rest periods.

Half of the group scored the first film (A), using both audio and visual stimuli, while half responded to audio stimuli only. In the second trial with the first film, which followed scoring of the alternate version (B) using both audio and visual stimuli, the conditions were reversed so that the half who scored from audio-only stimuli on the first trial scored the second trial with audio and visual stimuli and vice versa.

Only the data from the group of 50 clinicians with five or more years of experience are of interest for our purpose. The authors reported 84.7% correct responses for sounds in words spoken in isolation, 79.6% correct responses for sounds in words spoken in trios, and 84% correct responses for sounds in words spoken in phrases. The experienced clinicians correctly identified 72.1%, 73.1%, and 65.9% of the sounds misarticulated in isolated words, trios of words, and words in phrases, respectively. They incorrectly identified as misarticulations 9.2%, 16.6%, and 9.1% of the sounds in the three contexts, respectively. The published report is not explicit about the base from which the percentages were calculated.

It should be noted again that half of the group participated in the audio-visual condition without prior experience with the film, while the other half first scored the film in the audio condition only. The entire group next scored the alternate version of the film in the audio-visual condition, and then repeated scoring the first film with the audio-visual and audio-only conditions reversed. It seems likely that the results were inflated by the half of the group having repeated exposure to the same speakers, greater familiarity with the scoring form, and practice in coordinating observing the film and recording results. Superficially it may appear that order and practice effects were controlled; nonetheless, these effects were not controlled in a way to be of consequence to the data, so they remain a source of error in all of the comparisons. Though the investigators concluded that the two films were equivalent, the listeners had experience in the scoring task prior to the second film. Further, the speakers in the two films were identical, which adds to practice effects. Comparison of the audio-only condition with the audio-visual condition is faulted in a similar fashion, since order and practice could interact with listening conditions (audio versus audio-visual) or with the experience background of the listeners, or both.

The report of the way in which the scoring key was developed supplies another indication of clinician agreement. It has implications, also, for interpreting results from any application of the films.

> Two experienced clinicians with many years of experience with articulatory disorders viewed both films repeatedly in a sound treated booth . . . until both observers agreed on 'correct' answers. (p. 284.)

This statement points up a definite limitation in the usefulness of the films for the purposes for which they were intended. The scoring key was established under conditions entirely different from the conditions under which the film, as a test, would be administered, which leaves considerable leeway for valid disagreement with the key. The two observers who developed the scoring key not only viewed the film in a sound treated booth, they also "repeatedly" viewed it. Listening in a sound treated booth is an entirely different matter from listening in a large group situation in an uncontrolled sound environment. Opportunities to listen again to questionable responses, as is possible in live testing, would have undoubtedly altered the estimates of ability to identify errors. Further, the key appears to have been based on collaboration of two listeners rather than on independent scoring.

Reliability, at least in terms of potential practical application, cannot be determined by performance on repeated scoring within a period of approximately two hours or so. The clinical problem concerns the need to be reliable after intervals of several days or several months. Further, such estimates of reliability as might be inferred from some of the comparisons are contaminated by the varied conditions under which the scoring was done. That is, there was no listening task that was repeated under the same set of conditions.

The sense of the term valid as used in this study is obscure. Apparently what is meant is that the scoring key is the independent validating measure. However, in view of the documented variability among listeners, two listeners do not seem adequate for determining validity, particularly since there must have been substantial disagreement between them or repeated viewings of the film would not have been necessary. Further, the scoring key developed from collaboration of two listeners in a noise-controlled sound environment using both audio and visual stimuli was apparently used for scoring the responses made with audio-only stimuli. Thus, whether the audio-visual or audio-only conditions are compared with the key, all that the results really show is the extent to which the listeners could do in a single viewing of the film what two collaborators did under quite different conditions.

Another difficulty with the film for practical application is that the scoring method employed is different from that used in any of the articulation tests widely used today. It is more usual to make a judgment about one sound only in a given word. In addition, the scoring used is dichotomous, which is not sufficiently refined for many of the requirements of measurement of articulation disorders.

Even were all of these limitations overlooked, the film does nothing more than establish agreement and reliability. The problem of variability still remains. The essential task in clinical application, or in some research problems for that matter, is to bring the level of agreement in judging certain kinds of stimuli to a satisfactory level. Beyond that, the validity of any set of scores as a representation of an individual's speech status is an entirely different matter, one that has numerous complex variables attendant upon it.

Considerations in Estimating Agreement and Reliability

Rees and Cross (15) made a detailed analysis of the scores of eight practicing school clinicians who were given two trials with Ohio Film B (7) separated by an interval of one month. Unfortunately, the film now available for loan has a faulty sound track, which makes listening difficult and introduces an additional source of error. Further, the last word of Speaker XII is no longer on the sound track. The data were not analyzed as an indication of clinician agreement and reliability due to the additional source of error from the faulty sound track, as it is reasonable to suppose that agreement and reliability would be higher in the presence of good examples of the stimuli to be judged. The data were analyzed in order to determine methods of analysis that would provide the most meaningful information relative to a variety of questions that might be asked about clinician agreement and reliability. Only the responses to sounds produced in words spoken in isolation were studied.

The responses of the group of clinicians differed substantially from the scoring key. On the first trial, there were five items with 100% agreement among their listeners that differed from the key. There were 12 items on which seven out of eight of the listeners agreed, but the scoring was different from that indicated by the key. There were 10 items that were equivocal in the sense that half of the listeners judged them one way while half judged them another. Similar disagreement obtained on the second trial. Items on which responses are determined by chance are not useful in measurement.

Rees and Cross concluded that a scoring key would be called for only when a test can be constructed with equivocal items removed, and the remaining items scaled. In addition, the use of a key implies the use of total scores, either error scores or number of items correct. Total scores give a spurious estimate of agreement and reliability if refined measures are required. Their data show no instance whatsoever in which identical total scores were based entirely on the same set of items whether the scores were for pairs of clinicians in a single trial or between trials for a single clinician. A few examples illustrate the point. Clinician A assigned seven errors to Subject II on both trials; three errors were common to both scores, but 10 items differed in scoring between trials. Clinician B assigned 15 errors to Subject XII on both trials. Only 12 errors were common to both scores; six items were scored differently in the two trials. Clinicians F and G both assigned 19 errors to Subject VI on the first trial. Only 14 errors were common to both scores; 10 items were scored differently. The total number of errors (sum of all errors for all subjects assigned by all clinicians) was 644 for the first trial and 643 for the second trial. Nonetheless, a total of *257 items* were scored differently on the two trials.

Similar discrepancies occurred when total scores differed from trial to trial for a single clinician or within a given trial between clinicians. Clinician F assigned 17 errors to Subject IV on the first trial and 19 errors on the second trial. However, only 13 errors were the same in both error scores, while 10 items were scored differently. Clinician E assigned eight errors to Subject II, and Clinician G assigned six. Three errors were common to both scores; eight items were scored differently. Since items per se, not total scores, are of consequence in clinical application, it is immediately evident that analysis by total score would not be adequate for our purpose.

Neither the distribution of total scores nor error scores approached a normal distribution; therefore, the more powerful Pearson r must be ruled out because the assumptions basic to it cannot be met, and a distribution-free, though less powerful, statistical test used.

Different statistics give entirely different impressions of clinician agreement. Agreement among clinicians was computed in three ways. The total number of individual items agreed on between all possible pairs of clinicians was determined for each speaker. The totals were converted to percentages. For the group as a whole on the first trial, agreement was 83.11% and ranged from 81.44% to 85.82% for individual clinicians. When the speakers were ranked according to the total number of errors assigned by each clinician, the coefficient of concordance was .922 ($P < .01$). However, when Ebel's (4) intraclass correlation, which is a variance ratio based on total scores, was used, the correlation was .99 for average ratings and .92 for individual ratings. The same analyses for data from the second trail resulted in 82.78% agreement for the group as a whole and ranged from 80.00% to 85.35% for individual clinicians. Agreement based on $\underline{W}$ was .869 ($P < .01$). The intraclass correlation was .98 for average ratings and .89 for individual ratings. The intraclass correlation gives the impression of much better agreement than the other measures. Young and Downs (40) have discussed the limitations of this statistic, along with other considerations in testing agreement among observers. The percentage of agreement on individual items appears to be the better statistic for indicating level of agreement, but it has the shortcoming of making comparisons with other reports difficult unless N is extremely large.

Reliability for individual clinicians between the two trials (self-agreement from trial to trial) based on the number of individual items scored the same was 88.28% for the entire group and ranged from 83.58% to 90.51%. Reliability in identifying errors only ranged from 52% to 82% and was 67% for the entire group. This latter analysis is somewhat similar to that used by Irwin and Krafchick (7). This computation is not very satisfactory because the set of items varies according to the total number of errors identified for a given comparison. On the other hand, the figures are not inflated by items that are invariably scored as correct. That is, given a group of speakers with accurate articulation and a group with articulation errors, presumably agreement will be much higher in judging the former than the latter group.

Another estimate of reliability was made from ranking scores assigned by each clinician to each of the speakers on the two trials. Two of the rank correlation coefficients were nonsignificant with probabilities greater than .05. This means that the relative position of the speaker with respect to the group of speakers was not predictable from trial to trial for two of the clinicians. Only one $\underline{r}_S$ was significant at the 1% level. For Clinician C, $\underline{r}_S$ was 1.00, yet his agreement between trials based on total number of items scored the same was only 90.51%.

Clinicians behave differently from trial to trial with respect to agreement with other clinicians. When the clinicians were ranked according to percentage of agreement with all other clinicians on each of the two trials, $\underline{r}_S$ was .40 ($P > .05$), which means that agreement of individual clinicians cannot be predicted from trial to trial, at least as shown by this statistic. It would appear that the practice of estimating agreement and reliability on the basis of a single trial is not entirely satisfactory.

Agreement and Reliability in Judging Hoarse Voice Quality

Most of the literature on hoarseness is concerned with its underlying pathology, physical measures of its acoustic characteristics, and its treatment. No studies specifically designed to study the accuracy and reliability of listener identification of hoarse voice could be located. Three studies do, however, provide some information about judging hoarseness. Inferences can be drawn from four additional studies. Even though these studies deal with harsh voice quality, the kind of perceptual identification task required is probably similar to that involved in hoarseness.

Shipp and Huntington (23) studied acoustic and perceptual factors in hoarseness. Four listeners "experienced in the diagnosis and treatment of voice disorders" listened to 31 taped speech samples that included samples from 26 speakers at the time they had laryngitis and samples from five other speakers. Four of these additional speakers had habitual harsh voice, unilateral vocal fold paralysis, chronic hoarseness without identifiable vocal fold change. One normal speaker simulated harsh voice quality. The listeners used a scale in which *zero* was used to designate absence of hoarseness and *one* to *seven* represented degree of hoarseness along a severity continuum.

All five of the nonlaryngitic samples were eliminated in the screening process as well as the subject diagnosed elsewhere as having chronic hoarseness and nine of the 26 laryngitic subjects. One of the laryngitic subjects who was rejected had a medically confirmed diagnosis of acute laryngitis. The 15 subjects not eliminated in the screening process made subsequent recordings after the laryngitis abated. The mean hoarseness rating for samples made during laryngitis was 4.97, and the mean for the postlaryngitic samples was 1.30. The difference between mean severity ratings for each pair of samples was significant. The same samples were judged two months later for breathiness. Average interjudge agreement based on correlations between individual pairs of listeners was .51 for hoarseness and .55 for breathiness. The range of correlations for pairs of judges was from .17 to .73 for hoarseness and .33 to .78 for breathiness. Correlations for each listener's ratings of hoarseness and breathiness ranged from .18 to .64.

The authors concluded that hoarseness due to laryngitis was related to the perception of breathiness, occurrences of aphonia and voice breaks, restricted frequency range, and a small number of frequency breaks. The voices were not characterized by lowered pitch or harshness. They suggested that the perception of harshness appears to be a cue to the judgment of nonhoarse voice. They also conjectured that different pathologies act upon vocal fold vibration selectively, which leads to perceptual differences in voice quality.

In another study, Baynes (1) used two university clinic faculty members to verify the investigator's identification of children with hoarse voices in a school survey. A random sample of 94 pupils was examined by the two judges who rated severity of hoarseness on a one-to-four scale. The statement of agreement of the judges with the investigator implies considerable difference in judgment:

> Because one of the judges interpreted breathiness as a major component of hoarseness, only those children rated moderately or severely hoarse were accepted. (p. 175.)

Baynes further stated that all of the children identified by the two judges as hoarse had been identified in the survey. However, he did not indicate the discrepancy, if any, between the number identified in the survey but not identified by the judges. He did, however, conclude that his prevalence figure of 7.1% was conservative.

Yanagihara (39) conducted two kinds of studies on hoarsenes . They are of particular interest here, since the studies were conducted in the same laboratory in which our samples of hoarse voice were analyzed. In the first study, samples of vowels produced by patients with hoarse voice were subjected to spectrographic analysis from which four spectrographic types of hoarseness were identified. In the screening process, three otolaryngologists classified voice samples from 167 patients as mild, moderate, and severe. Thirty samples unanimously classified by the listeners were selected, 10 from each category of severity. The distribution of age and sex for the group was made as equivalent as possible. Correlation between perceived degree of hoarseness and spectrographic types was .65 (P = .01).

In the second part of the study, which was on synthetic hoarseness, Yanagihara reported reliability of six otolaryngologists in rating samples of normally produced vowels mixed with noise so as to correspond with the noise and harmonic destruction patterns of the four types of spectrographic hoarseness. Six rating categories were used--five degrees of severity of hoarseness and a designator for normal voice. The listeners were also asked to identify any sample that sounded artificial; all samples so marked were eliminated. Correlations between individual pairs of listeners ranged from .45 to .94. Average interjudge agreement was .77. which is somewhat higher than the reliability reported by Shipp and Huntington (23).

As can be seen from these studies, there is considerable variability among listeners in the identification process. Further, the reliability estimates are quite low. Identifying hoarseness and reliability in assessing its severity appear to be equally difficult as judging articulation errors, perhaps even more difficult.

The four studies about harsh voice quality from which some inferences can be made were all directed by Sherman of Iowa. All studies used a seven-point equal-appearing-intervals method of scaling. The criterion measure was the median scale value from groups of 30 to 35 listeners who were senior or graduate students in speech pathology.

Sherman and Linke (20) found a Pearson r of .97 between repeated trials for their listeners. Mean scale values did not differ between trials. The Pearson r for the 20 samples scaled twice in the Sherman and Jensen study (19) was .94, and the difference between means for the two trials was not significant. Rees's (14) listeners scaled syllables for degree of harshness. The Pearson r for repeated scaling of 100 syllables was .90, but the mean for the second trial was significantly lower than the mean for the first trial, which indicated some instability of the absolute scale values. The difference between means was only .25, even though it was significant at the 1% level.

Since the judgment of any particular dimension in a connected speech sample is unlikely to be free from the influence of extraneous factors such as general effectiveness in communicating, Sherman (17) examined backward playing of the samples as a means of eliminating such factors. She concluded that this method resulted in more valid measures of degree of severity of voice quality disorder, though nothing was gained as far as reliability was concerned.

These four studies indicate, at least, that harsh voice quality can be reliably scaled by using criterion measures based on the central tendency of large groups of listeners. Reliability obtained in this way is, of course, much higher than estimates of reliability based on individual pairs of listeners. The latter, however, is the critical estimate, since in practical application, group listening is not feasible as pointed out previously.

Since spectrographic analysis is based on vowels, a comparison of some aspects of the Yanagihara (39) and Rees (14) studies provoke some questions about identifying and classifying hoarseness, as it seems reasonable to assume some similarities in the perceptual task of evaluating both voice qualities. Whereas the other studies in which the method of equal-appearing intervals was used for judging harsh voice quality (17, 19, 20) required the listeners to rate short samples of connected speech, Rees's listeners rated individual syllables including vowels produced in isolation. She reported the lowest correlation coefficient found among the studies using this method, including those concerned with articulation disorders (9, 11, 13, 18, 21, 22, 34). It was also the only study on voice quality in which significant differences obtained between trials. Each syllable was repeated so that the listeners could hear the syllable twice. There were 1080 syllables making a total of 2160 stimulus items. Two listening sessions were required. The listening task may have been so long that scaling became difficult;

that is, there were so many stimuli to judge the listeners may have had difficulty making discriminations. The alternate explanation is that syllables are more difficult to scale than samples of connected speech.

The small shift in scale values did not preclude analyzing the data. Because the items were randomized, the shift would presumably have no differential effect on comparisons. The data showed that consonant environment and type of vowel initiation significantly affected perceived harshness. Vowels produced in isolation (abrupt initiation) were perceived as significantly more harsh than vowels released by the consonant **/h/** (gradual initiation). Vowels produced in both of these ways were perceived as more harsh than vowels in most other consonant environments.

Yanagihara used the vowel series **/u/**, **/ɔ/**, **/a/**, **/ɛ/**, and **/i/**. Speakers were instructed to glide from **/u/** to **/i/**. They also sustained each vowel for several seconds. He found that the range and energy of the noise components varied with perceived degree of hoarseness and that the noise components were more evident in the vowels **/a/**, **/ɛ/**, and **/i/** than in the vowels **/u/** and **/ɔ/** (pp. 532-533). These findings suggest that degree of hoarseness, like harshness, varies with vowels, though the vowels most affected are somewhat different. Both **/a/** and **/ɛ/** were perceptually among the least harsh vowels, while **/i/** was one of the two or three most harsh vowels (14, p. 162).

On the basis of these studies, several questions arise: (1) What is the best sampling procedure in routine screening for hoarse voice quality in the school situation? Can hoarse voice be identified from the same speech sample elicited to evaluate other speech characteristics, or is it necessary to ask for isolated vowels? (2) Is agreement and reliability better for connected speech samples or for vowels? (3) Do voices identified as hoarse on the basis of connected speech samples correspond to the four types of spectrographic hoarseness when voice quality is analyzed in the laboratory in the usual way? (4) Do visual cues during speech production influence listeners' identification and severity ratings? On a priori grounds alone, visual factors influence the judgments of articulation, as for example, acoustically equivalent **/s/** sounds made with and without tongue protrusion are usually judged differently. No such overt behaviors are usually associated with voice quality; nonetheless, judgments may be influenced by the appearance of tension, magnitude or amount of oral activity, age, appearance of the speaker, or extraneous factors such as those pointed out by Sherman (17).

One final question arises, suggested by the reliability of listeners reported by Shipp and Huntington (23) and Yanagihara (39), as follows: Are otolaryngologists better judges of perceived hoarseness than speech clinicians? This latter question is germane to the problem of what kind of experience makes a difference. Presumably, the otolaryngologist has occasion to see many more cases of hoarseness than speech clinicians working in schools. As indicated in Volume II of this report, voice disorders make up only 2% of the caseload, and the majority of those cases are nasal rather than hoarse. The otolaryngologist is also able to inspect the larynx, which, in and of itself, may be an important factor in refining perceptual discrimination. The association of a particular voice quality with the visualized larynx may materially aid in the process of learning to make perceptual judgments in the same way that the association between other kinds of sounds and their sources helps to establish sound discrimination. Stated differently, the otolaryngologist has another source of information to associate with his judgments, which may enhance agreement and reliability.

The entire matter of experience seems to have been treated in a most cavalier fashion. As seen throughout all of the studies reviewed, attempts are made to exercise rather minute control over a number of variables, yet listeners are said to be "experienced" with almost no additional qualification, and generalizations are made about experienced as opposed to inexperienced listeners. It appears to us that the nature, frequency, and extent of experience with the specific dimension being judged is an important variable in the identification and evaluation process. It is particularly important, however, that the experience be of a consequential nature, consequential in the sense that some kind of feedback exists so that judgments can be modified and refined.

CHAPTER II

METHOD

Large-Group Study--Agreement and Reliability in Judging Articulation

The Listeners

The listeners in this study were speech and hearing clinicians in Los Angeles County, including the Los Angeles City Unified School District, who were attending the fourteenth annual speech and hearing study conference. All school clinicians in the county were given release time to attend. Though it had not been anticipated, the number of listeners differed for the morning and afternoon sessions. Further, the number of responses on the items rated varied within each session. During the morning session, the mean number of responses was 264.8 with a standard deviation of 4.2. During the afternoon session, the mean number of responses was 228.1 with a standard deviation of 2.5.

Film for Judging Articulation

Irwin and Krafchick (7) concluded that audio-visual presentation of stimuli resulted in more accurate identification of articulation errors than audio stimuli only, though certain uncontrolled factors, discussed in the previous chapter, make this conclusion somewhat tenuous based on their study alone. On a priori grounds, the argument for audio-visual stimuli is compelling, since both are used in the practical situation. Therefore, we felt that the study required film presentation of the speakers, rather than tape recordings only.

The sound track on the Ohio film (7) available for loan was so faulty that it was not satisfactory for our purpose. In addition, none of the widely used standard articulation tests calls for the same kind of scoring used in that film. We also explored the training material used to train the clinicians making the national prevalence survey for the University of Colorado. However, their training materials are audio-only, being tape recordings, and did not, therefore, meet our requirement for both audio and visual stimuli.

Since materials from other sources were not available, two films (kinescopes) were made using six children--five males and one female--selected by the four consultants in the Los Angeles City Unified School District. The children were selected so as to represent a range in both age (six to 14 years) and severity of articulation problems. A description of the children is included as Appendix A. We did not intend the sample to be a random one, since our purpose was simply to collect a set of misarticulated sounds in order to begin identifying specific areas of difficulty in the judging process.

The children who served as speakers were seated at a table opposite a clinician who administered the test stimuli for the first film and served as the interlocutor for the film containing the connected speech samples. The video camera was on the child's face whenever he was speaking.

The test stimuli for the first film were 40 pictures from the 50-Item Templin Darley Articulation Screening Test. Ten of the blends were eliminated to shorten the test. The test stimuli are shown in Appendix B. The second film contained spontaneous speech samples of approximately one minute from each of the speakers. Responses to the test stimuli were separated by approximately two seconds, and a period of 15 seconds followed the presentation of each speaker in both films. The duration of the first film was 28 minutes; the duration of the second film was 15 minutes.

The equipment used for making the video tapes was a RCA P.K. 15 Vidicon camera linked to a PRT 1B video tape recorder and a RCA BK5 microphone. The kinescope was made from the video tape projected on a Conrac TV monitor using a Harvey 16 mm motion picture camera with PERT 7374 film.

Listening Tasks

There were two listening sessions of approximately 45 minutes each, separated by a period of four hours. Instructions for the listening tasks were contained in the films. They were transcribed and are included here as Appendix C.

Each clinician received his package of scoring materials at the time he registered for the conference. He was given his identification number, which he was to enter on all scoring forms, at this time also. The clinicians were requested to record their full number of years of experience as practicing speech clinicians on each form. The following categories were used: no previous experience, 1 year, 2-5 years, 5-10 years, 10 or more years.

Responses were marked on IBM score forms with a carbon pencil for computer counting. Separate forms were used for each speaker. Two different forms were used--one for rating articulation errors, and one for consistency, severity, and intelligibility ratings. They are shown in Appendix D. The first form was for scoring the articulation test responses in the first film. This form had the 40 stimulus words printed on it with the sounds to be scored underlined. The task for this film was to indicate whether the sounds underlined were produced correctly or incorrectly and then to mark the form accordingly in the spaces provided opposite each word. This task was performed in the same manner by all of the clinicians in the morning session and again in the afternoon session.

The listening task for the film with connected speech samples was divided. Half of the clinicians were to identify the misarticulated sounds in the speaker's spontaneous speech and to record the errors on a form that was the same as that used for recording errors made on the articulation test. The other half of the clinicians were in indicate whether the articulation errors were consistent or inconsistent; to rate the speech problem as mild, moderate, or severe; and to indicate whether the speech was intelligible, partially intelligible, or unintelligible. A different form was provided for recording these judgments. In the second session, the same groups repeated the listening task that had been assigned to them in the first session.

Listening Environment

The films were shown in an auditorium at the University of Southern California that had facilities for seating approximately 400 people. Playback equipment consisted on a Bell and Howell 16mm, 8-watt amplifier movie projector and a sound system that consisted of a 35-watt Altec Model 342 amplifier, which was connected to a 70-volt speaker system in the auditorium. The quality of the sound was subjectively good.

Procedural Difficulties

As indicated in the discussion of the listeners, the same number of judgments was expected on all items both within and between sessions. A part of the discrepancy was attributable to some procedural difficulties. One of the major problems in the listening sessions involved the projection of the film. In order for the room to be dark enough so that the speakers' faces could be easily seen, the lights had to be dimmed to a point that recording on the forms was difficult, which accounts in part for the variance in the number of responses recorded by the individual clinicians. Another difficulty arose from the need to look up at the screen in order to see the speaker's face and then look down at the form to record. The target area for marking the errors was small and the clinicians were not familiar with the form, which compounded the difficulty. As a result, a number of forms were so erratically marked that they had to be discarded.

The experienced clinician, who administers hundreds of articulation tests yearly, can readily record articulation errors heard in spontaneous speech providing he is familiar with the scoring form. However, the degree of accuracy with which he does this has not been determined. The task proved too difficult under the conditions that obtained as was evident by the reaction of the listeners. Therefore, these data were not retrieved, and this listening task was dropped when the study was replicated with a small group of randomly selected clinicians.

Small-Group Study--Agreement and Reliability in Judging Articulation

The small-group study of agreement and reliability in judging articulation was essentially a replication of the large-group study. This study differed from the first study in four respects: (1) the number of listeners; (2) the listening environment; (3) instructions to the listeners; and (4) the time interval between trials.

The Listeners

The listeners were 29 practicing school clinicians, randomly selected from Los Angeles area school. Thirty were selected originally, but one was unable to participate. All of the clinicians had participated in the large-group study conducted two-and-a-half months earlier.

Listening Environment

The listening sessions were held in a 20' x 40' acoustically treated room, one wall of which was draped.

The test films were projected with a Graphflex film projector. The sound equipment was mounted above the film screen. It consisted of an Ampex playback unit, Model 612 Stereo, of which only one channel was used.

Instructions to the Listeners

Whereas the instructions to the listeners were included in the film for the first study, they were deleted from the film for this study. A modified set of instructions was read by one of the principal investigators. The modified instructions are included in Appendix E. The modifications of the instructions were concerned mainly with two areas of confusion that had been noted in the previous study. First, instructions about proper entry of identifying information were expanded. Second, instructions to judge only the one sound as indicated for each of the test words were made more explicit, along with the direction to judge the first response of the speaker in the event that a word was repeated, which occurred in a few instances.

The Listening Sessions

Two listening sessions were scheduled separated by an interval of one week. The sessions began at 4:00 p.m. and continued to 8:00 p.m. and included other listening tasks in addition to those for the articulation study.

The film showing the articulation test was rated first. After a 10-minute break, the listeners rated 20 speakers for hoarse versus normal voice quality. This film was followed by a supper break. The listeners then rated the speakers in the film with the connected speech samples for consistency of articulation errors, severity of the articulation disorder, and intelligibility. Following another break, the listeners returned to rate the severity of 10 samples of hoarse voice quality. The schedule is contained in Appendix F.

Agreement and Reliability in Identifying and Rating Hoarse Voice Quality

The Listeners

The listeners for this part of the study were the same 29 randomly selected clinicians who participated in the small-group study of agreement and reliability in judging articulation errors.

The Speakers

Twenty school-age children served as speakers--10 with perceived hoarse voice quality and 10 with normal voice quality. The speakers with hoarse voice quality included seven males ranging in age from 6 to 14 years and three females ranging in age from 7 to 16 years. The speakers with normal voice quality included three males ranging in age from 7 to 12 years and seven females ranging in age from 7 to 16 years. A description of the speakers is contained in Appendix G.

The initial selection of the speakers was made as follows: The four speech and hearing consultants for the Los Angeles City Unified School District requested the school clinicians to refer children presumed to have hoarse voice quality. The consultants made tape recordings of the children referred using light-weight portable tape recorders. The recordings were made in the schools in which the children were enrolled under sound conditions normal for school environments.

The speech samples included a recording of the speaker reading a short passage and some spontaneous speech. The samples were approximately one minute in length. Instructions followed in making the recordings are shown in Appendix H.

Samples were obtained from 45 speakers. The consultants and the two principal investigators listened to the samples and selected 10 speakers who were perceived as hoarse by all listeners and whose voices were judged to represent a range of hoarseness from mild to severe.

Similar speech samples were obtained from speakers with normal voice quality. The same group of listeners reviewed the 25 samples of speakers thought to have normal voice quality. Questionable samples were discarded resulting in the selection of 10 speakers perceived by all listeners as having normal voice quality.

9

Listening Tapes

Tape recordings for the listening sessions were made at the Los Angeles County Schools Office in a room built to commercial studio recording specifications. Recording equipment included an Ampex Series 354 tape recorder with a RCA Type 77 DX microphone.

Each speaker made a one-minute recording that included a reading of the passage mentioned above and spontaneous speech. A 5-second interval separated the reading and spontaneous speech samples. Speakers were separated by a 10-second interval.

The listening tape for rating severity of hoarse voice quality was composed of the reading passage and spontaneous speech included in tape containing the samples of speakers with normal and hoarse voice quality. In addition, samples of the vowels /i/, /ɑ/, and /u/, which were sustained for five seconds each, were included for each speaker, also. The samples of sustained vowels were subjected to spectrographic analysis as described below.

Spectrographic Analysis

The spectrographic analyses were made at the Institute of Laryngology and Voice Disorders, which is directed by Hans von Leden, M.D., Professor of Biocommunications at the University of Southern California. The tests were performed individually in a soundproof room (ICA Model 401A). The different students with perceived hoarse voice qualities sustained the vowels /i/, /ɑ/, and /u/ for approximately 5 seconds. The acoustic signals were recorded on an Ampex two channel amplifier recorder (Cat. #0230960-01) via an Electro-Voice Microphone, Cardiod, 666 (OHM 50-150-250). The recordings were then transferred to a Sonograph (Kay Electric 606 1A) for a spectrographic analysis. A speaker system (Electro-Voice EV-Four) connected to a control Amplifier (Fisher Model X202C) was used for monitoring the patient's voice inthe acoustic laboratory as well as the recorded voice.

Hoarseness was classified according to the four types of spectrographic hoarseness described by Yanagihara (39). The laboratory staff of the Institute of Laryngology and Voice Disorders made the classifications of the spectrograms.

All speakers received a laryngoscopic examination conducted by Dr. Hans von Leden of the Institute staff.

The Listening Tasks

There were two listening tasks. The first task was identifying the speakers with hoarse voice quality from the listening tape containing speech samples from hoarse and nonhoarse speakers. The second listening task was rating severity of hoarseness as mild, moderate, or severe.

The listening tape used for this task contained samples from only those speakers with hoarse voice quality. Instructions to the listeners are contained in Appendix E along with those for the articulation study. The forms used for recording the judgments are included in Appendix D.

The Listening Sessions

The listening sessions for identifying speakers with hoarse voice quality and for rating severity of hoarseness were included as a part of the listening sessions for the articulation study. The schedule for the two trials, which were separated by a period of one week, is included in Appendix F.

CHAPTER III

RESULTS

Large-Group Study of Agreement and Reliability in Judging Articulation

Our interest was in identifying items on which agreement was good and those on which agreement was poor; therefore, the main form of data reduction was the percentage of agreement. As discussed previously, the number of listeners responding to each of the items differed within each session. Because the number of respondents differed on each item, means and standard deviations could not be used as the measure of central tendency; therefore, medians and Qs were used when central tendencies needed to be specified.

So many protocols were improperly identified that the total number of listeners would have been relatively small had we analyzed only those records that could be matched for the two sessions. Because the protocols could not be matched, the data could not be analyzed in the usual categories showing the number who consistently scored correct and incorrect on both trials and those who scored correct on the first trial but incorrect on the second trial and vice versa. Thus, the results tend to over-estimate agreement.

Level of Agreement

The median agreement for the 40 items for the six speakers, a total of 240 items, was 88.35% for the first trial. The range of agreement was from 50.6% to 100%; Q was 10.69%. For the second trial, the median agreement was 90.55%. The range was from 50.2% to 100%; Q was 10.71%.

On the first trial, agreement was 95.0% or better on 76 or 31.6% of the items. These items are of particular interest, as they are the only items on which agreement was at a really desirable level. Agreement was between 90% and 95% on 36 items. The range from 90% to 100% agreement encompassed a total of 112 items or 46.6% of 240 individual items. Agreement was from 80% to 90% on 50 items (20.9%); from 70% to 80% on 31 items (12.9%); and from 60% to 70% on 25 items (10.4%). The low level of agreement, 50% to 60%, on the remaining 22 items (9.2%) indicated that these were equivocal items with agreement no better than chance.

On the second trial, agreement was 95.0% or better on 84 or 35.0% of the items. Agreement was between 90% to 95% on 43 or 17.9% of the items. The range of agreement from 90% to 100% encompassed 127 items or 52.9%. Agreement was from 80% to 90% on 43 items (17.9%); from 70% to 80% on 25 items (10.4%); and from 60% to 70% on 28 items (11.7%). Agreement was between 50% and 60% on 17 items (7.1%). These comparisons are shown in Table III.1.

TABLE III.1

Number and percentages of items judged by the majority to be correct and incorrect according to level of agreement in two listening sessions separated by four hours. There was an average of 265 listeners in the first session and 228 listeners in the second session.

Agreement	First Trial				Second Trial			
in Percentage	Correct	Incorrect	Total	Percentage	Correct	Incorrect	Total	Percentage
100	2	1	3	1.2	--	2	2	.8
95 - 100	28	45	73	30.4	30	52	82	34.2
90 - 95	16	20	36	15.0	24	19	43	17.9
(90 - 100)	(46)	(66)	(112)	(46.6)	(54)	(73)	(127)	(52.9)
85 - 90	16	12	28	11.7	11	13	24	10.0
80 - 85	11	11	22	9.2	11	8	19	7.9
(80 - 90)	(27)	(23)	(50)	(20.9)	(22)	(21)	(43)	(17.9)
75 - 80	9	6	15	6.2	7	4	11	4.6
70 - 75	7	9	16	6.7	7	7	14	5.8
(70 - 80)	(16)	(15)	(31)	(12.9)	(14)	(11)	(25)	(10.4)
65 - 70	7	7	14	5.8	8	10	18	7.5
60 - 65	6	5	11	4.6	5	5	10	4.2
(60 - 70)	(13)	(12)	(25)	(10.4)	(13)	(15)	(28)	(11.7)
55 - 60	8	4	12	5.0	4	3	7	2.9
50 - 55	6	4	10	4.2	4	6	10	4.2
(50 - 60)	(14)	(8)	(22)	(9.2)	(8)	(9)	(17)	(7.1)
TOTAL	116	124	240	100.0	111	129	240	100.0

Agreement on Correct and Incorrect Items

Level of agreement was analyzed separately for items judged by the majority to be produced correctly and incorrectly. Since some items were judged by the majority to be correct during the first trial but incorrect during the second, two sets of measures were used. One set was based on the majority agreement regardless of the ratings made in the other session. The second set of measures took the change of the majority into account. The ratings made during the first trial were arbitrarily used as the criterion for scoring of items in the latter analysis.

While the median ratings from the second trial were consistently higher than those from the first session, the differences were too small to constitute real differences.

During the first trial, there were 116 items judged to be correct by the majority of the listeners. The median agreement on these items was 86.35%; *Q* = 10.30%; the range was from 52.3% to 100%. The median agreement on the 124 items judged to be incorrect by the majority of listeners was 91.25%; *Q* = 10.30%; the range was from 50.6% to 100%.

During the second trial, only 111 items were judged by the majority to be correct. The median agreement was 90.55%; *Q* was 10.07%; the range was from 50.2% to 99.6%. The median agreement for the 129 items judged by the majority to be incorrect in this session was 92.40%; *Q* = 10.74%; the range was from 50.2% to 100%.

When the ratings from the first trial were used as the criterion for scoring, the median agreement on the 116 items originally judged to be correct shifted to 88.65%, with a *Q* of 11.23%, and a range of 34.5% to 99.6%. For the 124 items originally judged to be incorrect, the median agreement from the second trial was 92.90%; *Q* = 9.05%; the range was from 51.8% to 100%.

The items on which the majority agreement shifted were as follows:

Speaker	Item	First Trial	Second Trial
1	/ z/-	54.7% Correct	65.5% Incorrect
1	-/tʃ/-	61.6% Correct	50.2% Incorrect
2	/ r/-	56.8% Correct	53.0% Incorrect
4	-/ r/-	53.8% Correct	54.4% Incorrect
4	/fr/-	55.6% Correct	55.8% Incorrect

Agreement was somewhat better in the first trial on items judged by the majority to be incorrect than on items judged to be correct, as shown in Table III.2. Of the 76 items with agreement from 95.0% to 100%, 30 (39.5%) were judged correct, while 46 (60.5%) were judged incorrect. Of the 36 items with agreement ranging from 90% to 95%, 16 and

TABLE III.2

Levels of agreement in judging items scored by the majority as correct versus items scored by the majority as incorrect.

Agreement in Percentage	Correct Number	Correct %	Incorrect Number	Incorrect %	Total Number	Total %
First Trial						
95 - 100	30	39.5	46	60.5	76	100.0
90 - 95	16	44.4	20	55.6	36	100.0
(90 - 100)	(46)	(41.1)	(66)	(58.9)	(112)	(100.0)
80 - 90	27	54.0	23	46.0	50	100.0
70 - 80	16	51.6	15	48.4	31	100.0
60 - 70	13	52.0	12	48.0	25	100.0
50 - 60	14	63.6	8	36.4	22	100.0
(50 - 70)	(27)	(57.4)	(20)	(42.6)	(47)	100.0
TOTAL	116	48.3	124	51.7	240	100.0
Second Trial						
95 - 100	30	35.7	54	64.3	82	100.0
90 - 95	24	55.8	19	44.2	43	100.0
(90 - 100)	(54)	(42.5)	(73)	(57.5)	(127)	(100.0)
80 - 90	22	51.2	21	48.8	43	100.0
70 - 80	14	56.0	11	44.0	25	100.0
60 - 70	13	46.4	15	53.6	28	100.0
50 - 60	8	47.1	9	52.9	17	100.0
(50 - 70)	(21)	(46.7)	(24)	(53.3)	(45)	(100.0)
TOTAL	111	46.3	129	53.7	240	100.0

20 were judged correct and incorrect, respectively. For the 112 items with agreement ranging from 90% to 100%, 41.1% and 58.9% were judged correct and incorrect, respectively. When items with agreement in the range of from 80% to 90% were added, 45.1% were judged correct and 54.9% were incorrect.

At the other extreme, the equivocal items with agreement ranging from 50% to 60%, 14 or 63.6% of the 22 items were judged by a small majority to be correct while 8 or 36.4% were judged incorrect. When the group of items with better, though still insubstantial agreement was added, the new total was 47, of which 57.4% were judged correct and 42.6% were judged incorrect. Of the 31 remaining items for which agreement ranged from 70% to 80%, 16 were correct and 15 were incorrect.

Agreement on correct and incorrect items during the second trial was distributed in somewhat the same way, but the differences were less exaggerated. In the range of from 95.0% to 100% agreement, 30 or 35.7% of the 82 items were judged correct, while 54 or 64.3% were judged incorrect. When all items in the 90% to 100% agreement range were included, 42.5% of the 127 items were judged correct, while 57.5% were incorrect. At the other extreme, the most equivocal items were evenly split between correct and incorrect--8 and 9, respectively. When the items in the range of 60% to 70% were added, 46.7% and 53.3% were judged correct and incorrect, respectively. The distribution had changed from one in which more of the equivocal items were correct to the reverse. It may be that the data from the second session are the better indicator, since the clinicians were more familiar with the details of the recording task.

We had hypothesized that there would be a group of items so obviously correct that agreement would be very high as well as a smaller group of items so obviously incorrect that agreement would also be high. We further hypothesized that most equivocal items would have the small majority scoring incorrect. The data from the first session do not support the hypothesis, but the data for the equivocal items from the second session lend some credence to it. The test items did not include any of the least frequently misarticulated sounds such as /m/, /b/, /n/, and so forth. The hypothesis may still be tenable when all sounds are included in the speech sample.

Agreement on Individual Sounds

Agreement on each sound was examined to determine whether some sounds had consistently high or consistently low agreement. There were six samples of each sound--one from each of the six speakers in the film. In order to arrive at some estimate of central tendency, the median agreement based on the six samples was used.

No particular sounds or sound elements clearly emerged as being agreed on at a high level. The consonant /ʃ/ was ranked among the highest in the initial and final positions, but dropped to a markedly lower level in the medial position. The range of agreement on this sound was 82.6% to 98.5% and from 84.6% to 99.3% for the initial and final positions, respectively. Similarly, initial and final **/tʃ/** ranked high. The **/tʃ/** in the medial position was much less well agreed on, as in the case of **/ʃ/** in the medial position, and ranked fifth from the lowest in the distribution of medians. It was one of the sounds on which the majority agreement shifted from correct in the first trial to incorrect in the second trial.

The consonant **/ð/** was also among the higher ranking sounds as far as median agreement was concerned, but the above pattern did not hold for this sound. Medial and final **/ð/** had better agreement than initial **/ð/**. Further, there was a marked shift in rank, as final **/ð/** was 10th during the first trial, but was second during the second trial, while medial **/ð/** went from 12th to eighth place. Initial **/ð/** remained stable at 16th and 17th place during the two trials, respectively.

For the most part, **/s/-**blends had moderately high agreement, though **/sw/-** was below the midpoint in the distribution.

During the first trial there were six sounds with a median agreement of 95.0% or higher. Twelve sounds had a median agreement of 95.0% or better during the second trial. These sounds are shown below.

First Trial		Second Trial	
Sound	Median Agreement	Sound	Median Agreement
/ ʃ /-	97.7%	**/str/-**	98.2%
-/ tʃ/	97.2%	**-/ ð /**	98.2%
/str/-	96.9%	**/ ʃ /-**	97.6%
-/ ʃ /	96.4%	**/ j /-**	97.6%
/ sn/-	95.4%	**-/ tʃ/**	97.4%
/ tʃ/-	95.0%	**/ sn/-**	97.2%
		-/ ʃ /	96.5%
		-/ ð /-	95.6%
		/ tʃ/-	95.4%
		-/ dʒ/-	95.2%
		/ fl/-	95.2%
		/ sk/-	95.2%

Although the order was somewhat different, the levels of agreement were consistent in that the sounds with the highest agreement on the first trial were included among the sounds with agreement of 95.0% or better in the second trial. Table III.3 shows the consistency is even more apparent when the 12 highest ranking sounds on the first trial are compared with those from the second trial. The only sounds not common to both lists were **/kl/-**, which ranked 11th in the first trial, and **/fl/-**, which ranked 11th in the second trial.

TABLE III.3

Rank order based on median percentage of agreement for the six samples of each sound for each listening session.

First Trial				Second Trial			
Rank	Sound	Median	Range	Rank	Sound	Median	Range
1	/ ʃ /-	97.7	82.6 - 98.5	1.5	/str/-	98.2	67.3 - 99.6
2	-/ tʃ/	97.2	70.5 - 99.3	1.5	-/ ð /	98.2	64.1 - 99.1
3	/str/-	96.9	63.6 - 100.0	3.5	/ ʃ /-	97.6	82.5 - 98.7
4	-/ ʃ /	96.4	84.6 - 99.3	3.5	/ j /-	97.6	94.3 - 99.6
5	/ sn/-	95.4	68.9 - 98.1	5	-/ tʃ/	97.4	74.2 - 98.3
6	/ tʃ/-	95.0	59.6 - 99.6	6	/ sn/-	97.2	71.0 - 100.0
7	/ sk/-	94.6	87.0 - 98.5	7	-/ ʃ /	96.5	88.7 - 98.7
8	/ j /-	94.5	93.2 - 98.5	8	-/ ð /-	95.6	65.5 - 98.2
9	-/ dʒ/-	94.4	53.0 - 98.1	9	/ tʃ/-	95.4	64.9 - 99.1
10.5	-/ ð /	94.2	67.2 - 99.3	11	-/ dʒ/-	95.2	53.1 - 99.6
10.5	/ kl/-	94.2	86.2 - 100.0	11	/ fl/-	95.2	76.3 - 97.8
12	-/ ð /-	93.7	73.2 - 99.3	11	/ sk/-	95.2	83.2 - 100.0
13	/spl/-	92.5	56.6 - 98.1	13	/ kl/-	94.5	91.6 - 99.6
14	/ ju/	91.5	79.7 - 97.3	14	/ ju/	93.3	73.9 - 97.4
15	/ fl/-	91.3	74.3 - 98.2	15	/ θr/-	93.2	69.4 - 97.4
16	/ ð /-	91.2	55.1 - 98.2	16	/spl/-	93.0	64.6 - 99.6
17	/ θr/-	90.5	74.2 - 97.0	17	/ ð /-	91.9	55.7 - 99.6
18.5	-/ ʃ /-	89.8	60.1 - 99.3	18	/ l /-	91.6	70.0 - 99.1
18.5	/ st/-	89.8	75.9 - 97.4	19	-/ j /-	91.2	62.9 - 99.1
20.5	-/ j /-	88.6	53.3 - 100.0	20	/ st/-	90.9	78.0 - 99.1
20.5	/ pl/-	88.6	66.3 - 98.9	21	-/ ʒ /-	90.8	87.3 - 96.0
22	/ gr/-	88.3	54.5 - 94.8	22	/ sw/-	90.2	57.1 - 98.3
23	-/ ʒ /-	87.9	85.9 - 96.7	23	/ pl/-	89.5	74.8 - 98.2
24	/ sw/-	87.5	55.0 - 93.9	24	/ θ /-	89.0	63.9 - 99.6
25	/ l /-	86.6	59.7 - 99.2	25	/ dʒ/-	87.2	76.4 - 96.9

TABLE III.3 (continued)

First Trial				Second Trial			
Rank	Sound	Median	Range	Rank	Sound	Median	Range
26	/ ɝ /	86.1	50.8 - 95.0	26	/ gr/-	87.0	54.8 - 96.0
27	/ dʒ/-	85.8	74.1 - 98.9	27	-/ θ /	86.8	75.3 - 99.6
28	/ tr/-	84.2	74.4 - 91.5	28	-/ ʃ /-	85.8	57.5 - 97.8
29	/ θ /-	82.9	54.9 - 98.1	29	-/ θ /-	85.6	66.5 - 96.5
30	-/ θ /	82.8	70.9 - 98.1	30	/ ʃr/-	84.6	72.5 98.3
31	-/ θ /-	82.3	61.5 - 95.1	31.5	/ ɝ /	84.3	56.1 - 99.6
32	/ ʃr/-	80.3	64.3 - 97.8	31.5	/ tr/-	84.3	70.9 - 90.8
33	/ v /-	76.4	52.3 - 92.9	33	/ v /-	78.4	52.1 - 96.1
34	/ r /-	76.3	56.8 - 89.4	34	-/ r /-	75.4	45.6 - 93.9
35	-/ tʃ/-	73.1	59.9 - 96.2	35	/ br/-	74.9	56.3 - 94.8
36	/ br/-	72.5	52.4 - 95.5	36	-/ tʃ/-	68.7	49.8 - 94.8
37	/ z /-	70.6	54.7 - 86.6	37	/ r /-	68.2	47.0 - 90.4
38	-/ r /-	68.7	53.8 - 93.8	38	/ fr/-	66.9	44.2 - 98.2
39	/ fr/-	65.6	55.6 - 97.3	39	/ z /-	65.9	34.5 - 87.9
40	/ pr/-	61.8	50.6 - 77.4	40	/ pr/-	62.5	51.8 - 81.8

A group of eight sounds posed special difficulty as far as agreement was concerned. This group of sounds contained the five sounds on which the majority shifted from rating them correct in the first session to incorrect during the second session. The **/r/**, either as a single consonant or in blends accounted for much of the low agreement, though one of the **/r/**-blends, **/θr/-**, ranked in the top half of the distribution. The other sounds with medians below 80% were **/v/** and **/z/**, which were tested in the initial position only, and the medial **/tʃ/**. These sounds are shown below.

First Trial		Second Trial	
Sound	Median Agreement	Sound	Median Agreement
/ v/-	76.4%	**/ v/-**	78.4%
/ r/-	76.3%	**-/ r/-**	75.4%
-/tʃ/-	73.1%	**/br/-**	74.9%
/br/-	72.5%	**-/tʃ/-**	68.7%
/ z/-	70.6%	**/ r/-**	68.2%
-/ r/-	68.7%	**/fr/-**	66.9%
/fr/-	65.6%	**/ z/-**	65.9%
/pr/-	61.8%	**/pr/-**	62.5%

Agreement on Speakers

Median agreement on the 40 items for each speaker varied as can be seen in Table III.4. For the first trial, the medians ranged from 82.9% for Speaker 1 to 93.6% for Speaker 3. Q values were variable, also, and ranged from 6.3% for Speaker 6 to 14.2% for Speaker 2. Level of agreement was not associated with the severity of the articulatory deviation as judged by the number of correct responses; r_S based on ranks for number correct and agreement was .30 ($P > .05$). The magnitude of the dispersion varied with the level of the median.

Median agreement for the six speakers on the second trial ranged from 87.0% for Speaker 1 to 95.2% for Speaker 3. Dispersions remained similar to those from the first trial. The same lack of association was found between number of correct responses and level of agreement; r_S was .43 ($P > .05$).

The relative level of agreement remained stable from trial to trial. The Spearman rank correlation based on ranks according to agreement was .943 (P = .01). This finding suggests that some speakers' speech is more accurately judged than others when the criterion for accuracy is level of agreement.

Reliability Between Trials

Level of agreement for the 240 items was quite stable. The Spearman rank correlation coefficient between agreement ratings for the two trials, using the correct or incorrect rating by the majority from the

TABLE III.4

Median, Q, and range of agreement in scoring articulation of each of six speakers on a 40-item articulation test.

Speaker	First Trial	Second Trial
Speaker 1		
Number Correct	20	18
Median	82.9%	87.0%
Q	11.0%	11.7%
Range	50.6% - 99.2%	50.2% - 99.6%
		(34.5% - 99.6%)*
Speaker 2		
Number Correct	27	26
Median	85.8%	87.8%
Q	14.2%	12.7%
Range	52.4% - 100.0%	52.8% - 99.6%
		(47.0% - 99.6%)*
Speaker 3		
Number Correct	22	22
Median	93.6%	95.2%
Q	6.4%	6.6%
Range	54.3% - 99.6%	62.9% - 100.0%
Speaker 4		
Number Correct	20	18
Median	89.3%	91.0%
Q	9.9%	10.6%
Range	50.8% - 98.2%	54.4% - 99.6%
		(44.2% - 99.6%)*
Speaker 5		
Number Correct	13	13
Median	85.2%	89.8%
Q	10.6%	11.2%
Range	53.0% - 99.3%	53.3% - 99.1%
Speaker 6		
Number Correct	14	14
Median	93.4%	92.0%
Q	6.3%	5.0%
Range	52.3% - 100.0%	50.2% - 99.6%

*Range of agreement using the majority agreement in the first trial as the criterion for scoring.

first session as the criterion for scoring, was .94 ($P < .001$). The correlation coefficient between levels of agreement for the two sessions for the 116 items agreed on by the majority as correct during the first trial was .93 ($P < .001$). A similar correlation coefficient obtained for the 124 items rated incorrect, as $\underline{r_S}$ was .93 ($P < .001$). This finding suggests that agreement on correct and incorrect items is equally stable. These conclusions must be qualified, however, by the lack of information about shifting within relatively stable totals.

Effects of Experience

Five experience categories were used, which were as follows: no previous experience (clinicians in their first year of employment), one year of previous experience, two to five years, five to ten years, and ten or more years. Again, recognizing that the data are limited because the percentages do not reflect shifting judgments, there was no evidence that the groups differed in relative level of agreement that obtained for each of the six speakers. The coefficients of concordances for the first and second trials for the five experience groups computed separately for each speaker are shown below. In every case, $\underline{W}$ is significant ($P < .01$).

	First Trial	Second Trial
	W	W
Speaker 1	.87	.90
Speaker 2	.85	.87
Speaker 3	.82	.81
Speaker 4	.89	.85
Speaker 5	.88	.91
Speaker 6	.83	.87

The rank correlation between agreement on the 40 items for each of the six speakers indicated that reliability as far as level of agreement is concerned was positively related for the two listening sessions. In all cases, the correlations were significantly greater than zero ($P < .01$), even though the magnitude of the correlations were, for the most part, too low to be of practical significance. The $\underline{r_S}$s ranged from .67 to .97. They are shown in Table III.5. It is evident that the clinicians with no previous experience produced the lowest set of correlations, as the correlations ranged from .67 to .79 for the six speakers. The correlations for the group with one year of previous experience ranged from .79 to .90; the range for the group with two to five years of experience was from .80 to .94, while the range for the two groups with five or more years was from .85 to .97. These comparisons do, in fact, suggest differences, which might become evident in a more precise design. However, it is possible that the relatively small size of the two groups with the least experience may have reduced the stability of these results in comparison with the larger groups having more experience.

TABLE III.5

Spearman rank correlations between levels of agreement in the first and second trials for judging each of the 40 items produced by each speaker. All correlations are significant ($P < .01$).

Previous Experience	Speaker					
	1	2	3	4	5	6
None	.77	.79	.74	.69	.78	.67
1 Year	.82	.90	.89	.79	.81	.80
2 to 5 Years	.89	.89	.88	.94	.80	.85
5 to 9 Years	.97	.87	.87	.88	.92	.85
10 or More Years	.91	.91	.86	.93	.94	.85

TABLE III.6

Median percentage of agreement for each experience group on the 40 items produced by each of six speakers.

	Previous Experience				
Speaker	None	1 Year	2-5 Years	5-10 Years	10 or More Years
Speaker 1					
Trial 1	84.2	84.4	82.1	84.1	82.4
Trial 2	86.7	87.5	86.8	84.9	87.7
Speaker 2					
Trial 1	83.3	87.5	86.1	87.5	85.7
Trial 2	86.7	91.7	91.2	85.2	87.9
Speaker 3					
Trial 1	94.4	96.6	95.7	92.2	93.3
Trial 2	99.5	99.8	95.5	94.3	95.5
Speaker 4					
Trial 1	85.0	90.3	91.1	88.7	89.0
Trial 2	93.3	91.7	92.3	92.3	89.2
Speaker 5					
Trial 1	84.2	90.0	87.0	86.2	83.3
Trial 2	93.3	87.5	90.9	88.7	88.2
Speaker 6					
Trial 1	94.7	90.0	94.5	93.5	90.3
Trial 2	92.9	95.7	93.4	94.3	93.9

The medians on the 40 items for each of the speakers do not suggest systematic differences in level of agreement between experience groups. In nearly all instances, the obtained medians were higher in the second trial; nonetheless, the differences are too small to warrant a conclusion that they are significant. The medians are shown in Table III.6.

Total agreement (100%) in judging individual items occurred a surprising number of times when the group was divided according to experience. There were 393 such instances out of a possible 2400. As can be seen in Table III.7, more instances of total agreement occurred in the second trial for all groups with the exception of the group with two to five years of experience. While it would appear that practice with the film and scoring procedure improved agreement as far as total agreement was concerned, group size was also reduced for the second trial. It may be that those who failed to complete the second trial had special difficulty with the listening and recording task and contributed heavily to the disagreement of the previous trial. It is not possible to draw a conclusion about the reason for so many more instances of total agreement during the second session, since it could have been due to either practice, smaller groups, or better motivation on the part of those remaining to complete the task.

In a general way, instances of total agreement decreased with experience in both sessions, but group size increased with experience. By far the smallest group was made up of beginning clinicians. This group also had the most instances of total agreement. Next in size was the group of clinicians with one year of previous experience, and this group had the second highest number of instances of total agreement. The number of clinicians was somewhat similar for the three remaining experience groups. Each of these groups was over twice the size of either of the groups with the least experience. There was as much difference in the number of instances of total agreement among these three groups (12 instances for the group with ten or more years of experience and 27 instances for the group with five to ten years) as there was between the group with one year of previous experience and the group with five to ten years, which had the third highest number of instances of total agreement in the first trial. On the second trial, the difference between these two latter groups was much larger, and the difference among the groups with more experience was slightly smaller. Here again, conclusions are not justified in that the possibilities for disagreement, both intrinsic and extrinsic, increase as group size increases.

The number of instances of 100% agreement seem to be unrelated to agreement between trials. The inexperienced group had 100% agreement on 19 of the 40 items produced by Speaker 3 on the first session and 23 on the second session (see Table III.7), yet r_S for level of agreement on the 40 items was .74 (see Table III.5). In contrast, the group with the

TABLE III.7

Instances of 100% agreement within experience groups in judging each of the 40 items produced by each of the six speakers in the first and second trials.

Previous Experience	Speaker 1	2	3	4	5	6	Total
None							
Trial 1, N = 19	4	13	19	5	10	13	64
Trial 2, N = 15	7	13	23	13	9	16	81
1 Year							
Trial 1, N = 31	2	11	11	8	7	10	49
Trial 2, N = 24	5	14	21	4	6	15	65
2 to 5 Years							
Trial 1, N = 69	2	3	8	3	3	4	23
Trial 2, N = 66	4	5	7	3	4	9	32
5 to 10 Years							
Trial 1, N = 64	3	2	10	1	3	8	27
Trial 2, N = 53	5	3	2	4	3	4	21
10 or More Years							
Trial 1, N = 74	2	2	3	--	2	3	12
Trial 2, N = 66	2	6	5	3	1	2	19
Subtotals							
Trial 1, N = 257	13	31	51	17	25	38	175
Trial 2, N = 224	23	41	58	27	23	46	218
TOTAL	36	72	109	44	48	84	393

most experience had only three instances of 100% agreement in the first trial and five in the second trial for the same speaker; $\underline{r_S}$ for the two trials for this speaker was .86.

Even though the results of the statistical tests, whether for within-group agreement based on $\underline{W}$ or reliability from trial to trial as indicated by $\underline{r_S}$, do not support a conclusion of differences based on experience, examination of data themselves indicates that a more precise study of the effects of experience on agreement and reliability ought not be ruled out.

Consistency of Articulation Errors

It should be noted at the outset that a few of the totals for consistency, severity, and intelligibility appear to be reversals in that the number of ratings from the first trial is smaller than for the second trial. It was necessary to discard some of the data, which was separated by the clinicians' years of experience, because of errors in marking the forms. Since all experience groups were about equally affected, it is assumed that no particular bias was introduced by this necessity. Nonetheless, it was not possible to make comparisons by experience groups as originally planned.

Each of the six speakers was rated for consistency of articulation errors in spontaneous speech. General agreement was 74.5% on the first trial and 77.5% on the second trial. In all cases, the majority judged each speaker to be consistent. In the first trial, agreement ranged from 69.6% to 79.2%. Results from the second trial were similar, with agreement ranging from 72.6% to 85.7%.

Examination of Table III.8 shows that the differences in level of agreement in judging individual speakers was small for both sessions. Level of agreement did not vary as a function of speakers from trial to trial as shown by $\underline{r_S}$, which was .97 ($P < .01$).

The relatively low level of agreement may have been due to ambiguous criteria rather than difficulty in identifying inconsistent errors. A speaker might be judged to be consistent if most errors were consistent and only a few were inconsistent. Or he might be judged to be inconsistent if there was any instance whatsoever of inconsistency; conversely, he might be judged to be consistent if there was just one sound consistently misarticulated. It seems likely that verbal clarification of criteria might improve agreement in making this kind of judgment.

Severity and Intelligibility

Agreement in judging severity of the articulation disorders of the six speakers ranged from 51.5% to 96.9% on the first trial and from 56.4% to 96.0% on the second trial. One speaker's severity ratings were equivocal, as 51.5% rated this speaker as severe on the first trial,

TABLE III.8

Agreement of a large group of clinicians in rating the articulation errors in the spontaneous speech of six speakers as consistent or inconsistent in two listening sessions separated by four hours.

	Consistency Rating					
	Consistent		Inconsistent		Total	
Speaker	Number	%	Number	%	Number	%
Speaker 1						
Trial 1	76	79.2	20	20.8	96	100.0
Trial 2	114	85.7	19	14.3	133	100.0
Speaker 2						
Trial 1	94	69.6	41	30.4	135	100.0
Trial 2	101	73.7	36	26.3	137	100.0
Speaker 3						
Trial 1	104	77.6	30	22.4	134	100.0
Trial 2	98	77.8	28	22.2	126	100.0
Speaker 4						
Trial 1	92	70.2	39	29.8	131	100.0
Trial 2	105	77.2	31	22.8	136	100.0
Speaker 5						
Trial 1	101	77.7	29	22.3	130	100.0
Trial 2	103	78.0	29	22.0	132	100.0
Speaker 6						
Trial 1	94	74.0	33	26.0	127	100.0
Trial 2	98	72.6	37	27.4	135	100.0
Total						
Trial 1	561	74.5	192	25.5	753	100.0
Trial 2	619	77.5	180	22.5	799	100.0

TABLE III.9

Agreement of a large group of clinicians in rating the severity of the articulation disorders of six speakers as mild, moderate, or severe in two listening sessions separated by four hours.

	Severity Rating							
	Mild		Moderate		Severe		Total	
Speaker	Number	%	Number	%	Number	%	Number	%
Speaker 1								
Trial 1	--	--	28	21.0	105	79.0	133	100.0
Trial 2	--	--	24	18.0	109	82.0	133	100.0
Speaker 2								
Trial 1	30	22.4	97	72.4	7	5.2	134	100.0
Trial 2	37	27.0	88	64.2	12	8.8	137	100.0
Speaker 3								
Trial 1	81	60.9	48	36.1	4	3.0	133	100.0
Trial 2	90	65.7	44	32.1	3	2.2	137	100.0
Speaker 4								
Trial 1	1	.8	63	47.7	68	51.5	132	100.0
Trial 2	4	4.0	57	56.4	40	39.6	101	100.0
Speaker 5								
Trial 1	1	.7	3	2.4	123	96.9	127	100.0
Trial 2	1	.8	4	3.2	120	96.0	125	100.0
Speaker 6								
Trial 1	--	--	26	20.5	101	79.5	127	100.0
Trial 2	--	--	29	21.6	105	78.4	134	100.0

but the majority changed to 56.4% rating as moderate on the second trial. The difference in agreement between trials for the other speakers was quite small. The agreement in classifying by severity can be seen in Table III.9. Severity was rated by the majority as mild in one case, moderate in one case, severe in three cases, and essentially moderate to severe in one case. Agreement was very high on one of the speakers who was rated as having a severe articulation disorder; however, agreement on the other speakers rated as severe was of about the same magnitude as agreement on the other ratings.

Intelligibility Ratings

Agreement in classifying the speakers as intelligible, partially intelligible, and unintelligible ranged from 70.8% to 88.7% on the first trial and from 66.9% to 89.8% on the second trial. The largest difference occurred in the ratings for Speaker 4. In the first trial, 76.3% rated this speaker as partially intelligible, but only 66.9% gave this rating in the second trial. This was the speaker whose severity rating was equivocal Differences between ratings from the two trials for the other speakers were exceedingly small. The majority rating for two speakers was intelligible; three speakers were judged by the majority to be partially intelligible, while one speaker was judged to be unintelligible. Agreement on ratings is shown in Table III.10.

Severity and Intelligibility Ratings for Individual Speakers

The severity and intelligibility ratings corresponded rather well for each of the speakers. Ratings agreed on by the majority on both trials were the same except in one instance. The ratings are shown below.

Speaker 1	Severe	Partially Intelligible
Speaker 2	Moderate	Intelligible
Speaker 3	Mild	Intelligible
Speaker 4	Severe (Trial 1) Moderate (Trial 2)	Partially Intelligible
Speaker 5	Severe	Unintelligible
Speaker 6	Severe	Partially Intelligible

Since all speakers were judged by the majority to be consistent in misarticulating sounds, consistency is apparently unrelated to either severity or intelligibility. Even the extremes of the severity and intelligibility distributions gave no evidence of a distinction as far as consistency was concerned. Speaker 3, who was judged to have a mild articulation disorder and to be intelligible, was judged as consistent by 77.6% in comparison with 60.9% and 88.7% rating mild and intelligible, respectively. Speaker 5, whose articulation disorder was rated as severe and who was unintelligible, was also rated as consistent by 77.7% in contrast with 96.9% and 70.8% giving the ratings of severe and unintelligible, respectively.

TABLE III.10

Agreement of a large group of clinicians in rating six speakers as intelligible, partially intelligible, and unintelligible in two listening sessions separated by four hours.

	Intelligibility Ratings							
	Intelligible		Partially Intelligible		Unintelligible		Total	
Speaker	Number	%	Number	%	Number	%	Number	%
Speaker 1								
Trial 1	14	10.4	107	79.9	13	9.7	134	100.0
Trial 2	13	9.8	106	80.3	13	9.9	132	100.0
Speaker 2								
Trial 1	103	77.4	30	22.6	--	--	133	100.0
Trial 2	108	79.4	28	20.6	--	--	136	100.0
Speaker 3								
Trial 1	118	88.7	14	10.5	1	.8	133	100.0
Trial 2	123	89.8	14	10.2	--	--	137	100.0
Speaker 4								
Trial 1	27	20.6	100	76.3	4	3.1	131	100.0
Trial 2	40	29.4	91	66.9	5	3.7	136	100.0
Speaker 5								
Trial 1	1	.7	37	28.5	92	70.8	130	100.0
Trial 2	--	--	26	26.3	73	73.7	99	100.0
Speaker 6								
Trial 1	3	2.6	87	74.3	27	23.1	117	100.0
Trial 2	3	3.1	72	72.7	24	24.2	99	100.0

Small-Group Study of Agreement and Reliability in Judging Articulation

The responses of the 29 listeners on the two trials separated by one week were analyzed to determine level of agreement, agreement on items judged to be correct and incorrect, and items on which agreement was relatively high and relatively low. The criterion measure was the number of consistent ratings for the two trials with correct or incorrect items determined by the largest number of consistent ratings.

The data were also analyzed for agreement among the listeners within each trial and self-agreement, or reliability, from trial to trial. The criterion measure for these analyses was the total number of items scored the same either within trials or between trials.

The ratings for consistency of articulation errors, severity of the articulation disorder, and intelligibility were also analyzed on the basis of consistent agreement between trials.

Level of Agreement

Mean consistent agreement among all listeners for the 40 sounds for each of the six speakers--a total of 240 items--was 82.6% and ranged from 27.6% to 100%.

Consistent agreement on individual items was 100% for 45 or 18.7% of the items. Agreement was 96.6% (28 out of 29 ratings consistent from trial to trial) for another 30 or 12.5% of the total of 240 items. These 75 items on which agreement was either 29 out of 29 or 28 out of 29 represent 31.2% of the items. Thus, slightly less than one-third of the items had 95% or better agreement. If the criterion for acceptable agreement is extended downward to 90%, an additional 33 items or a total of 108 would be included representing 45% of the 240 items.

Agreement on 52 or 21.7% of the items was below 70%. Consistent agreement was so low on 25 or 10.4% of the items that the number of ratings in the category containing the largest number of ratings represented less than half of the listeners.

In order to compare the performance of the small group with that of the large group, agreement within each of the two trials was also computed. Mean agreement on the first trial was 89.1%, and on the second trial, 88.4%. Sixty-six or 27.5% of the items were agreed on by 100% of the group of 29 listeners. Agreement was 96.6% on 45 or 18.8% of the items and 93.1% on 32 or 13.3%. Thus, by the criterion of 95% or better agreement, agreement was good on 111 or 46.3% of the items, or on 143 or 59.6% if the criterion for adequate agreement is taken as 90%. Agreement was less than 70% on 38 or 15.8% of the items.

On the second trial, 61 or 25.4% of the items received 100% agreement; agreement was 96.6% on 50 or 20.9% of the items, and was 93.1% on 28 or 11.6%. On this trial, agreement was good (95%-100%) on 111 or

TABLE III.11

Consistent agreement between trials and agreement within each of the trials separately among 29 listeners in judging 240 individual items produced by six speakers.

Percentage of Agreement	Consistent Trial 1 and 2		Trial 1		Trial 2	
	Number of Items	% of Items	Number of Items	% of Items	Number of Items	% of Items
100	45	18.7	66	27.5	61	25.4
95 - 99	30	12.5	45	18.8	50	20.9
(95 - 100)	(75)	(31.2)	(111)	(46.3)	(111)	(46.3)
90 - 95	33	13.8	32	13.3	28	11.6
(90 - 100)	(108)	(45.0)	(143)	(59.6)	(139)	(57.9)
80 - 90	55	22.9	45	18.8	49	20.5
70 - 80	25	10.4	14	5.8	19	7.9
60 - 70	11	4.6	18	7.5	14	5.8
50 - 60	16	6.7	20	8.3	19	7.9
(50 - 70)	(27)	(11.3)	(38)	(15.8)	(33)	(13.7)
< 50	25	10.4				
(< 50 - 70)	(52)	(21.7)				
TOTAL	240	100.0	240	100.0	240	100.0

46.3% of the items, or on 139 or 57.9% if the more lenient criterion is used. Agreement was less than 70% on 33 or 13.7% of the items. The distributions of number of items by agreement for each of the trials and for consistent agreement between trials can be seen in Table III.11.

These results indicate that agreement, using consistent agreement from trial to trial as the criterion measure, was good on only 31% of the items, and could be regarded as satisfactory on another 14%. Thus, just 45% of the items fell within the range of satisfactory to good agreement. Less than half of the group gave consistent ratings for 10% of the items. Agreement on these items must be regarded as entirely unsatisfactory. Agreement on another 11% of the items ranged from 50% to 70%, which is also unsatisfactory. Agreement on approximately one-third of the items was from 70% to 90%, which is rather poor considering the kinds of decisions that are made on the basis of articulation test results.

Agreement within each trial separately was considerably higher than consistent agreement from trial to trial; however, these analyses do not take into account the unstable ratings and cannot, therefore, be considered adequate measures of agreement. They were reported primarily for use in the subsequent comparison with agreement found in the large-group study for which only within-group data were available. They do illustrate the inflation of agreement figures when inconsistent judgments are not taken into account. They show, also, that essentially no change in agreement occurred between the two trials separated by one week.

The extent to which data based on a single trial are deceptive is further illustrated by the fact that only 45 of the items were consistently agreed on by 100% of the listeners, yet 66 and 61 items were agreed on by 100% of the listeners in the two trials separately. Agreement was 100% on 21 items in the first trial for which agreement was less than 100% on the second trial. Agreement was 100% on 16 items in the second trial for which agreement was less than 100% on the first trial. In most cases just one listener changed the rating from trial to trial, but in 13 instances, two listeners changed, while in five instances three listeners changed ratings.

Agreement on Correct and Incorrect Items

Using the criterion of consistent agreement from trial to trial, 125 of the 240 items were judged to be correct; 113 were judged to be incorrect; and two were indeterminant in that the number of consistent ratings of correct equaled the number of consistent ratings of incorrect. The medial **/r/** by Speaker 2 was judged consistently by 13 listeners as correct and by 13 as incorrect. Final **/ð/** for Speaker 3 was consistently judged as correct by 11 listeners and as incorrect by the same number.

The level of consistent agreement on correct items was 83.1% versus 81.4% on incorrect items. The distribution of correct and incorrect items by level of agreement is shown in Table III.12. Of the 75 sounds with 96.6% or better agreement, 51 or approximately two-thirds were judged to be correct, while 24 or approximately one-third were judged to be incorrect. With the next group of items added, 65 or 60.2% of the 108 items with 90% or better agreement were judged to be correct, while 43 or 39.8% were judged to be incorrect. Of the 50 items on which ratings were highly inconsistent, half were judged to be correct, while half were judged to be incorrect.

Considering agreement within each trial separately, 125 items were agreed on by the majority as correct in the first trial, while 121 were agreed on as correct in the second trial. The level of agreement was approximately the same for correct and incorrect items--90.5% and 87.6%, respectively. On the second trial, agreement on correct and incorrect items was 88.6% and 88.1%, respectively.

In the first trial 111 items had 96.6% or better agreement. Of these items, 67 or 60.4% were judged to be correct. Of the 143 items with 90% or better agreement, 75 or 52.5% were judged to be correct. Only 50.0% or 19 or the 38 items on which agreement was less than 70% were judged to be correct.

In the second trial, 111 items had 96.6% or better agreement; 62 or 55.9% were judged by the majority to be correct. Of the 139 items with 90% or better agreement, 73 or 52.5% were judged to be correct. In contrast with the first trial, 18 or 54.5% of the 33 items on which agreement was less than 70% were judged to be correct.

The results indicate that even though consistent agreement on correct and incorrect items was the same when all items were included, the highest agreement occurred on sounds judged to be correct more often than on sounds judged to be incorrect. Two out of every three items on which agreement was 95% or better were judged to be correctly articulated. Further, 60% of the items on which agreement was 90% or better were judged to be correct. Items on which agreement was unsatisfactory were evenly split between correct and incorrect. Within each trial separately, highest agreement was also on correct items, but not to the same extent as for consistent ratings except for the items on which agreement was 90% or better on the first trial. In contrast with consistent judgment on items with unsatisfactory agreement, not quite half were judged to be correct on the first trial and slightly more than half were judged to be correct on the second trial.

Agreement on Individual Items

Table III.13 shows the number of listeners making consistent judgments from trial to trial for each of the 240 items. There was one sample of each of the 40 sounds by each of the six speakers. Agreement

TABLE III.12

Consistent agreement between trials and agreement within each of the trials separately among 29 listeners in judging 240 items as correctly or incorrectly articulated.

Percentage of Agreement	Correct Number	Correct %	Incorrect Number	Incorrect %	Total Number	Total %
Trial 1 and 2						
100	29	64.4	16	35.6	45	100.0
95 - 99	22	73.3	8	26.7	30	100.0
(95 - 100)	(51)	(68.0)	(24)	(32.0)	(75)	(100.0)
90 - 95	14	42.4	19	57.6	33	100.0
(90 - 100)	(65)	(60.2)	(43)	(39.8)	(108)	(100.0)
80 - 90	20	36.4	35	63.6	55	100.0
70 - 80	15	60.0	10	40.0	25	100.0
60 - 70	4	36.4	7	63.6	11	100.0
50 - 60	8	50.0	8	50.0	16	100.0
(50 - 70)	(12)	(44.4)	(15)	(55.5)	(27)	(100.0)
< 50	13	56.5	10	43.5	23	100.0
(< 50 - 70)	(25)	(50.0)	(25)	(50.0)	(50)	(100.0)
TOTAL	125	52.5	113	47.5	238*	100.0

---

*Agreement on two items was 50% correct and 50% incorrect. These items are not shown.

TABLE III.12 (continued)

Percentage of Agreement	Correct		Incorrect		Total	
	Number	%	Number	%	Number	%
Trial 1						
100	44	66.7	22	33.3	66	100.0
95 - 99	23	51.1	22	48.9	45	100.0
(95 - 100)	(67)	(60.4)	(44)	(39.6)	(111)	(100.0)
90 - 95	8	25.0	24	75.0	32	100.0
(90 - 100)	(75)	(52.5)	(68)	(47.5)	(143)	(100.0)
80 - 90	23	51.1	22	48.9	45	100.0
70 - 80	8	57.1	6	42.9	14	100.0
60 - 70	10	55.6	8	44.4	18	100.0
50 - 60	9	45.0	11	55.0	20	100.0
(50 - 70)	(19)	(50.0)	(19)	(50.0)	(38)	(100.0)
< 50	--	--	--	--	--	--
(< 50 - 70)	(19)	(50.0)	(19)	(50.0)	(38)	(100.0)
TOTAL	125	52.1	115	47.9	240	100.0

TABLE III.12 (continued)

Percentage of Agreement	Correct Number	Correct %	Incorrect Number	Incorrect %	Total Number	Total %
Trial 2						
100	39	63.9	22	36.1	61	100.0
95 - 99	23	46.0	27	54.0	50	100.0
(95 - 100)	(62)	(55.9)	(49)	(44.1)	(111)	(100.0)
90 - 95	11	39.3	17	60.7	28	100.0
(90 - 100)	(73)	(52.5)	(66)	(47.5)	(139)	(100.0)
80 - 90	22	44.9	27	55.1	49	100.0
70 - 80	8	42.1	11	57.9	19	100.0
60 - 70	9	64.3	5	35.7	14	100.0
50 - 60	9	47.4	10	52.6	19	100.0
(50 - 70)	(18)	(54.5)	(15)	(45.5)	(33)	(100.0)
< 50	--	--	--	--	--	--
(< 50 - 70)	(18)	(54.5)	(15)	(45.5)	(33)	(100.0)
TOTAL	121	50.4	119	49.6	240	100.0

was distributed over a rather wide range for all of the sounds, except for initial **/j/**. Agreement on this sound was 100% for three samples and 96.6% for three samples. The range of agreement for final **/ʃ/** was also restricted, but not to the same extent as for initial **/j/**; the range extended from 100% to 89.7%.

At least one sample of 28 of the sounds had 100% consistent agreement from trial to trial. One or more samples of four of the sounds, **/r/-**, **/tr/-**, **/ʃr/-**, **/fl/-**, had 96.6% agreement. The highest agreement on any sample of seven sounds was 93.1%. These sounds were **-/r/-**, **-/θ/-**, **/z/-**, **-/tʃ/-**, **/θr/-**, **/st/-**, and **/sw/-**. The highest agreement on **/pr/-** was 89.7%.

Less than half of the group gave consistent ratings on 25 of the samples. The blends **/fr/-** and **/ʃr/-** appeared most frequently in this group of sounds with three samples each. **/ɜ/**, **/z/-**, **/tʃ/-**, and **/pr/** were represented with two samples each. One sample each of **/ju/**, initial and medial **/r/**, initial and final **/ð/**, initial **/ʃ/** and **/tʃ/**, medial **/dʒ/**, and the blends **/pl/-**, **/spl/-**, and **/str/-** were consistently agreed on by less than half of the group.

The distribution of agreement on **/fr/-** differed from that for the other sounds. Though agreement was 100% on one sample of this blend, agreement on the remaining five samples was low, being only 62.1% on the sample with the next highest level of agreement. One other sample was notably different, also, in that only eight listeners consistently agreed in judging one sample of **/spl/-**.

When consistent agreement was averaged over all six samples of the 40 test items, initial **/j/** ranked first in agreement with 98.3% followed by final **/ʃ/** with 94.8% agreement. Agreement on four other sounds was also above 90%. They were the blends **/kl/-**, **/sk/-**, **/sn/-**, and **/fl/-**. The blend **/fr/-** ranked lowest with only 56.9% consistent agreement. Agreement did not reach 70% for five other sounds: medial **/r/** and **/tʃ/**, initial **/z/**, and the blends **/pr/-** and **/ʃr/**. The rank order of the sounds, and the percentage of listeners making consistent ratings from trial to trial are shown in Table III.14.

The data in Table III.14 show, also, that agreement varied with the position of the sound in the test words. Four of the sounds--**/θ/**, **/ð/**, **/ʃ/**, **/tʃ/**--appeared in all three positions. Agreement was highest for these sounds in the final position and lowest for the medial position. Agreement was only slightly higher for the sounds in the initial position than in the medial position. Mean agreement was 83.0%, initial position; 80.8%, medial position; and 89.8%, final position. Three sounds appeared in initial and medial position only. They were **/j/**, **/r/**, and **/dʒ/**. With these sounds added, mean agreement for the seven sounds in initial position was 84.6% compared with 80.0% for medial position.

TABLE III.13

Distribution of the six samples of each of the 40 test items according to the number of listeners out of a total of 29 making consistent ratings on two trials separated by one week.

	Number of Listeners Making Consistent Ratings							
	29	28	27	26-24	23-21	20-18	17-15	< 15
				89.7-	79.3-	69.0-	58.6-	48.3-
Sound	100%	96.6%	93.1%	82.8%	72.4%	58.6%	51.7%	27.6%
/ ɝ /	2	--	1	--	--	--	1	2
/ ju/	1	2	--	1	1	--	--	1
/ r /-	--	2	--	1	--	1	1	1
-/ r /-	--	--	1	1	--	1	2	1
/ l /-	2	--	2	--	1	--	1	--
/ v /-	2	1	--	2	--	1	--	--
/ θ /-	1	1	--	2	1	--	1	--
-/ θ /-	--	--	2	2	2	--	--	--
-/ θ /	1	--	1	3	1	--	--	--
/ ð /-	1	--	1	2	1	--	--	1
-/ ð /-	1	1	--	4	--	--	--	--
-/ ð /	1	1	2	1	--	--	--	1
/ z /-	--	--	1	1	1	--	1	2
/ ʃ /-	3	--	1	1	--	--	--	1
-/ ʃ /-	2	--	--	1	1	1	1	--
-/ ʃ /	1	2	2	1	--	--	--	--
-/ ʒ /-	1	--	1	2	2	--	--	--
/ j /-	3	3	--	--	--	--	--	--
-/ j /-	2	--	--	1	2	1	--	--
/ tʃ/-	2	2	--	--	--	--	1	1
-/ tʃ/-	--	--	1	1	--	1	1	2
-/ tʃ/	3	--	2	--	--	--	1	--
/ dʒ/-	3	--	--	1	--	--	2	--
-/ dʒ/-	3	1	--	--	--	1	--	1
/ pr/-	--	--	--	2	1	1	--	2
/ br/-	1	--	1	2	2	--	--	--
/ tr/-	--	2	1	1	2	--	--	--
/ gr/-	1	--	1	1	2	--	1	--
/ fr/-	1	--	--	--	--	1	1	3
/ θr/-	--	--	1	3	2	--	--	--
/ ʃr/-	--	1	1	1	--	--	--	3

TABLE III.13 (continued)

	Number of Listeners Making Consistent Ratings							
	29	28	27	26-24	23-21	20-18	17-15	< 15
Sound	100%	96.6%	93.1%	89.7-82.8%	79.3-72.4%	69.0-58.6%	58.6-51.7%	48.3-27.6%
/ pl/-	1	--	1	1	1	1	--	1
/ kl/-	1	2	1	2	--	--	--	--
/ fl/-	--	2	--	4	--	--	--	--
/ sn/-	1	2	1	1	1	--	--	--
/ st/-	--	--	2	4	--	--	--	--
/ sk/-	1	3	--	1	1	--	--	--
/ sw/-	--	--	2	3	--	--	1	--
/spl/-	1	1	2	--	--	1	--	1
/str/-	2	1	1	1	--	--	--	1
TOTAL	45	30	33	55	25	11	16	25

TABLE III.14

Rank order of the 40 test items based on the mean of the six samples--one from each of six speakers--for each item. The criterion measure for agreement was the number of listeners of a total of 29 making consistent ratings on two trials separated by one week.

Rank	Sound	Percentage of Agreement
1	/ j /-	98.3
2	-/ ʃ /	94.8
3	/ kl/-	93.1
4	/ sk/-	92.5
5	/ sn/-	92.0
6	/ fl/-	91.4
7	-/ ð /-	89.7
8.5	-/ tʃ/	89.7
8.5	-/ θ /	89.7
10	/ v /-	89.1
11.5	/ tr/-	87.9
11.5	/ st/-	87.9
13	/ br/-	87.4
14	/str/-	86.8
16.5	/ l /-	86.2
16.5	/ ʃ /-	86.2
16.5	-/ ʒ /-	86.2
16.5	/ θr/-	86.2
19	-/ θ /-	85.6
20.5	-/ ð /	85.1
20.5	-/ dʒ/-	85.1
22	-/ j /-	84.5
25	/ ju/	82.2
25	/ θ /-	82.2
25	-/ ʃ /-	82.2
25	/ tʃ/-	82.2
25	/ sw/-	82.2
28.5	/ ð /-	81.6
28.5	/ dʒ/-	81.6
30	/ gr/-	80.5
31.5	/ pl/-	79.3
31.5	/spl/-	79.3
33	/ r /-	74.1
34	/ ɝ /	72.4
35	/ ʃr/-	67.8
36.5	/ pr/	67.2
36.5	-/ r /-	67.2
38	/ z /-	64.4
39	-/ tʃ/-	63.8
40	/ fr/-	56.9

Agreement did not differ on voiced and voiceless consonants. Twenty-two items were single consonants of which 13 were voiced and nine were voiceless. Mean agreement on the voiced consonants was 82.6%, while mean agreement on the voiceless was 84.0%.

A somewhat different ordering occurred when the sounds or blends were grouped. Agreement for grouped sounds is shown in Table III.15. Agreement was highest in this ordering for /j/ followed by /v/. Agreement on all samples of these sounds was 91.4% and 89.1%, respectively. The /l/-blends were in third place, /ʃ/ was in fourth place, and the /s/-blends were in fifth place. Agreement was low on both the vocalic /ɝ/ and consonantal /r/--72.4% and 70.7%, respectively, while /z/ ranked lowest with 64.4% agreement. Agreement on the /r/-blends as a group was also low and was 77.7%, which is considerably lower than the 87.9% and 86.8% agreement on /l/- and /s/-blends, respectively.

Agreement in judging consonants and blends was approximately the same. Agreement in judging the diphthong /ju/ and semivowel /ɝ/ was somewhat lower; however, there were only two examples of this kind of item. Agreement for all consonants and blends was 83.2% and 82.4%, respectively. On /ju/ and /ɝ/, agreement was 77.3%.

In view of the variability of agreement with position of the sound, the ordering of the sounds with position disregarded, as is shown in Table III.15, would very likely be different had samples of /v/, /l/, and /z/ in medial and final positions and /ʒ/ and /dʒ/ in final position been included.

Agreement on Individual Speakers

Consistent agreement from trial to trial was 82.6% for all speakers and ranged from 76.9% to 88.2% for individual speakers. Agreement on individual speakers using the majority rating from single trials only was 89.1% on the first trial and 88.4% on the second trial. The range of agreement on individual speakers for the respective trials was 83.6% to 96.7% for the first trial and 84.0% to 91.3% on the second trial. These comparisons are shown in Table III.16. Even though agreement was lower when the criterion used was consistent agreement, the relative position of the speakers did not change. The Spearman rank correlation between consistent agreement and agreement on the first trial was .943 ($P < .01$). Between consistent agreement and agreement on the second trial, $\underline{r_S}$ was .986 ($P < .01$).

The number of correct responses as determined by consistent ratings from trial to trial and within each trial separately is shown for each of the six speakers in Table III.17. Using the rating given by the majority as the criterion for correct or incorrect articulation, only two speakers received the same total score on both trials. The majority rating changed on eight items for the other speakers. The scores based on the largest number of consistent ratings was the same for two of the

TABLE III.15

Rank order of the test items by mean agreement on groups of similar items. The number of examples within each group, for which there were six samples each, is indicated. The criterion measure for agreement was the number of listeners of a total of 29 making consistent ratings on two trials separated by one week.

Rank	Sound	Percentage of Agreement	Number of Examples	
1	/ j/	91.4	2	Initial, Medial
2	/ v/	89.1	1	Initial
3	/ l/-blends	87.9	3	Initial **/pl/, /kl/, /fl/**
4	/ ʃ/	87.8	3	Initial, Medial, Final
5	/ s/-blends	86.8	6	Initial **/sn/, /st/, /sk/, /sw/, /spl/, /str/**
6.5	/ l/	86.2	1	Initial
6.5	/ ʒ/	86.2	1	Medial
8	/ ð/	86.0	3	Initial, Medial, Final
9	/ θ/	85.8	3	Initial, Medial, Final
10	/dʒ/	83.3	2	Initial, Medial
11	/ju/	82.2	1	Medial
12	/tʃ/	78.6	3	Initial, Medial, Final
13	/ r/-blends	77.7	6	Initial//**pr/, /br/, /tr/, /gr/, /fr/, /θr/, /ʃr/**
14	/ ɝ/	72.4	1	Medial
15	/ r/	70.7	2	Initial, Medial
16	/ z/	64.4	1	Initial

TABLE III.16

Mean consistent agreement from trial to trial and agreement within each trial separately among 29 listeners in judging the 40 test items produced by each of the six speakers.

Speaker	Trials 1 and 2	Agreement Trial 1	Trial 2
Speaker 1	76.9%	84.7%	84.0%
Speaker 2	84.7%	89.3%	90.1%
Speaker 3	88.2%	96.7%	91.1%
Speaker 4	80.3%	88.4%	88.8%
Speaker 5	78.6%	83.6%	84.9%
Speaker 6	87.0%	91.8%	91.3%
All Speakers	82.6%	89.1%	88.4%

TABLE III.17

Number of sounds of a total of 40 correctly articulated by each of the six speakers as determined by the largest number of consistent ratings from trial to trial and by the majority within each trial separately.

Speaker	Number of Correct Responses Trials 1 and 2	Trial 1	Trial 2
Speaker 1	23	23	21
Speaker 2	28 or 29*	30	27
Speaker 3	23 or 24*	24	24
Speaker 4	21	22	21
Speaker 5	14	13	15
Speaker 6	13	13	13
TOTAL	122 - 124	125	121

*An equal number of listeners judged this item to be correct and incorrect.

speakers when compared with the scores from the first trial and for two speakers when compared with the second trial; however, only one of the speakers receiving the same scores was common to both trials. Though the differences between any set of scores was small and nonsignificant, the fact that a majority of the group did not agree from trial to trial on the total number of correct responses for four of the six speakers is significant as is the failure of the total scores from either trial to coincide with the total scores derived from the group of highly reliable listeners--those whose ratings were consistent from trial to trial.

Agreement Among Listeners

The mean number of items each listener scored the same as every other listener was computed and averaged for the six speakers for each trial. The means for the listeners are shown in Table III.18. The general mean was 33.0 or 82.5% of the 40 items on the first trial and 33.1 or 82.8% on the second trial. Mean agreement on all speakers for individual listeners ranged from 29.3 (73.2%) to 34.4 (86.0%) on the first trial and from 30.1 (75.2%) to 34.7 (86.8%) on the second trial.

The extent to which individual listeners agreed with every other listener was positively related for the two trials, though the magnitude of the rank correlation was low; r_S was .703 ($P < .01$). There was no difference in mean agreement from trial to trial, as the mean difference between trials was -.1, and t was .67 ($P = .60$).

Listener Reliability

The criterion measure for reliability or self-agreement was the number of items each listener scored the same from trial to trial averaged for the six speakers. As can be seen from Table III.18, mean self-agreement for all listeners was from 32.2 (80.4%) to 38.2 (95.4%).

In order to arrive at an error term for testing differences between listeners, the data were cast in a treatments by subjects design. The more common application of a treatments by subjects design would be to determine whether the speakers differed from each other. However, our interest was in listener rather than speaker behavior. Essentially, the question being asked was whether a collection of individuals to whom six tests were administered achieved the same scores.

The listeners differed in mean self-agreement as shown by the significant F ratio of 2.59 ($P < .001$). The summary of the analysis of variance is shown in Table III.19. Fifty-two of the 406 pairs of differences were significant.

Examination of the data showed that six listeners (Listeners 1, 3, 10, 24, 26, 27, in Table III.18) accounted for most of the low reliability. In terms of percentages, the mean number of items for speakers that

TABLE III.18

Mean number of a total of 40 test items each listener scored the same as every other listener averaged for the six speakers for each of the two trials, and mean number of items each listener scored the same from trial to trial averaged for the six speakers.

	Agreement With All Other Listeners				Self - Agreement	
	Trial 1		Trial 2		Trial 1 and 2	
Listener	Mean	%	Mean	%	Mean	%
1	31.1	77.8	30.2	75.5	32.3	80.8
2	34.1	85.2	34.5	86.2	36.8	92.0
3	29.3	73.2	30.1	75.2	32.7	81.7
4	33.7	84.2	34.1	85.2	36.2	90.4
5	34.4	86.0	34.3	85.8	38.2	95.4
6	34.0	85.0	33.7	84.2	36.7	91.7
7	33.3	83.2	33.9	84.8	36.2	90.4
8	33.6	84.0	33.1	82.7	36.0	90.0
9	33.6	84.0	34.2	85.5	35.5	88.8
10	31.8	79.5	31.0	77.5	33.0	82.5
11	33.4	83.5	31.7	79.2	33.7	84.2
12	33.4	83.5	34.1	85.2	35.5	88.8
13	32.0	80.0	32.5	81.2	37.0	92.5
14	34.1	85.2	33.9	84.8	37.2	92.9
15	34.3	85.7	34.1	85.2	36.7	91.7
16	32.6	81.5	32.9	82.2	35.1	89.2
17	32.7	81.7	33.1	82.7	35.0	87.5
18	33.9	84.8	34.3	85.7	35.8	89.6
19	33.5	83.8	33.7	84.2	36.8	92.0
20	33.6	84.0	31.9	79.8	36.0	90.0

TABLE III.18 (continued)

Listener	Agreement With All Other Listeners				Self - Agreement	
	Trial 1		Trial 2		Trial 1 and 2	
	Mean	%	Mean	%	Mean	%
21	31.1	77.8	30.8	77.0	34.8	87.1
22	33.4	83.5	33.8	84.5	35.7	89.2
23	33.8	84.5	33.3	83.2	35.5	88.8
24	30.7	76.8	32.5	81.2	32.7	81.7
25	32.6	81.5	32.0	80.0	34.5	86.2
26	32.8	82.0	33.6	84.0	32.2	80.4
27	32.3	80.8	33.9	84.8	33.2	82.9
28	34.3	85.8	34.7	86.8	37.0	92.5
29	33.5	83.8	32.9	82.2	36.2	90.4
TOTAL	33.0	82.5	33.1	82.8	35.3	88.3

TABLE III.19

Summary of analysis of variance for number of items each listener scored the same from trial to trial for six speakers.

Source	df	ss	ms	F	p
Listeners	28	455.10	16.25	2.59	$<.001$
Speakers	5	243.36	48.67		
Listeners X Speakers	140	877.87	6.27		
TOTAL	173	1576.33			

these listeners scored the same from trial to trial ranged from 80.4% to 82.9%. These scores were removed, and the data were recalculated. Mean self-agreement increased to 36.0 or 90.0%. F for the recalculated data was .289 ($P > .20$). This F indicates that by using a selective process, it should be possible to constitute a group of listeners that have similar reliability from trial to trial and that reliability above 90% should be possible under these conditions. However, the hypothesis would have to be validated by retesting the selected listeners. Whether such a group would perform in the same way in the presence of articulatory stimuli different from those used in this study would need to be determined as well.

Relation Between Inter-Listener Agreement and Reliability

Self-agreement from trial to trial was better than agreement with other listeners on either trial, though the two kinds of measures have a positive but low relation. The difference between the mean number of items each listener scored the same as every other listener in the first trial (33.0 or 82.5%) and the mean number of items each listener scored the same from trial to trial (35.3 or 88.3%) was -2.3; t was 11.39 ($P < .01$). The results were similar when the comparison involved the second trial for which inter-listener agreement was 33.1 or 82.8%. The t ratio was 8.69 ($P < .01$). The Spearman rank correlation between inter-listener agreement on the first trial and self-agreement was .706 ($P < .01$). For the comparison with the second trial, r_s was .512 ($P < .01$).

Consistency of Articulation Errors

Agreement on consistent versus inconsistent articulation errors in spontaneous speech samples of each of the six speakers is shown in Table III.20. Mean consistent agreement was 83.9% and ranged from 75.9% to 96.6% for individual speakers. The 146 consistent ratings were divided, with 130 or 89% indicating consistent articulation errors and 16 or 11% indicating inconsistent articulation errors.

The number of listeners consistently classifying individual speakers as making consistent articulation errors ranged from 19 or 65.5% to 24 or 82.8% with a mean of 21.7 or 74.7%. A significant number of listeners (determined by z with a 5% level of significance) were consistent from trial to trial in classifying five of the six speakers. Twenty-four listeners (82.8%) consistently rated both Speaker 1 and 4 as making consistent articulation errors. Twenty-two listeners (75.9%) rated the articulation errors of Speaker 3 as consistent, while 21 (72.4%) and 20 (69.0%) assigned this rating to Speakers 5 and 6, respectively. Only 19 listeners (65.5%) consistently classified Speaker 2 as making consistent articulation errors. This number does not represent a significant majority of the listeners when tested statistically.

TABLE III.20

Agreement and consistency of 29 clinicians in rating the articulation errors in the spontaneous speech of six speakers as consistent or inconsistent in two trials separated by one week.

	Consistency Rating					
	Inconsistent		Consistent		Total	
Trial	Number	%	Number	%	Number	%
Speaker 1						
Trial 1	4	13.8	25	86.2	29	100.0
Trial 2	5	17.2	24	82.8	29	100.0
Consistency--Trial 1 and 2	4	13.8	24	82.8	28	96.6
Speaker 2						
Trial 1	6	20.7	23	79.3	29	100.0
Trial 2	8	27.6	21	72.4	29	100.0
Consistency--Trial 1 and 2	4	13.8	19	65.5	23	79.3
Speaker 3						
Trial 1	4	13.8	25	86.2	29	100.0
Trial 2	3	10.3	26	89.7	29	100.0
Consistency--Trial 1 and 2	--	--	22	75.9	22	75.9
Speaker 4						
Trial 1	3	10.3	26	89.7	29	100.0
Trial 2	4	13.8	25	86.2	29	100.0
Consistency--Trial 1 and 2	2	6.9	24	82.8	26	89.7
Speaker 5						
Trial 1	7	24.1	22	75.9	29	100.0
Trial 2	3	10.3	26	89.7	29	100.0
Consistency--Trial 1 and 2	2	6.9	21	72.4	23	79.3

TABLE III.20 (continued)

Trial	Consistency Rating Inconsistent Number	 %	 Consistent Number	 %	 Total Number	 %
Speaker 6						
Trial 1	8	27.6	21	72.4	29	100.0
Trial 2	5	17.2	24	82.8	29	100.0
Consistency-- Trial 1 and 2	4	13.8	20	69.0	24	82.8
TOTAL (Consistent Ratings)	16	9.2	130	74.7	146	83.9

Agreement within each trial separately was determined, also. Mean agreement in rating the six speakers as making consistent articulation errors was 81.6% on the first trial. Agreement ranged from 72.4% to 89.7% on this trial, also. Though the range was the same on both trials, the agreement represented by the extremes was for different speakers. Considerable shifting in the extent of agreement on individual speakers occurred from trial to trial. $\underline{r}_S$ was .32, which is a zero order correlation, for speakers ranked according to percentage of agreement on each of the trials.

Severity Ratings

Agreement in rating the articulation disorders of the six speakers as mild, moderate, or severe is shown in Table III.21. The ratings were based on the samples of spontaneous speech. Mean consistent agreement from trial to trial was 79.3%. The range was from 58.6% to 93.1% for individual speakers. The consistent ratings, however, were confined to a single severity category in the case of only one speaker. The ratings for three speakers were distributed over two categories, and over all three categories for two of the speakers.

Mean agreement in selecting a single severity category for each of the speakers was 67.2%. Agreement ranged from 37.9% to 93.1%. Agreement was substantial on Speaker 5; 27 listeners (93.1%) consistently rated this speaker as having a severe articulation disorder. Twenty-five listeners (86.2%) were consistent in rating Speaker 1 as severe, while 23 (79.3%) consistently rated Speaker 6 as severe.

The number of listeners consistently assigning the most frequently used severity rating for three speakers did not represent a significant majority of the listeners. Only 17 listeners (58.6%) rated the articulation disorder of Speaker 2 as moderate; three listeners assigned the rating of mild, and one consistently regarded this speaker's articulation disorder as severe. Agreement was even lower on the remaining two speakers. Speaker 4 was consistently rated as severe by 14 listeners (48.3%) while seven (24.1%) assigned the rating of moderate. All ratings were confined to these two categories. Only 11 listeners (37.9%) consistently rated Speaker 3 as having a mild articulation disorder; five (17.2%) used the moderate category, and one listener consistently assigned a rating of severe.

Mean agreement with each trial separately, based on the severity category used by the largest number of listeners for each speaker, was 75.3% on the first trial and ranged from 58.6% to 93.1% for individual speakers. On the second trial, mean agreement was 79.3%. The range was from 58.6% to 100%. The relative level of agreement on the most frequently assigned severity rating for each of the speakers was similar for the two trials. $\underline{r}_S$ was .985 ($P < .01$).

TABLE III.21

Agreement and consistency of 29 clinicians in rating the severity of the articulation disorders of six speakers as mild, moderate, or severe in two trials separated by one week.

	Severity Rating							
	Mild		Moderate		Severe		Total	
Trial	Number	%	Number	%	Number	%	Number	%
Speaker 1								
Trial 1	--	--	4	13.8	25	86.2	29	100.0
Trial 2	--	--	2	6.9	27	93.1	29	100.0
Consistency-- Trial 1 and 2	--	--	2	6.9	25	86.2	27	93.1
Speaker 2								
Trial 1	5	17.2	22	75.9	2	6.9	29	100.0
Trial 2	7	24.1	20	69.0	2	6.9	29	100.0
Consistency-- Trial 1 and 2	3	10.3	17	58.6	1	3.5	21	72.4
Speaker 3								
Trial 1	17	58.6	9	31.0	3	10.4	29	100.0
Trial 2	17	58.6	11	37.9	1	3.5	29	100.0
Consistency-- Trial 1 and 2	11	37.9	5	17.2	1	3.5	17	58.6

TABLE III.21 (continued)

Trial	Severity Rating Mild Number	%	Moderate Number	%	Severe Number	%	Total Number	%
Speaker 4								
Trial 1	--	--	12	41.4	17	58.6	29	100.0
Trial 2	--	--	10	34.5	19	65.5	29	100.0
Consistency-- Trial 1 and 2	--	--	7	24.1	14	48.3	21	72.4
Speaker 5								
Trial 1	--	--	2	6.9	27	93.1	29	100.0
Trial 2	--	--	--	--	29	100.0	29	100.0
Consistency-- Trial 1 and 2	--	--	--	--	27	93.1	27	93.1
Speaker 6								
Trial 1	--	--	6	20.7	23	79.3	29	100.0
Trial 2	--	--	3	10.3	26	89.7	29	100.0
Consistency-- Trial 1 and 2	--	--	2	6.9	23	79.3	25	86.2
TOTAL (Consistent Ratings)	14	8.0	33	19.0	91	52.3	138	79.3

Intelligibility Ratings

Agreement in rating the six speakers as intelligible, partially intelligible, and unintelligible is shown in Table III.22. Mean consistent agreement was 87.3%. Agreement on individual speakers ranged from 82.8% to 93.1%. The ratings were distributed over two intelligibility categories in every case.

Mean consistent agreement on the most frequently assigned rating was 71.8%. The range was from 44.8% to 89.7%. Agreement was highest for Speaker 6; 26 listeners (89.7%) rated this speaker as partially intelligible. Speaker 2 was consistently regarded as intelligible by 23 listeners (79.3%), while three listeners consistently regarded him as unintelligible. Speaker 1 was consistently rated as partially intelligible by 22 listeners (75.9%), and the same number of listeners consistently rated Speaker 3 as intelligible. Two listeners consistently rated Speaker 1 as intelligible, while two rated Speaker 3 as partially intelligible.

Only 19 listeners (65.5%) rated Speaker 4 as partially intelligible, with seven consistently rating him intelligible. Agreement was divided on Speaker 5; 13 listeners (44.8%) consistently assigned the rating of unintelligible, while 12 (41.4%) consistently assigned the rating of partially intelligible.

Agreement within the trials separately, based on the rating most frequently assigned to the individual speakers, was 79.9%. The range was from 51.7% to 93.1% on the first trial. On the second trial, agreement was 76.4% and ranged from 51.7% to 93.1%, also. Even though the same speakers represented the two extremes of the range on both trials, the relative level of agreement on the speakers' ratings differed. $\underline{r_S}$ was .771 ($P > .05$).

Comparison of Consistency, Severity and Intelligibility Ratings

The data were examined to determine whether ratings of consistency of articulation errors, severity of the articulation disorder, and intelligibility were related. All ratings were based on one-minute samples of spontaneous speech. Percentage of consistent agreement from trial to trial was used for this analysis.

It seemed reasonable to hypothesize that the speaker with the most severe articulation disorder would be the most consistent in making articulation errors and would be the most unintelligible. Similarly, it seemed reasonable to suppose that the speaker rated as having the most mild articulation disorder would have the most inconsistent articulation errors and the greatest intelligibility. An underlying assumption was that the extent of listener agreement reflected a continuum within each rating category and thus represented an ordinal scale.

TABLE III.22

Agreement and consistency of 29 clinicians in rating six speakers with articulation disorders as intelligible, partially intelligible, or unintelligible in two trials separated by one week.

			Intelligibility Rating					
	Intelligible		Partially Intelligible		Unintelligible		Total	
Trial	Number	%	Number	%	Number	%	Number	%
Speaker 1								
Trial 1	3	10.3	26	89.7	--	--	29	100.0
Trial 2	6	20.7	23	79.3	--	--	29	100.0
Consistency-- Trial 1 and 2	2	6.9	22	75.9	--	--	24	82.8
Speaker 2								
Trial 1	25	86.2	4	13.8	--	--	29	100.0
Trial 2	24	82.8	5	17.2	--	--	29	100.0
Consistency-- Trial 1 and 2	23	79.3	3	10.4	--	--	26	89.7
Speaker 3								
Trial 1	24	82.8	5	17.2	--	--	29	100.0
Trial 2	25	86.2	4	13.8	--	--	29	100.0
Consistency-- Trial 1 and 2	22	75.9	2	6.9	--	--	24	82.8

TABLE III.22 (continued)

Trial	Intelligible Number	Intelligible %	Partially Intelligible Number	Partially Intelligible %	Unintelligible Number	Unintelligible %	Total Number	Total %
			Intelligibility Rating					
Speaker 4								
Trial 1	7	24.1	22	75.9	--	--	29	100.0
Trial 2	10	34.5	19	65.5	--	--	29	100.0
Consistency-- Trial 1 and 2	7	24.2	19	65.5	--	--	26	89.7
Speaker 5								
Trial 1	--	--	14	48.3	15	51.7	29	100.0
Trial 2	--	--	14	48.3	15	51.7	29	100.0
Consistency-- Trial 1 and 2	--	--	12	41.4	13	44.8	25	86.2
Speaker 6								
Trial 1	--	--	27	93.1	2	6.9	29	100.0
Trial 2	--	--	27	93.1	2	6.9	29	100.0
Consistency-- Trial 1 and 2	--	--	26	89.7	1	3.4	27	93.1
TOTAL (Consistent Ratings)	54	31.0	84	48.3	14	8.0	152	87.3

TABLE III.23

Ratings, percentage of consistent agreement, and ranks for each of the six speakers on consistency of articulation errors, severity of the articulation disorder, and intelligibility in spontaneous speech.

	Consistency			Severity			Intelligibility		
Speaker	Rating	Agreement	Rank	Rating	Agreement	Rank	Rating	Agreement	Rank
1	Consistent	82.8%	5.5	Severe	86.2%	5	Partially Intelligible	75.9%	4
2	Consistent	65.5%	1.0	Moderate	58.6%	2	Intelligible	79.3%	1
3	Consistent	75.9%	4.0	Mild	37.9%	1	Intelligible	75.9%	2
4	Consistent	82.8%	5.5	Severe	48.3%	3	Partially Intelligible	65.5%	3
5	Consistent	72.4%	3.0	Severe	93.1%	6	Unintelligible	44.8%	6
6	Consistent	69.0%	2.0	Severe	79.3%	4	Partially I Intelligible	89.7%	5

Ranks were assigned to the speakers as follows. The speaker receiving the lowest percentage of agreement on error consistency was assigned the rank of *one* in keeping with the hypothesis that inconsistent errors are equated with less severe disorders and more intelligible speech. The speaker with the highest percentage of agreement on error consistency was assigned the rank of *six*. The speaker rated as having a mild articulation disorder was assigned the rank of *one*, while the speaker rated as having a moderate disorder was assigned the rank of *two*. Ranks for the four speakers having disorders rated as severe were determined by percentage of agreement. Ranks for intelligibility were assigned in a similar fashion. The ranks assigned to the speakers are shown in Table III.23, along with the data from which they were derived.

Ratings of consistency of articulation errors, severity of the articulation disorder, and intelligibility are, apparently, not related. Kendall's coefficient of concordance was .591, which is not significant at even the 5% level of confidence. Inspection of the ranks showed a closer relation between ranks for severity and intelligibility than between other combinations of the ranks.

Comparison of Results of Large- and Small-Group Studies

Level of Agreement

Agreement in judging articulation was much the same for the large and small groups. Both between trials and between groups comparisons showed that extent of agreement was similar. The index of agreement was based on a scoring key determined by the majority of the listeners. If the majority of the listeners rated the item as correct, agreement on that item was the percentage of listeners who scored it correct. For the large group, the median was used as the measure of central tendency for reasons explained previously. For the small group, the mean number of listeners scoring the item according to the key was used. Agreement on the two trials for each of the groups is shown below.

	Trial 1	Trial 2
Large Group: Median	88.4%	90.6%
Small Group: Mean	89.1%	88.4%

These figures are similar to those Irwin and Krafchick (7) reported for 50 clinicians with five or more years of experience who were asked to score articulation errors from filmed articulation tests. The percentages of correct scoring for test sounds in words produced in isolation, words produced as trios, and words produced in phrases were 84.7%, 79.6%, and 84.0%, respectively. The Irwin and Krafchick figures were based on agreement with a scoring key developed by two listeners. The method of test presentation and scoring differed from those used in the present study.

The results compare favorably with those reported by Sommers and associates (shown in Table I.1) for six to eight experienced school clinicians after special training. Their agreement figures ranged from 84.0% to 92.8%. Results from both the large- and small-group studies showed better agreement than the 72.0% to 77.0% agreement for three listeners reported by Wright (38). Methods and procedures used in these studies were considerably different from those employed in the present study.

Our agreement figures are equivalent to the Carter and Buck (3) report of 88.2% agreement for seven listeners, but are lower than the 93% for two listeners reported by Winitz (3) and the 97% reported by Vandemark and Mann (35), also for two listeners. Estimates from these latter two studies were based on Ns too small to be of any significance in generalizing to clinicians. Other reports of agreement were based on statistics not directly comparable to those used here.

For an additional analysis of agreement, two criteria were selected. Agreement of 95% or better was considered good agreement, while agreement of 90% or better was considered satisfactory agreement.

Agreement in the small group was good, as defined above, on a few more items than in the large group. Agreement was 95% or better on a little less than half of the items in the small group, while agreement of 95% or better obtained for only approximately one-third of the items in the large group. The comparisons are shown below.

	Large Group	Small Group
Trial 1	76 items or 31.6%	111 items or 46.3%
Trial 2	84 items or 35.0%	111 items or 46.3%

Agreement of 90% or better occurred on nearly 60% of the items in the small group and on approximately half of the items in the large group.

	Large Group	Small Group
Trial 1	112 items or 46.7%	143 items or 59.6%
Trial 2	127 items or 52.9%	139 items or 57.9%

Agreement in the large group was no better than chance on approximately 20% of the items, and on about 15% in the small group. The slightly better performance of the small group may have been due to better listening conditions and more precise instructions.

Agreement on Correct vs. Incorrect Items

The two groups differed in the number of items judged to be correct and also in agreement on correct as opposed to incorrect items. The large group judged fewer items to be correct, and over-all agreement on correct items was slightly lower than for incorrect items, though differences were so small as to be negligible. The reverse was true for the small group.

	Large Group		Small Group	
	Number	Agreement	Number	Agreement
Trial 1				
Correct	116	86.4%	125	90.5%
Incorrect	124	91.2%	115	87.6%
Trial 2				
Correct	111	90.6%	121	88.6%
Incorrect	129	92.4%	119	88.1%

In the large group, 60.5% of the items on which agreement was good (95% or better) were incorrect items, whereas in the small group 60.4% of the items on which agreement was good were correct. Items on which agreement was 90% or better were more evenly divided between correct and incorrect. A few more items were incorrect as judged by the large group, but a few more items were judged correct by the small group.

In the large group, a few more of the items on which agreement was equivocal (less than 70%) were correct on the first trial but incorrect on the second trial, while in the small group unsatisfactory agreement obtained on slightly more correct items, but in the second trial only. The comparisons are shown in Table III.24.

There is no obvious reason for the differences between groups in judging correct versus incorrect items. The fact that the majority of the two groups differed seems to reflect the rather large variations found among clinicians in making judgments about articulation.

Agreement on Sounds

Agreement on specific sounds varied between groups and from trial to trial for each group, though some similarities were apparent. Among the 10 sounds with the highest agreement, two consonants as singles, initial **/j/** and final **/ʃ/**, two initial double blends, **/sk/** and **/sn/**, and the affricate **/tʃ/** in final position always appeared. Similarly, among the 10 sounds with the lowest agreement, six were common to both trials for both groups: **/r/** in initial and medial positions, **/z/** in initial position, the two initial double blends **/fr/** and **/pr/**, and the affricate **/tʃ/** in the medial position.

In general, blends were as well or better agreed on as consonants as singles. In addition, **/r/**, **/ɜ/**, and blends with **/r/** along with initial **/z/** were the most difficult to judge from the standpoint of

TABLE III.24

Number and percentage of correctly and incorrectly articulated sounds on which agreement was 95% or better, 90% or better, and less than 70% from two trials of the large and small groups.

	Large Group					Small Group				
	Correct		Incorrect			Correct		Incorrect		
Agreement	Number of Items	%	Number of Items	%	Total	Number of Items	%	Number of Items	%	Total
Trial 1										
95%	30	39.5	46	60.5	76	67	60.4	44	39.6	111
90%	46	41.1	66	58.9	112	75	52.5	68	47.5	143
70%	27	57.4	20	42.6	47	19	50.0	19	50.0	38
Trial 2										
95%	30	35.7	54	64.3	84	62	55.9	49	44.1	111
90%	54	42.5	73	57.5	127	73	52.5	66	47.5	139
70%	21	46.7	24	53.3	45	18	54.5	15	45.5	33

agreement. These sounds are also among the most frequently misarticulated sounds as shown in Tables C.6, C.7, and C.11 in Volume II of this report.

Agreement on Articulation Scores for Speakers

The number of correct items produced by each of the six speakers was determined by whether the majority of the group rated the items as correct or incorrect. Only one speaker was assigned the same score by both the large and small groups on the first trial. On the second trial, none of the speakers was assigned the same total score.

Three speakers were assigned the same scores on both trials of the large group; only two speakers were assigned the same scores on the first and second trials of the small group. Thus, neither between group nor within group agreement was adequate. While some fluctuation might be expected, failure of the majority to agree from trial to trial shows marked instability of judgments as does the failure of the majority of the two groups to agree. The scores for each of the six speakers, based on the number of items correct out of a total of 40, are shown below.

	Large Group		Small Group	
	Trial 1	Trial 2	Trial 1	Trial 2
Speaker 1	20	18	23	21
Speaker 2	27	26	30	27
Speaker 3	22	22	24	24
Speaker 4	20	18	22	21
Speaker 5	13	13	13	15
Speaker 6	14	14	13	13
TOTAL	116	111	125	121

Ratings for Consistency of Articulation Errors

Performance in rating consistency of articulation errors in spontaneous speech was somewhat similar for the two groups, though agreement was slightly higher for the small group. However, the range of agreement for speakers was larger in the small group. Mean agreement for speakers and the range of agreement for the two trials of each of the groups are shown below.

	Large Group		Small Group	
	Mean	Range	Mean	Range
Trial 1	74.5%	70.2% - 79.2%	81.6%	72.4% - 89.7%
Trial 2	77.5%	72.6% - 85.7%	83.9%	72.4% - 89.7%

Extent of agreement shifted from trial to trial on individual speakers. Agreement was slightly higher for some speakers on the second trial, but lower for others. Similar shifting on speakers was found when agreement in the large and small groups was compared. Nonetheless, the majority of each group on each trial judged all speakers to make consistent articulation errors. The results of both trials for both groups for individual speakers are shown in Table III.25.

The consistency data for the population in the caseload, shown in Table A.4 in Volume II of this report, indicated that 76.4% of the pupils made consistent articulation errors, while 23.6% made inconsistent errors. The above data indicate that the proportion of clinicians who identified errors as consistent is about the same as the proportion of the pupils said to be consistent. Considering, also, that the speakers were not clearly distinguished from one another as being more or less consistent in making errors on the basis of level of agreement, the population proportion based on the caseload data of consistent articulation errors on the part of 76% of the pupils may be more a reflection of a tendency for three out of four clinicians to judge articulation errors as consistent than a description of the pupils' articulatory behavior.

Error consistency is presumed to be related to stimulability, which is, in turn, presumed to be a prognosticator of capability to improve articulation without formalized instruction or, alternately, of rapid response to therapy. As such, the measure would appear to be of value; nonetheless these data suggest that it is not a particularly useful measure, at least when based on spontaneous speech. It is possible, of course, that better agreement might obtain if the criteria for the ratings were objectified. That is, some clinicians may rate errors as consistent if the errors are primarily consistent, while others may use the rating only if no instances whatsoever of inconsistency are heard.

Ratings for Severity of Articulation Disorders

Agreement on severity ratings using the three categories of mild, moderate, and severe were similar for the two groups. Agreement on the six speakers combined for the two trials of each group were as follows:

	Large Group		Small Group	
	Mean	Range	Mean	Range
Trial 1	73.2%	51.5% - 96.9%	75.3%	58.6% - 93.1%
Trial 2	74.2%	56.4% - 96.0%	79.3%	58.6% - 100.0%

In the case of severity ratings, agreement was clearly better on some speakers than on others. Extent of agreement shifted slightly from trial to trial. Agreement was higher for some speakers on the second trial, but lower for others. Agreement on one speaker was over

TABLE III.25

Agreement on two trials of the large and small groups in rating the consistency of articulation errors in spontaneous speech of six speakers.

Trial	Large Group	Small Group	Consistency Rating
Speaker 1			
Trial 1	79.2%	86.2%	Consistent
Trial 2	85.7%	82.8%	Consistent
Speaker 2			
Trial 1	69.6%	79.3%	Consistent
Trial 2	73.7%	72.4%	Consistent
Speaker 3			
Trial 1	77.6%	82.6%	Consistent
Trial 2	77.8%	89.7%	Consistent
Speaker 4			
Trial 1	70.2%	89.7%	Consistent
Trial 2	77.2%	86.2%	Consistent
Speaker 5			
Trial 1	77.7%	75.9%	Consistent
Trial 2	78.0%	89.7%	Consistent
Speaker 6			
Trial 1	74.0%	72.4%	Consistent
Trial 2	72.6%	82.8%	Consistent

TABLE III.26

Agreement on two trials of the large and small groups in rating the severity of the articulation disorders of six speakers as mild, moderate, or severe.

Trial	Large Group	Small Group	Severity Rating
Speaker 1			
Trial 1	79.0%	86.2%	Severe
Trial 2	82.0%	93.1%	Severe
Speaker 2			
Trial 1	72.4%	75.9%	Moderate
Trial 2	64.2%	69.0%	Moderate
Speaker 3			
Trial 1	60.9%	58.6%	Mild
Trial 2	65.7%	58.6%	Mild
Speaker 4			
Trial 1	51.5%	58.6%	Severe
Trial 2		65.5%	Severe
Trial 2	56.4%		Moderate
Speaker 5			
Trial 1	96.9%	93.1%	Severe
Trial 2	96.0%	100.0%	Severe
Speaker 6			
Trial 1	79.5%	79.3%	Severe
Trial 2	78.4%	89.7%	Severe

90% in each of the groups on both trials. For one of the speakers, the majority shifted from a rating of severe on the first trial to a rating of moderate on the second trial in the large group. This was the only instance in which the rating agreed on by the majority was not the same in both groups. The level of agreement on this speaker was the lowest for any of the speakers and indicated considerable ambivalence about whether the speaker's articulation disorder should be rated as severe or moderately severe. Agreement on each of the speakers for each of the groups is shown in Table III.26.

Whether a scale providing categories half way between moderate and severe and between moderate and mild would have produced better agreement is a matter for conjecture. The levels of agreement within the category of severe, for example, do suggest a continuum. However, expanding the scale could create additional disagreement, since in most instances the ratings were distributed over as many categories as were available.

As long as case selection is generally based on severity, there is need for greater uniformity of judgment. The data indicate that on the average about three out of every 10 clinicians would differ in assessing severity. As a result pupils would be given different priorities for service depending on the clinician making the decision. Further, the lack of stability in agreement from trial to trial as well as between groups indicates that the severity ratings are not very serviceable in measuring progress from a severe to a moderate or from a moderate to a mild disorder.

Intelligibility Ratings

The large and small groups performed in about the same way in rating speakers as intelligible, partially intelligible, and unintelligible as far as over-all agreement was concerned. The majority of both groups assigned the same intelligibility ratings to each of the speakers on both trials. However, the range of agreement on individual speakers was considerably larger for the small group.

Over-all agreement and ranges for the two groups are shown below.

	Large Group		Small Group	
	Mean	Range	Mean	Range
Trial 1	78.0%	70.8% - 88.7%	79.9%	51.7% - 93.1%
Trial 2	77.1%	66.9% - 89.8%	76.4%	51.7% - 93.1%

Agreement between trials for each of the groups was better than for severity ratings or ratings of consistency of articulation errors. Level of agreement differed substantially for only one speaker between trials for the large group. A similar difference obtained between trials of the small for this speaker, also. A difference of the same magnitude

TABLE III.27

Agreement on two trials of the large and small groups in rating the intelligibility of six speakers with articulation disorders as intelligible, partially intelligible, or unintelligible.

Trial	Large Group	Small Group	Intelligibility Rating
Speaker 1			
Trial 1	79.9%	89.7%	Partially Intelligible
Trial 2	80.3%	79.3%	Partially Intelligible
Speaker 2			
Trial 1	77.4%	86.2%	Intelligible
Trial 2	79.4%	82.8%	Intelligible
Speaker 3			
Trial 1	88.7%	82.8%	Intelligible
Trial 2	89.8%	82.6%	Intelligible
Speaker 4			
Trial 1	76.3%	75.9%	Partially Intelligible
Trial 2	66.9%	65.5%	Partially Intelligible
Speaker 5			
Trial 1	70.8%	51.7%	Unintelligible
Trial 2	73.7%	51.7%	Unintelligible
Speaker 6			
Trial 1	74.3%	93.1%	Partially Intelligible
Trial 2	72.7%	93.1%	Partially Intelligible

obtained for one additional speaker on the two trials of the small group. Comparisons of agreement on intelligibility ratings for individual speakers are shown in Table III.27.

The value of intelligibility ratings as a meaningful descriptor of speech behavior is open to question for several reasons. First, Table A.4 in Volume II showed that 79% of the caseload was intelligible 18% was partially intelligible, 3% was unintelligible. As a measure of improvement, as from unintelligible to partially intelligible or partially intelligible to intelligible, intelligibility ratings are needed for a little less than one-fourth of the caseload. A second consideration is that intelligibility appears to be partially a matter of familiarity with the speaker's acoustic code, since repeated contact with a speaker may result in improved understanding of his speech. A third consideration is that of the extent to which clinicians' ability to understand a speaker is similar to laymen's ability to understand. Since clinicians are in daily contact with a wide range of children with atypical speech patterns, it seems reasonable to assume they can understand speech that would be puzzling to people with much less exposure to speech deviations. The reaction of the people that make up the child's every day social environment would seem to be far more important than clinicians' judgments of intelligibility. Efforts to improve the uniformity of intelligibility ratings should be preceded by a study of the relation between intelligibility as determined by laymen and clinicians.

Agreement and Reliability in Judging Hoarseness

Identification of Hoarse Voice Quality

Results of the two trials in which the 29 listeners were asked to identify the voice quality of 20 speakers as either hoarse or normal are shown in Table III.28. The total number of consistent judgments was 486 of a possible 580 or 83.8% when consistent judgments per se were considered. Agreement on individual speakers ranged from 51.7% to 100%.

Ten speakers were rated as hoarse; 10 were perceived as having normal voice quality. Consistent agreement in selecting the most frequently assigned rating was only 73.8% for speakers identified as having hoarse voices and 82.4% for speakers identified as having normal voices. Agreement on individual speakers judged to be hoarse ranged from 27.6% to 100%. The range for speakers judged to have normal voice quality was from 37.9% to 100%.

Four of the speakers identified as hoarse were subject to considerable disagreement. Even though the largest number of listeners assigned this rating, the number did not represent a significant majority of the listeners as determined by $\underline{z}$. Only eight listeners (27.6%) consistently identified Speaker 15 as hoarse, while six listeners (20.7%) identified the voice quality as normal. Fifteen listeners (51.7%) changed ratings

TABLE III.28

Agreement and consistency among 29 listeners given two trials in identifying hoarse and normal voice quality and spectrogram classification. The number in parentheses is the speaker's number when rated for severity of hoarseness as shown in Tables III.29 and III.30.

Trial	Normal		Hoarse		Total		Spectrogram Classification
	Number	%	Number	%	Number	%	
Speaker 1 (7)							
Trial 1	19	65.5	10	34.5	29	100.0	Moderate, Type II
Trial 2	17	58.6	12	41.4	29	100.0	
Consistency-- Trial 1 and 2	11	37.9	4	13.8	15	51.7	
Speaker 2							
Trial 1	27	93.1	2	6.9	29	100.0	Normal
Trial 2	27	93.1	2	6.9	29	100.0	
Consistency-- Trial 1 and 2	26	89.7	1	3.4	27	93.1	
Speaker 3							
Trial 1	29	100.0	--	--	29	100.0	Normal
Trial 2	28	96.6	1	3.4	29	100.0	
Consistency-- Trial 1 and 2	28	96.6	--	--	28	96.6	
Speaker 4 (6)							
Trial 1	6	20.7	23	79.3	29	100.0	Mild, Type I
Trial 2	4	13.8	25	86.2	29	100.0	
Consistency-- Trial 1 and 2	3	10.3	22	75.9	25	86.2	

TABLE III.28 (continued)

Trial	Normal		Hoarse		Total		Spectrogram Classification
	Number	%	Number	%	Number	%	
Speaker 5							
Trial 1	24	82.8	5	17.2	29	100.0	Normal
Trial 2	24	82.8	5	17.2	29	100.0	
Consistency-- Trial 1 and 2	20	69.0	1	3.4	21	72.4	
Speaker 6 (2)							
Trial 1	12	41.4	17	58.6	29	100.0	Mild, Type I
Trial 2	4	13.8	25	86.2	29	100.0	
Consistency-- Trial 1 and 2	3	10.3	16	55.2	19	65.5	
Speaker 7 (9)							
Trial 1	7	24.1	22	75.9	29	100.0	Mild, Type I
Trial 2	5	17.2	24	82.8	29	100.0	
Consistency-- Trial 1 and 2	2	6.9	19	65.5	21	72.4	
Speaker 8							
Trial 1	29	100.0	--	--	29	100.0	Normal
Trial 2	29	100.0	--	--	29	100.0	
Consistency-- Trial 1 and 2	29	100.0	--	--	29	100.0	

TABLE III.28 (continued)

Trial	Normal Number	Normal %	Hoarse Number	Hoarse %	Total Number	Total %	Spectrogram Classification
Speaker 9 (10)							
Trial 1	3	10.3	26	89.7	29	100.0	Severe, Type IV
Trial 2	1	3.4	28	96.6	29	100.0	
Consistency--Trial 1 and 2	1	3.4	26	89.7	27	93.1	
Speaker 10 (8)							
Trial 1	--	--	29	100.0	29	100.0	Mild, Type I, Advanced
Trial 2	--	--	29	100.0	29	100.0	
Consistency--Trial 1 and 2	--	--	29	100.0	29	100.0	
Speaker 11 (5)							
Trial 1	4	13.8	25	86.2	29	100.0	Moderate, Type II
Trial 2	1	3.4	28	96.6	29	100.0	
Consistency--Trial 1 and 2	--	--	24	82.8	24	82.8	
Speaker 12							
Trial 1	28	96.6	1	3.4	29	100.0	Normal
Trial 2	29	100.0	--	--	29	100.0	
Consistency--Trial 1 and 2	28	96.6	--	--	28	96.6	

TABLE III.28 (continued)

Trial	Normal		Hoarse		Total		Spectrogram Classification
	Number	%	Number	%	Number	%	
Speaker 13							
Trial 1	17	58.6	12	41.4	29	100.0	Normal
Trial 2	25	86.2	4	13.8	29	100.0	
Consistency-- Trial 1 and 2	15	51.7	2	6.9	17	58.6	
Speaker 14 (3)							
Trial 1	4	13.8	25	86.2	29	100.0	Normal
Trial 2	1	3.4	28	96.6	29	100.0	
Consistency-- Trial 1 and 2	1	3.4	25	86.2	26	89.6	
Speaker 15							
Trial 1	15	51.7	14	48.3	29	100.0	Normal
Trial 2	12	41.4	17	58.6	29	100.0	
Consistency-- Trial 1 and 2	6	20.7	8	27.6	14	48.3	
Speaker 16							
Trial 1	28	96.6	1	3.4	29	100.0	Normal
Trial 2	29	100.0	--	--	29	100.0	
Consistency-- Trial 1 and 2	28	96.6	--	--	28	96.6	

TABLE III.28 (continued)

Total	Normal		Hoarse		Total		Spectrogram Classification
	Number	%	Number	%	Number	%	
Speaker 17 (4)							
Trial 1	12	41.4	17	58.6	29	100.0	Mild, Type I
Trial 2	8	27.6	21	72.4	29	100.0	
Consistency--Trial 1 and 2	7	24.1	16	55.2	23	79.3	
Speaker 18 (1)							
Trial 1	--	--	29	100.0	29	100.0	Moderate, Type II
Trial 2	--	--	29	100.0	29	100.0	
Consistency--Trial 1 and 2	--	--	29	100.0	29	100.0	
Speaker 19							
Trial 1	29	100.0	--	--	29	100.0	Normal
Trial 2	29	100.0	--	--	29	100.0	
Consistency--Trial 1 and 2	29	100.0	--	--	29	100.0	
Speaker 20							
Trial 1	26	89.7	3	10.3	29	100.0	Normal
Trial 2	26	89.7	3	10.3	29	100.0	
Consistency--Trial 1 and 2	25	86.2	2	6.9	27	93.1	
TOTAL (Consistency)	262	45.2	224	38.6	486	83.8	

from trial to trial. The judgments, examined for each trial separately, showed that just over half (15) of the listeners rated the voice as normal on the first trial, while 17 judged the quality to be hoarse on the second trial. Sixteen listeners (55.2%) judged Speakers 6 and 17 as having hoarse voices, while 19 listeners (65.5%) judged Speaker 7 as hoarse. For the remaining six speakers, the number of listeners making consistent judgments represented a majority.

Of the group judged to have normal voice quality, the number of listeners consistently assigning this rating to two speakers was less than a majority. Only 11 listeners (37.9%) assigned Speaker 1 to the normal voice category, while 15 (51.7%) rated Speaker 13 as having normal voice quality. A majority of the listeners consistently assigned the remaining eight speakers to the normal voice quality category.

Applying the arbitrary criterion of 95% or better agreement, agreement was good on only two of the 10 speakers judged to be hoarse and on half of the speakers judged to have normal voice quality. Extending the criterion downward did not improve the results, as agreement between 90% and 95% did not obtain for any of the speakers. Agreement was no better than chance on four or 40% of the speakers judged to be hoarse, and on two or 20% of the speakers judged to have normal voice quality.

Identification of voice quality agreed with the classification resulting from spectrographic analysis and laryngoscopic examination for 17 (85.0%) of the 20 speakers. For this comparison, the type of spectrographic hoarseness, which represents severity, was disregarded.

Ratings for three of the speakers differed from the classification based on spectrographic analysis and laryngoscopic examination. Two speakers were perceived as hoarse who had normal voice quality spectrographically and who were normal on laryngoscopic examination. One speaker was perceived as having normal voice quality, but had a spectrogram showing hoarseness. In this case, indirect laryngoscopy showed swelling of the vocal cords, and the spectrogram was classified as Type II, indicating moderate hoarseness. A description of the four types of spectrographic hoarseness is contained in Yanagihara's (39) article.

Agreement was fairly high, though not good, on Speaker 14, who was perceived as hoarse by 25 listeners (86.2%), but who had normal voice by other measures. Agreement was very low on the other two speakers for whom perceived voice quality ratings differed from the classifications based on spectrograms and laryngoscopic analysis. Speaker 15 was judged to be hoarse by eight listeners (27.6%), but six listeners (20.7%) were consistent in identifying normal voice quality. Fifteen of the 29 listeners changed ratings on the two trials. This voice was normal on the laboratory measures. Speaker 1 was rated as having normal voice quality by 11 listeners (37.9%), while four listeners (13.8%) regarded

TABLE III.29

Agreement and consistency among 29 listeners given two trials in rating perceived severity of hoarseness and spectrographic hoarseness. The numbers in parentheses represent the speaker's number in the trials for identification of hoarseness.

Trial	Mild		Moderate		Severe		Total		Spectrographic Hoarseness
	Number	%	Number	%	Number	%	Number	%	
Speaker 1 (18)									
Trial 1	2	6.9	22	75.9	5	17.2	29	100.0	Moderate, Type II
Trial 2	--	--	13	44.8	16	55.2	29	100.0	
Consistency--Trial 1 and 2	--	--	12	41.4	5	17.2	17	58.6	
Speaker 2 (6)									
Trial 1	12	41.4	14	48.3	3	10.3	29	100.0	Mild, Type I
Trial 2	4	13.8	16	55.2	9	31.0	29	100.0	
Consistency--Trial 1 and 2	2	6.9	7	24.1	3	10.4	12	41.4	
Speaker 3 (14)									
Trial 1	7	24.1	12	41.4	10	34.5	29	100.0	Normal
Trial 2	--	--	12	41.4	17	58.6	29	100.0	
Consistency--Trial 1 and 2	--	--	5	17.2	8	27.6	13	44.8	
Speaker 4 (17)									
Trial 1	17	58.6	10	34.5	2	6.9	29	100.0	Mild, Type I
Trial 2	18	62.1	10	34.5	1	3.4	29	100.0	
Consistency--Trial 1 and 2	12	41.4	4	13.8	1	3.4	17	58.6	

TABLE III.29 (continued)

Trial	Mild		Moderate		Severe		Total		Spectrographic Hoarseness
	Number	%	Number	%	Number	%	Number	%	
Speaker 5 (11)									
Trial 1	2	6.9	12	41.4	15	51.7	29	100.0	Moderate, Type II
Trial 2	--	--	14	48.3	15	51.7	29	100.0	
Consistency--Trial 1 and 2	--	--	8	27.6	10	34.5	18	62.1	
Speaker 6 (4)									
Trial 1	9	31.0	17	58.6	3	10.4	29	100.0	Mild, Type I
Trial 2	6	20.7	20	69.0	3	10.3	29	100.0	
Consistency--Trial 1 and 2	5	17.3	13	44.8	--	--	18	62.1	
Speaker 7 (1)									
Trial 1	22	75.9	5	17.2	2	6.9	29	100.0	Moderate, Type II
Trial 2	24	82.8	4	13.8	1	3.4	29	100.0	
Consistency--Trial 1 and 2	20	69.0	2	6.9	--	--	22	75.9	
Speaker 8 (10)									
Trial 1	--	--	4	13.8	25	86.2	29	100.0	Mild, Type I, Advanced
Trial 2	--	--	3	10.3	26	89.7	29	100.0	
Consistency--Trial 1 and 2	--	--	1	3.4	23	79.3	24	82.7	

TABLE III.29 (continued)

Trial	Mild Number	Mild %	Moderate Number	Moderate %	Severe Number	Severe %	Total Number	Total %	Spectrographic Hoarseness
Speaker 9 (7)									
Trial 1	2	6.9	6	20.7	21	72.4	29	100.0	Mild, Type I
Trial 2	3	10.4	17	58.6	9	31.0	29	100.0	
Consistency-- Trial 1 and 2	2	6.9	6	20.7	9	31.0	17	58.6	
Speaker 10 (9)									
Trial 1	1	3.4	4	13.8	24	82.8	29	100.0	Severe, Type IV
Trial 2	1	3.4	5	17.3	23	79.3	29	100.0	
Consistency-- Trial 1 and 2	1	3.4	2	6.9	21	72.4	24	82.7	
TOTAL (Consistency)	42	14.5	60	20.7	80	27.6	182	62.8	

the voice as hoarse. Fourteen listeners changed ratings from the first to the second trial. This speaker's spectrogram showed moderate hoarseness, and swelling of the vocal cords was present.

Severity of Hoarseness Ratings

Severity ratings of the 10 speakers selected to represent a range of perceived hoarseness are shown in Table III.29. Three severity categories were used: mild, moderate, severe. Consistent agreement on severity of hoarseness was 62.8%. Agreement on individual speakers ranged from 44.8% to 82.8%.

Consistent agreement on the most frequently assigned severity rating for each of the speakers was much lower. Mean agreement on the severity ratings was 46.6% and ranged from 24.1% to 79.3%. The consistent ratings were distributed over two of the categories for six of the speakers, and over all three categories for four of the speakers.

Results indicated that agreement in selecting a single severity rating for the speakers was unsatisfactory. Agreement did not reach 90% on any of the speakers. Further, the number of listeners assigning the same severity rating from trial to trial to individual speakers represented a significant majority for only three or 30% of the speakers.

Severity ratings were in agreement with the results of spectrographic analysis for only three or 30% of the speakers. Two of the speakers were perceived to be mildly hoarse; three, moderately hoarse; and five, severely hoarse. Classified by spectrographic hoarseness, one speaker had normal voice quality, five had Type 1 (mild) hoarseness; three had Type II (moderate) hoarseness; only one had Type IV (severe) hoarseness. A comparison of the classification of perceived and spectrographic severity of hoarseness is shown in Table III.30.

A significant majority of the listeners agreed on severity ratings for only three of the 10 speakers. Speaker 8 was judged severe by 23 listeners (79.3%); Speaker 10 was judged severe by 21 listeners (72.4%); and Speaker 7 was rated mild by 20 listeners (69.0%). This latter speaker had been identified as having normal voice quality in the identification trials.

The severity ratings for these three speakers, for whom agreement was best, agreed with the spectrographic analyses in only one instance. Speaker 10 had Type IV (severe) spectrographic hoarseness. He had nodules on the left vocal cord and had sustained vocal cord damage as the result of intubation following an accident. Though 21 listeners (72.4%) consistently rated the voice as severely hoarse, two listeners consistently assigned the rating of moderate, while one listener regarded the hoarseness as mild. Five listeners (17.3%) changed ratings on the two trials. Speaker 8 had Type I (mild-advanced) spectrographic

TABLE III.30

Percentage of listeners consistently assigning the most frequently identified severity rating for each of the 10 speakers and severity ratings based on spectrograms. The numbers in parentheses are the speakers' numbers in the identification trials. (See Table III.28.)

Speaker	Perceived Hoarseness	Percentage of Agreement	Spectrographic Hoarseness
1 (18)	Moderate	41.4	Type II, Moderate
2 (6)	Moderate	24.1	Type I, Mild
3 (14)	Severe	27.6	Normal
4 (17)	Mild	41.4	Type I, Mild
5 (11)	Severe	34.5	Type II, Moderate
6 (4)	Moderate	44.8	Type I, Mild
7 (1)	Mild	69.0	Type II, Moderate
8 (10)	Severe	79.3	Type I, Mild--Advanced
9 (7)	Severe	31.0	Type I, Mild
10 (9)	Severe	72.4	Type IV, Severe
Mean Agreement		46.4	

hoarseness. The vocal cords could not be visualized on indirect laryngoscopy. The number of listeners (23 or 79.3%) who agreed on the severity rating of severe was the largest for any of the speakers. One listener consistently rated this voice as mildly hoarse; five listeners (17.3%) changed ratings on the two trials. Speaker 7 had swelling of the vocal cords and Type II (moderate) spectrographic hoarseness. Nonetheless, he was consistently perceived as being mildly hoarse by 20 (69.0%) of the listeners; two listeners classified the voice as moderately hoarse, while seven listeners (24.1%) changed ratings on the two trials. This was the only speaker for whom perceived hoarseness was less severe than the severity rating based on the spectrograms.

The perceived severity of hoarseness for Speakers 1 and 4 agreed with the spectrographic type of hoarseness and was also verified by laryngoscopic examination. However, the level of agreement was unimpressive. Speaker 1 had Type II (moderate) spectrographic hoarseness. Laryngoscopic examination revealed nodules on both vocal cords. This speaker was rated moderately hoarse by 12 listeners (41.4%); five listeners (17.2%) assigned the rating of severe hoarseness, but 12 listeners (41.4%) changed severity ratings from trial to trial. Speaker 4 had Type I (mild) spectrographic hoarseness. Slight swelling of the vocal cords was observed on indirect laryngoscopy. Hoarseness was rated mild by 12 (41.4%) of the listeners; four (13.8%) consistently used the moderate category; one assigned a rating of severe hoarseness. Twelve listeners (41.4%) were inconsistent in their severity ratings.

Speaker 3, who had normal voice quality on the spectrograms and a negative laryngeal examination, was consistently rated as severely hoarse by the largest number of listeners assigning consistent ratings to this speaker's voice. These severity ratings were subject to the greatest disagreement. Only 13 listeners (44.8%) were consistent in assigning a particular severity rating. Of these 13 listeners, only eight (27.6%) assigned the rating of severe, while five (17.2%) assigned the rating of moderate. Sixteen listeners (55.2%) changed ratings from trial to trial. None of the listeners consistently assigned this voice to the mild category--the result that would be expected in the case of a sample of normal voice quality erroneously included among samples of hoarse voice quality and instructions to the listeners to rate the severity of hoarseness.

Agreement on the remaining four speakers was low, ranging from 24.1% to 44.8%. Speaker 2 was perceived as moderately hoarse; spectrographic hoarseness was Type I (mild). The vocal cords could not be visualized on indirect laryngoscopy due to an overhanging epiglottis and hypertrophied tonsils. Speaker 5 was perceived as severely hoarse, but had Type II (moderate) spectrographic hoarseness. This speaker showed no evidence of laryngeal pathology; the examining physician classified the hoarseness as functional. Speaker 6 was perceived to be moderately hoarse. Spectrographic hoarseness was Type I (mild). There was a nodule on the left vocal cord and a very small nodule on the right cord. Speaker 9 was perceived as severely hoarse, but spectrographic hoarseness was Type I (mild). This speaker was so anxious that indirect laryngoscopy was not possible.

The results of this study can be compared only indirectly with the results of the Shipp and Huntington (23) study. Shipp and Huntington required four selected listeners to agree unanimously in identifying hoarse voice quality from speech samples of 31 speakers. Twenty-six of the speakers had laryngitis; one other speaker was chronically hoarse but without vocal fold change. No normal voices were included. Only 15 of the 26 laryngitic speakers were perceived as hoarse by all listeners. The speaker with a diagnosis of chronic hoarseness was not judged to be hoarse by all four listeners. Thus, only 56% of the speakers were correctly classified, assuming all laryngitic speakers to be hoarse. Clinicians in the present study correctly classified seven of the 20 voices (35%) on the first trial and nine of the 20 (45%) on the second trial, using agreement of 28 or 29 out of 29 listeners to be an approximation of 100% agreement among four listeners. On this basis, the performance of the clinicians in this study was, perhaps, somewhat lower than the performance of the clinicians in the Shipp and Huntington study.

As far as severity ratings are concerned, differences in the rating scale and statistical tests used make comparisons even more tenuous. In the Shipp and Huntington study, a seven-point equal-appearing intervals scale was used. Average inter-judge agreement was .51 and ranged from .17 to .73 for individual pairs of judges. Agreement of one judge with each of the three other judges was .17, .19, and .29. These figures represent very low agreement as do the agreement figures from the present study.

Yanagihara (39) reported only that the correlation between degree of perceived and spectrographic type of hoarseness was .65. Three otolaryngologists rated recordings of a series of vowels produced by 30 hoarse patients. The rating scale used was *slight*, *moderate*, and *severe*. Though the correlation coefficient was significant at the 1% level, the magnitude of the correlation indicated little more than a positive relation between degree of perceived hoarseness and degree of hoarseness based on spectrograms. In the present study, degree of hoarseness perceived by a majority of the listeners and type of spectrographic hoarseness agreed for only three of the 10 speakers. Neither Yanagihara's listeners nor those in the present study agreed very well with severity based on the spectrograms.

Comparisons of Ratings of Articulation and Hoarse Voice Quality

The comparisons of ratings of articulation with ratings of voice quality were based on consistent agreement from trial to trial. Data from only the small group (29 clinicians) were used.

Two kinds of comparisons were made. The first comparison was based on the number of listeners assigning the same rating from trial to trial regardless of the specific rating assigned. For example, the number of listeners who consistently judged a speaker to make inconsistent articulation errors plus the number of clinicians who consistently judged the same speaker to make consistent articulation errors constituted the number of clinicians making consistent judgment about that speaker. This measure shows the extent to which clinicians' judgments were reliable, but disregards agreement on a particular rating for a given speaker.

The second comparison was based on the number of clinicians assigning the same rating to a speaker on both trials in the specific rating category selected by the largest number of listeners making reliable ratings for that speaker. This comparison eliminated both unreliable judgments as well as reliable judgments that differed from the majority. Thus, this measure is based on both inter- and intra-clinician agreement.

Reliable Ratings

The mean number of listeners assigning the same rating on the two trials for each of the different kinds of ratings along with standard deviations and ranges are shown in Table III.31. Reliability was highest for judging intelligibility of the speech of speakers with articulation disorders. The mean number of listeners (25.3 or 87.3%) coupled with the small standard deviation and restricted range indicates somewhat better performance in rating intelligibility than in making other kinds of ratings. Nonetheless, the differences between this mean and the means for the other ratings are so small as to be of relatively little practical significance.

The mean number of clinicians making reliable judgments was much the same for judging consistency of articulation errors, severity of the articulation disorders, and for identifying hoarse and normal voice quality. The means for judging the consistency of articulation errors and identifying hoarse and normal voice quality were identical. However, the range was large for voice quality judgments. Agreement was very poor in some instances, but 100% in others. Reliability in judging error consistency was never as high or as low as in the case of voice quality identification. On this basis, judging error consistency was more satisfactory than voice quality identification. Unfortunately, the consequence of variation is of less importance in judging error consistency than in identifying voice quality, particularly when the voice quality is hoarseness. The mean number of clinicians assigning the same severity rating from trial to trial for articulation disorders was low relative to the means for the other kinds of ratings except for severity of hoarseness. Reliability in rating individual speakers was variable. Nearly as many listeners changed ratings for some speakers as assigned the same rating from trial to trial. The consequence of such extensive ambivalence is variability in assigning priorities for service as well as fluctuation in decisions about the progress of those receiving service.

TABLE III.31

Mean number of listeners, standard deviation, and range assigning the same ratings on both trials in judging five aspects of speech.

Type of Rating	Mean	Standard Deviation	Range
Consistency of Articulation Errors (6 Speakers)	24.3 83.9%	2.42	22 - 28 75.9 - 96.6%
Severity of Articulation Disorder (6 Speakers)	23.0 79.3%	3.65	17 - 27 58.6 - 93.1%
Intelligibility (6 Speakers)	25.3 87.3%	1.71	24 - 27 82.8 - 93.1%
Identification of Voice Quality (20 Speakers)	24.3 83.8%	4.76	15 - 29 48.3 -100.0%
Severity of Hoarseness (10 Speakers)	18.2 62.8%	3.89	13 - 24 44.8 - 82.8%

TABLE III.32

Mean number of listeners, standard deviation, and range consistently assigning the most frequently identified rating category for each speaker in judging five aspects of speech.

Type of Rating	Mean	Standard Deviation	Range
Consistency of Articulation Errors (6 Speakers)	21.7 74.7%	1.85	19 - 24 65.5 - 82.8%
Severity of Articulation Disorder (6 Speakers)	19.5 67.2%	5.88	11 - 27 37.9 - 93.1%
Intelligibility (6 Speakers)	20.8 71.8%	4.23	13 - 26 44.8 - 89.7%
Identification of Voice Quality (20 Speakers)	22.6 78.1%	6.36	8 - 29 27.6 -100.0%
Severity of Hoarseness (10 Speakers)	13.5 46.6%	5.46	7 - 23 24.1 - 79.3%

Reliability in judging severity of hoarseness was very low. The mean number of clinicians assigning the same severity rating from trial to trial was only 18.2 or 62.8% with a S.D. of 3.89. The range for the 10 speakers was relatively large, being from 13 to 24 listeners (44.8% to 82.8%). For some of the speakers, the number of listeners who changed severity ratings was larger that the number who assigned the same rating on both trials. While identification is probably more consequential than severity ratings, since failure to identify speakers with hoarse voices usually means failure to refer for needed medical attention, the lack of stability in judging severity leaves the clinician without a means of evaluating progress of the comparitive effectiveness of various methods of modifying voice quality.

Reliability and Agreement in Selecting a Single Descriptive Category for Each Speaker

The mean number of listeners assigning the same rating from trial to trial in the most frequently designated rating category for each speaker was considerably smaller than the mean number of listeners making reliable ratings per se. None of the means for the five types of ratings reached 80%. The means, standard deviations, and ranges are shown in Table III.32.

The mean for identification of voice quality was highest, but the standard deviation was large. Less than a majority of the listeners assigned the rating used by the largest number of listeners making consistent ratings in some cases, as shown by the range of from 8 to 29 listeners (27.6% to 100%). While agreement reached 100% on some speakers, it was extremely poor on others.

Ratings of consistency of articulation errors were better, perhaps, than identification of voice quality in that the standard deviation was small relative to those for the other types of ratings, and the range for individual speakers was restricted. Nonetheless, maximum agreement on any speaker was no greater than 82.8% (24 listeners), while the maximum for the other ratings, excluding severity of hoarseness ratings, was as high as 26 listeners (89.7%) for intelligibility, 27 (93.1%) for severity of the articulation disorder, and 29 (100%) for identification of voice quality. On the other hand, the minimum number of listeners agreeing was 19 (65.5%), while minimum for identification of voice quality, severity of the articulation disorder, and intelligibility were 8 (27.6%), 11 (37.9%), and 13 (44.8%), respectively.

Agreement in consistently selecting a particular severity of hoarseness rating for each of the speakers was much lower than for other kinds of ratings. The mean number of listeners consistently assigning the same rating as that used by the largest number of listeners whose ratings were reliable was 13.5, which represents 46.6% of the listeners, or less than a majority. The range was from 7 to 23 or 24.1% to 79.3% on individual speakers. Not only was disagreement extensive, there was little stability from trial to trial.

REFERENCES

1. Baynes, Robert A. "An Incidence of Chronic Hoarseness Among Children." *Journal of Speech and Hearing Disorders.* 31, May, 1966. p. 172-176. Excerpt (page 31) reprinted by permission of publisher, author and/or copyright owner.

2. Burgi, Ernest J., And Matthews, Jack. "Effect of Listener Sophistication upon Global Ratings of Speech Behavior." *Journal of Speech and Hearing Research.* 3, December, 1960. p. 348-353. Excerpt (page 17) reprinted by permission of publisher, author and/or copyright owner.

3. Carter, Eunice T., and McKenzie, Buck. "Prognostic Testing for Functional Articulation Disorders among Children in the First Grade." *Journal of Speech and Hearing Disorders.* 23, May, 1958. p. 124-133.

4. Ebel, Robert L. "Estimation of the Reliability of Ratings." *Psychometrika.* 16, December, 1951. p. 407-424.

5. Elbert, Mary; Shelton, Ralph L., Jr.; and Arndt, William B. "A Task for Evaluation of Articulation Change: 1. Development of Methodology." *Journal of Speech and Hearing Research.* 10, June, 1967. p. 281-288.

6. Irwin, Ruth Becky. "The Effects of Speech Therapy upon Certain Linguistic Skills of First Grade Children." *Journal of Speech and Hearing Disorders.* 28, November, 1963. p. 375-381.

7. Irwin, Ruth Becky, and Krafchick, Ivan Paul. "An Audio-Visual Test for Evaluating the Ability to Recognize Phonetic Errors." *Journal of Speech and Hearing Research.* 8, September, 1965. p. 281-290. Excerpts (pages 25 and 26) reprinted by permission of publisher, author and/or copyright owner.

8. Irwin, Ruth Becky, and Musselman, Barbara Wilson. "A Compact Picture Articulation Test." *Journal of Speech and Hearing Disorders.* 27, February, 1962. p. 36-39.

9. Jordan, Evan P. "Articulation Test Measures and Listener Ratings of Articulation Defectiveness." *Journal of Speech and Hearing Research.* 3, December, 1960. p. 303-319.

10. Lindquist, E. F. *Design and Analysis of Experiments in Psychology and Education.* Boston: Houghton-Mifflin Company. 1953. 393 p.

11. Morrison, Sheila. "Measuring the Severity of Articulation Defectiveness." *Journal of Speech and Hearing Disorders.* 20, December, 1955. p. 347-351.

12. Oyer, Herbert J. "Speech Error Recognition Ability." *Journal of Speech and Hearing Disorders.* 24, November, 1959. p. 391-394.

13. Prather, Elizabeth Moodie. "Scaling Defectiveness of Articulation by Direct Magnitude-Estimation." *Journal of Speech and Hearing Research.* 3, December, 1960. p. 380-392.

14. Rees, Maryjane. "Some Variables Affecting Perceived Harshness." *Journal of Speech and Hearing Research.* 1, June, 1958. p. 155-168.

15. Rees, Maryjane, and Cross, A. Donald. *Agreement and Reliability of Judgments of Articulation Errors.* Unpublished study.

16. Shelton, Ralph L., Jr.; Elebert, Mary; and Arndt, William B., Jr. "A Task for Evaluation of Articulation Change: Comparison of Task Scores during Baseline and Lesson Series Testing." *Journal of Speech and Hearing Research.* 10, September, 1967. p. 578-585.

17. Sherman, Dorothy. "The Merits of Backward Playing of Connected Speech in the Scaling of Voice Quality Disorders." *Journal of Speech and Hearing Disorders.* 19, September, 1954. p. 312-321.

18. Sherman, Dorothy, and Cullinan, Walter L. "Several Procedures for Scaling Articulation." *Journal of Speech and Hearing Research.* 3, June, 1960. p. 191-198.

19. Sherman, Dorothy, and Jensen, Paul. "Harshness and Oral Reading Time." *Journal of Speech and Hearing Disorders.* 27, May, 1962. p. 172-177.

20. Sherman, Dorothy, and Linke, Eugene. "The Influence of Certain Vowel Types on Degree of Harsh Voice Quality." *Journal of Speech and Hearing Disorders.* 17, December, 1952. p. 401-408.

21. Sherman, Dorothy, and Moodie, Catherine E. "Four Psychological Scaling Methods Applied to An Articulation Defectiveness." *Journal of Speech and Hearing Disorders.* 22, December, 1957. p. 698-706.

22. Sherman, Dorothy, and Morrison, Sheila. "Reliability of Individual Ratings of Severity of Defective Articulation." *Journal of Speech and Hearing Disorders.* 20, December, 1955. p. 352-358.

23. Shipp, Thomas, and Huntington, Dorothy A. "Some Acoustic and Perceptual Factors in Acute-Laryngitic Hoarseness." *Journal of Speech and Hearing Disorders.* 30, November, 1965. p. 350-359. Excerpt (page 30) reprinted by permission of the publisher, author and/or copyright owner.

24. Siegel, Gerald M. "Experienced and Inexperienced Examiners." *Journal of Speech and Hearing Disorders.* 27, February, 1962. p. 28-35.

25. Siegel, Gerald M.; Winitz, Harris; and Conkey, Harlan. "The Influence of Testing Instruments on Articulation Responses of Children." *Journal of Speech and Hearing Disorders*. 28, February, 1963. p. 67-76.

26. Siegel, Sidney. *Nonparametric Statistics for the Behavioral Sciences*. New York: McGraw-Hill Book Company. 1956. 312 pages.

27. Sommers, Ronald K. "Factors in the Effectiveness of Mothers Trained to Aid in Speech Correction." *Journal of Speech and Hearing Disorders*. 27, May, 1962. p. 178-186.

28. Sommers, Ronald K.; Cockerille, Clara E.; Paul, Clara D.; Bowser, Dolores C.; Fichter, George R.; Fenton, Ann K.; and Copetas, Florence G. "Effects of Speech Therapy and Speech Improvement upon Articulation and Reading." *Journal of Speech and Hearing Disorders*. 26, February, 1961. p. 27-38.

29. Sommers, Ronald K.; Copetas, Florence G.; Bowser, Dolores C.; Fichter, George R.; Furlong, Ann K.; Rhodes, Frank E.; and Saunders, Zane G. "Effects of Various Durations of Speech Improvement upon Articulation and Reading." *Journal of Speech and Hearing Disorders*. 27, February, 1962. p. 54-61.

30. Sommers, Ronald K.; Furlong, Ann K.; Rhodes, Frank E.; Fichter, George R.; Bowser, Dolores C.; Copetas, Florence G.; and Saunders, Zane G. "Effects of Maternal Attitudes upon Improvement in Articulation when Mothers Are Trained to Assist in Speech Correction." *Journal of Speech and Hearing Disorders*. 29, May, 1964. p. 126-132.

31. Sommers, Ronald K.; Leiss, Robert H.; Delp, Mary Ann; Gerber, Adele J.; Fundrella, Dolores; Smith, Richard M. II; Revucky, Mary V.; Ellis, Dorothy; and Haley, Virginia A. "Factors Related to the Effectiveness of Articulation Therapy for Kindergarten, First, and Second Grade Children." *Journal of Speech and Hearing Research*. 10, September, 1967. p. 428-437.

32. Sommers, Ronald K.; Schaeffer, Morton H.; Leiss, Robert H.; Gerber, Adele J.; Bray, Mary Ann; Fundrella, Dolores; Olson, Janice K.; and Tomkins, Elizabeth R. "The Effectiveness of Group and Individual Therapy." *Journal of Speech and Hearing Research*. 9, June, 1966. p. 219-225.

33. Sommers, Ronald K.; Shilling, Samuel P.; Paul, Clara D.; Copetas, Florence G.; Bowser, Dolores C.; and McClintock, Colitte J. "Training Parents of Children with Functional Misarticulation." *Journal of Speech and Hearing Research*. 2, September, 1959. p. 258-265.

34. Stitt, Clyde L., and Huntington, Dorothy A. "Reliability of Judgments of Articulation Proficiency." *Journal of Speech and Hearing Research*. 6, March, 1963. p. 49-56.

35. Vandemark, Ann Ahlstrand, and Mann, Mary Bachmann. "Oral Language Skills of Children with Defective Articulation." *Journal of Speech and Hearing Research*. 8, December, 1965. p. 409-414.

36. Wilson, Frank B. "Efficacy of Speech Therapy with Educable Mentally Retarded Children." *Journal of Speech and Hearing Research*. 9, September, 1966. p. 423-433.

37. Winitz, Harris. "Language Skills of Male and Female Kindergarten Children." *Journal of Speech and Hearing Research*. 2, December, 1959. p. 377-386.

38. Wright, Herbert N. "Reliability of Evaluation During Basic Articulation and Stimulation Testing." *Journal of Speech and Hearing Disorders*. Monograph Supplement 4, 1954. p. 20-27.

39. Yanagihara, Naoaki. "Significance of Harmonic Changes and Noise Components in Hoarseness." *Journal of Speech and Hearing Research*. 10, September, 1967. p. 531-541.

40. Young, Martin A., and Downs, Tom D. "Testing the Significance of the Agreement Among Observers." *Journal of Speech and Hearing Research*. 11, March, 1968. p. 5-17.

APPENDIX A

Speakers with Articulation Disorders

Speaker	Sex	Age in Years	Grade Placement	Ethnicity
1	Male	14	8	Other White
2	Male	8	2	Other White
3	Female	8.5	3	Other White
4	Male	14	8	Other White
5	Male	6	1	Spanish Surname
6	Male	12	7	Negro

APPENDIX B

Test Stimuli Used for the Articulation Test

(Sounds Being Tested Are Underlined)

1. BIRD
2. MUSIC
3. RABBIT
4. ARROW
5. LEAF
6. VALENTINE
7. THUMB
8. BATHTUB
9. TEETH
10. THERE
11. FEATHER
12. SMOOTH
13. ZIPPER
14. SHEEP
15. DISHES
16. FISH
17. TELEVISION
18. YELLOW
19. ONION
20. CHAIR
21. MATCHES
22. WATCH
23. JAR
24. ENGINE
25. PRESENTS
26. BREAD
27. TREE
28. GRASS
29. FROG
30. THREE
31. SHREDDED WHEAT
32. PLANTING
33. CLOWN
34. FLOWER
35. SNAKE
36. STAIRS
37. SKY
38. SWEEPING
39. SPLASH
40. STRING

APPENDIX C

Instructions to Listeners for Judging Articulation Errors and Rating Consistency of Articulation Errors, Severity of the Articulation Disorder, and Intelligibility

FILM I

Introduction

I am Phil Essman from the Los Angeles County Schools Office.

This training film was produced to study clinician agreement and reliability relative to articulation. Six pupils with articulation disorders will each be presented with 40 words. The clinician will pronounce each word and the pupil will repeat the word. Each word tests the pupil's ability to articulate the specific phoneme identified by phonetic symbols and underlined on the score sheet. Your task is to judge whether the underlined speech sounds identified by phonetic symbols are correct or incorrect. You are judging only the underlined sound. If the child's response is correct, please leave the score sheet blank. If the response is incorrect, mark the incorrect column with your I.B.M. pencil. Please judge only the pupil's first response and ignore a repetition or correction by the pupil.

Here is a sample of the identification marking of your score sheet Your clinician number is marked on the right under *Identification Number*. My clinician number is 0247. It is marked on the form by marking down one space for each number. In your folder you have 6 score sheets, one for each child that you will observe in the film. Take one score sheet from your envelope and find the place for your clinician identification number in the upper right hand corner and mark your clinician number on the first score sheet form. Be sure to use the I.B.M. pencil provided and mark with dark lines.

Next, find the far right-hand column for marking your years of experience in speech and hearing. For example, if you began in a paid speech and hearing position this fall and worked until December of this year, you would have completed zero years of experience. If you were in the eighth month of your fourth year in speech and hearing, you would have completed three years of experience. Your current year does not count. Please mark the appropriate column for your years of experience in speech and hearing. All paid experience in the profession in all settings should be counted.

Your clinician in the film is Angela Scalero. As Angela introduces each child, she will remind you of the child's number. Please be sure at this time to mark the child's number in the box beside *Child Number*. For example, Child No. 1 would be marked in this way. Do not mark the child number until each child is introduced.

Please mark each incorrect response on your score sheet with your I.B.M. pencil. It is helpful to use a ruler so as not to mark the wrong column.

You will have time at the end of the film to copy your clinician number and years of experience from the first form to the remaining 5 forms. The film will be silent and blank after each child; at this time you may catch up on your marking.

Now we are ready to meet Miss Scalero and the first child.

Conclusion

At this time, please turn to Child No. 1's form, and with it as a model, mark your clinician number on each of the remaining forms. Then, using Form 1 as a model, mark your years of experience in speech and hearing on the 5 other forms.

The reliability of the clinician's judgments may be determined by repeating the test one week after the first test.

Thank you for your help in this important endeavor to further advance your profession of speech and hearing.

FILM II

Introduction

I am Phil Essman from the Los Angeles County Schools Office.

This training film was produced to study clinician agreement and reliability relative to articulation. Six pupils with articulation disorders will be presented, and samples of spontaneous speech of approximately one minute in length will be elicited from each child. Your task is to listen to each spontaneous speech sample relative to errors made in the articulation of speech sounds. You will be judging for consistency of errors, severity of the articulation disorder and intelligibility of the speech sample.

Here is a sample of the identification part of your score sheet including your clinician number. On the right, your clinician number has been marked. My clinician number is 0247. It is marked on the form by marking down one space for each number. In your folder you have six score sheets, one for each child you will observe in the film. Take one score sheet from your folder and find the place for your clinician number in the upper right-hand corner. Now please mark your clinician number on your first score sheet form. Be sure to mark dark lines using your special I.B.M. pencil.

Next, find the far right-hand column for marking your years of experience in speech and hearing. For example, if you began in a paid speech and hearing position this fall and worked until December of this year, you would have completed zero years of experience. If you were in the eighth month of your fourth year in speech and hearing, you would have completed three years of experience. Your current year does not count. Please mark the appropriate column for your years of experience in speech and hearing. All paid experience in the profession in all settings should be counted.

Your clinician in the film is Angela Scalero. As Angela introduces each child, she will remind you of the child's number. Please be sure at this time to mark the child's number in the box provided. For example, Child No. 1 would be marked in this way. Do not mark the child number until each child is introduced.

With your I.B.M. pencil you will mark the appropriate spaces relative to consistency, severity and intelligibility.

You will have time at the end of the film to copy your clinician number and years of experience from the first form to the remaining 5 forms. The film will be silent and blank after each child; at this time you may catch up on your marking.

Now we are ready to meet Miss Scalero and the first child.

Conclusion

At this time, please turn to Child No. 1's form, and with it as a model, mark your clinician number on each of the remaining forms. Then, using Form 1 as a model, mark your years of experience in speech and hearing on the 5 other forms.

The reliability of the clinicians' judgments may be determined by repeating the test one week after the first test.

Thank you for your help in this important endeavor to further advance your profession of speech and hearing.

APPENDIX D

Forms Used for Recording Judgments or Ratings for the Various Listening Tasks

Mark your clinician number here

Mark your child number here

IDENTIFICATION NUMBER

☐	0	1	2	3	4	5	6	7	8	9
☐	0	1	2	3	4	5	6	7	8	9
☐	0	1	2	3	4	5	6	7	8	9
☐	0	1	2	3	4	5	6	7	8	9
☐	0	1	2	3	4	5	6	7	8	9
☐	0	1	2	3	4	5	6	7	8	9
☐	0	1	2	3	4	5	6	7	8	9
☐	0	1	2	3	4					
☐	0	1	2	3	4	5				
☐	0	1	2	3	4					

Years Experience
Completed in
Speech and Hearing
Mark One

0 years [ ]
1 year [ ]
2-4 years [ ]
5-9 years [ ]
10-15 years [ ]

Mark items either Correct or Incorrect

	CORRECT	INCORRECT
1. BIRD	1. ☐	☐
2. MUSIC	2. ☐	☐
3. RABBIT	3. ☐	☐
4. ARROW	4. ☐	☐
5. LEAF	5. ☐	☐
6. VALENTINE	6. ☐	☐
7. THUMB	7. ☐	☐
8. BATHTUB	8. ☐	☐
9. TEETH	9. ☐	☐
10. THERE	10. ☐	☐
11. FEATHER	11. ☐	☐
12. SMOOTH	12. ☐	☐
13. ZIPPER	13. ☐	☐
14. SHEEP	14. ☐	☐
15. DISHES	15. ☐	☐
16. FISH	16. ☐	☐
17. TELEVISION	17. ☐	☐
18. YELLOW	18. ☐	☐
19. ONION	19. ☐	☐
20. CHAIR	20. ☐	☐
21. MATCHES	21. ☐	☐
22. WATCH	22. ☐	☐
23. JAR	23. ☐	☐
24. ENGINE	24. ☐	☐
25. PRESENTS	25. ☐	☐
26. BREAD	26. ☐	☐
27. TREE	27. ☐	☐
28. GRASS	28. ☐	☐
29. FROG	29. ☐	☐
30. THREE	30. ☐	☐
31. SHREDDED WHEAT	31. ☐	☐
32. PLANTING	32. ☐	☐
33. CLOWN	33. ☐	☐
34. FLOWER	34. ☐	☐
35. SNAKE	35. ☐	☐
36. STAIRS	36. ☐	☐
37. SKY	37. ☐	☐
38. SWEEPING	38. ☐	☐
39. SPLASH	39. ☐	☐
40. STRING	40. ☐	☐

IBM 517 PRINTED IN U. S. A.

Mark your clinician number here

Mark the child number here

IDENTIFICATION NUMBER

0 1 2 3 4 5 6 7 8 9
0 1 2 3 4 5 6 7 8 9
0 1 2 3 4 5 6 7 8 9
0 1 2 3 4 5 6 7 8 9
0 1 2 3 4 5 6 7 8 9
0 1 2 3 4 5 6 7 8 9
0 1 2 3 4 5 6 7 8 9
0 1 2 3 4 5 6 7 8 9
0 1 2 3 4 5 6 7 8 9
0 1 2 3 4 5 6 7 8 9

Years Experience
Completed in
Speech and Hearing
Mark One

0 years ☐
1 year ☐
2-4 years ☐
5-9 years ☐
10-15 years ☐

Criteria I
(Mark as Appropriate)

ERRORS

Consistent ☐
Inconsistent ☐

SEVERITY

Mild ☐
Moderate ☐
Severe ☐

INTELLIGIBILITY

Intelligible ☐
Partially
Intelligible ☐
Unintelligible ☐

CLINICIAN STUDY III

NORMAL -- HOARSE VOICES

DIRECTIONS: FOR EACH PUPIL, CHECK EITHER NORMAL OR HOARSE AS BEST DESCRIBING HIS VOICE QUALITY.

	NORMAL	HOARSE
CHILD 1		
CHILD 2		
CHILD 3		
CHILD 4		
CHILD 5		
CHILD 6		
CHILD 7		
CHILD 8		
CHILD 9		
CHILD 10		
CHILD 11		
CHILD 12		
CHILD 13		
CHILD 14		
CHILD 15		
CHILD 16		
CHILD 17		
CHILD 18		
CHILD 19		
CHILD 20		

CLINICIAN STUDY IV

HOARSENESS -- SEVERITY

DIRECTIONS: FOR EACH PUPIL, CHECK ONE HOARSENESS SEVERITY RATING. CHECK EITHER MILD, MODERATE, OR SEVERE.

	MILD	MODERATE	SEVERE
CHILD 1	__________	__________	__________
CHILD 2	__________	__________	__________
CHILD 3	__________	__________	__________
CHILD 4	__________	__________	__________
CHILD 5	__________	__________	__________
CHILD 6	__________	__________	__________
CHILD 7	__________	__________	__________
CHILD 8	__________	__________	__________
CHILD 9	__________	__________	__________
CHILD 10	__________	__________	__________

APPENDIX E

Modified Instructions Used with the Small-Group Listening Sessions

I. Identification Data

A. Here is an example of how to mark your identification number. You will also note an X. Write in the child number below the X. Please take from the envelope only your first set of six (6) I.B.M. forms. Following the example, mark your identification number on each of the six (6) forms. Please mark in the spaces shown in the example.

B. Look to the right-hand side of your I.B.M. form and there you will note a place for marking years of experience. Years of experience means all of your experience in speech and hearing in any work context. A year's experience refers to a complete year's experience. For example, if you are now halfway through your first year's experience, you would mark 0 years of experience on the form because you would not have at this time completed a full year's experience. Please mark your years of experience on each of the six forms.

C. You will write the child number in the position where the X is written on the sample form. You will write in the child number rather than mark it. However, the child number should not be marked ahead. Wait and mark the child number as each child is introduced.

II. Study One (Forty Speech Sounds)

The purpose of this first study is to judge whether the underlined speech sounds are correct or incorrect as articulated by the pupils in the film.

A. Take the first response of the pupil only; ignore a repetition or correction on his part.

B. In this study remember you were only listening for the speech sound that is underlined. For those not familiar with the Templin-Darley Articulation Test Form from which this word list is taken, you may place the list of forty (40) phonetic symbols next to the incorrect column and use the list as an identification for the sound being tested. Be careful not to let the list slip out of position.

C. Mark the incorrect sounds only on your I.B.M. form. If the sound is correct, leave the form blank.

D. Use the ruler on this form as a line guide to insure against incorrect lining of items.

E. There will be a blank leader after each child on the film. You may use this time to get caught up on your marking.

F. If you can not see and hear both, judge by what you hear.

G. You will now hear Child One. Remember to write a "one" in the place indicated by the X on the forms. Wait until each child is introduced before writing the number.

H. This is the end of Study One. Please check each of the I.B.M. forms to be sure you have marked your identification number and your years of experience, and have written the child number on each of the forms. After they are complete, please return them to the position behind the rest of the forms in your envelope.

III. Study Two (Evaluation of Normal vs. Hoarse Voices)

In this study your task will be to listen to a tape recording and judge whether the voice quality of each child on the recording is normal or hoarse. You will mark normal or hoarse for each of the twenty (20) children on the tape recording.

A. From your envelope please take out the form marked *Study Two*. You will also find a form marked *Identification Data for Study Two*. This form will give you the sex and age of each pupil on the tape recording.

B. Write your clinician number in the upper right-hand corner and below it write your years of experience as stated on the form for Study One. Please note your clinician number is centered on the sample on the envelope.

C. There will be a blank space after each sample. Use this time to mark your form. While listening to the sample you may note the sex and age of each pupil.

D. Study Two is now completed. Please check your form to see that you have written your clinician number and years of experience in the upper right-hand corner before returning the form to your envelope in the position behind Study One.

IV. Study Three (Spontaneous Speech Samples--Articulation)

In Study Three the task is to listen to spontaneous speech samples relative to articulation and judge consistency, severity, and intelligibility.

A. Mark your identification data on these forms as for the previous studies.

B. There is a blank leader between pupils. Watch the film and listen and plan to mark your ratings after each child finishes.

C. Check all six (6) forms to be sure that you correctly marked your identification number, the child number, and your years of experience.

V. Study Four (Severity Ratings of Hoarse Voices)

The task in Study Four is to decide upon a severity rating for each of the pupils with hoarse voices on the tape recording. Each pupil should be marked as mild, moderate, or severe. Choose only one of the severity ratings.

A. Take the form marked Study Four from your envelope and in the upper right-hand corner please write your identification number and years of experience as they were marked on Study One.

B. As each pupil begins repeating elongated vowels, mark your form. The repetition of the elongated vowels means that the pupil has nearly reached the end of his speech sample.

C. Before returning Study Four to the envelope, please be sure that your identification number and years of experience have been marked.

At this time, please remove the instruction sample with your name from the envelope. Please return your writing boards, rulers, and all forms to your envelope and lock the clasp before turning in the envelope.

APPENDIX F

Schedule for Wednesday, April 17, and Wednesday, April 24, 1968

(Note Schedule Is the Same for Both Days)

4:00 - 4:15 p.m.	Coffee and rolls
4:15 - 5:00	View the film on articulation (40 speech sounds) shown on January 26, and write down your evaluation.
	Stretch Break
5:10 - 6:00	Listen to a tape recording of pupils with hoarse voices and pupils with normal voices and write down your evaluation.
6:00 - 6:30	Coffee and sack lunches (please bring your own lunch).
6:30 - 7:15	View the film on articulation (spontaneous speech) shown on January 26, and write down your judgments of intelligibility, severity and consistency.
	Stretch Break
7:20 - 8:00	Listen to tape recordings of pupils with hoarse voices and judge the degree of hoarseness, i.e., mild, moderate, or severe.

Please Note: All papers will be identified by your clinician number only and you will remain anonymous.

APPENDIX G

Speakers with normal and perceived hoarse voice quality. Tape I includes both normal and hoarse voices; Tape II includes hoarse voices only.

Tape I	Tape II	Sex	Age in Years	Grade Placement	Voice Quality	Laryngoscopic Findings
1	7	Male	11	5	Moderate, II	Small swelling.
2		Female	11	5	Normal	
3		Male	7	2	Normal	
4	6	Male	11.5	6	Mild, I	Nodule on left vocal cord, very small nodule on right vocal cord.
5		Female	9	4	Normal	
6	2	Male	6	1	Mild, I	Overhanging epiglottis and hypertrophic tonsils prevented visualizing vocal cords.
7	9	Female	16	10	Mild, I	Subject was too anxious to permit examination.
8		Female	9	4	Normal	
9	10	Male	14	8	Severe, IV	Nodules on left vocal cord, damaged vocal cords due to intubation following accident.
10	8	Male	8	3	Mild, I (Advanced)	Could not visualize vocal cords.

APPENDIX G (continued)

Tape I	Tape II	Sex	Age in Years	Grade Placement	Voice Quality	Laryngoscopic Findings
11	5	Female	7	1	Moderate, II	No evidence of pathology, probably functional hoarseness.
12		Female	16	10	Normal	
13		Female	11	5	Normal	
14	3	Male	8	3	Normal*	
15		Female	8	3	Normal	
16		Male	10	5	Normal	
17	4	Male	9	4	Mild, I	Slight swelling, excessive vocalizing.
18	1	Female	11	5	Moderate, II	Nodules on both vocal cords.
19		Female	7	2	Normal	
20		Male	12	6	Normal	

*No spectrographic hoarseness, but was perceived as hoarse.

APPENDIX H

Instructions and Reading Passage Used in Recording Speakers with Normal and Hoarse Voice Quality

Order

1. Speaker is to give his first name, age, and grade. Microphone is OFF while the adult is speaking.
2. Obtain reading sample.
3. Blank tape for 5 seconds.
4. Elicit spontaneous speech sample.
5. Blank tape for 10 seconds. Proceed to the next speaker.

Reading Passage

Once, a long time ago, there was a young mouse named Arthur.

He could never make up his mind.

His mother asked him, "What do you want for your birthday?"

But Arthur only answered, "I don't know."

He didn't like birds and he didn't like toys.

He didn't like music and he didn't like boys.

So Arthur didn't get any present at all because he couldn't decide what he wanted.

Examiners Please Note:

Students who read the above passage should practice until they can read easily at a normal rate before a recording is made.

Students who cannot read well enough should have each line presented to them by the examiner with the microphone OFF and repeat the line after the examiner with the microphone ON. This format should be used for each line in the passage.

Recording a Spontaneous Speech Sample

First, the clinician and pupil should decide on a topic which the pupil will talk about when he is recording. The clinician should suggest possible topics such as hobbies, favorite T.V. show, favorite story, the people in your family, your pets, or a recent trip.

Then the clinician will turn on the recorder and say "Mary, what would you like to talk about?" The pupil will answer and proceed to talk about the topic for a minimum of 1 1/2 minutes. If necessary, the clinician may ask more questions to obtain a sample of the desired length.