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ABSTRACT

Although receptive language organization is the foundation of all linguistic development, the evaluation of children's performance in listening to extended streams of speech is not a significant aspect of present methods of assessing children's language and reading capability. In repeated individual test sessions, 44 normal children in suburban primary school registered their listening preferences for either the natural soundtrack or an electronically processed unintelligible soundtrack accompanying selected segments of "Sesame Street" programs. Thirty-three of the children decisively rejected the unintelligible TV soundtracks. The remaining eleven children each spent as many as 30 minutes viewing TV programs with garbled, distorted soundtracks, although clear soundtracks were easily available. Each of the nonselective listeners also showed patterns of mild to moderate language and reading dysfunction in the classroom. These data confirm other studies in suggesting that approximately 25 percent of presumed normal children manifest unrecognized anomalies of selective language listening. These results strongly suggest the importance of including systematic evaluation of speech-stream receptive language functioning in language and reading assessment. (Author/TO)

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RECEPTIVE LANGUAGE ANOMALY AND LANGUAGE/READING DYSFUNCTION IN "NORMAL" PRIMARY GRADE SCHOOL CHILDREN

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ABSTRACT

Although receptive language organization lies at the foundation of all other linguistic development, the evaluation of children's performance in listening to extended streams of speech does not constitute a significant aspect of present methods of assessing children's language and reading capability.

In this study 44 normal children in an upper middle class suburban primary school were allowed to control an automated closed circuit TV system. In repeated individual test sessions the system registered their listening preferences for either the natural soundtrack or an electronically processed unintelligible alternate soundtrack accompanying selected segments of Sesame Street programs.

Thirty-three of the children decisively rejected the unintelligible TV soundtracks--as expected of normal listeners. However, the remaining 11 children did not do so. They each spent as many as 30 minutes viewing TV programs with garbled, distorted soundtracks, although clear,

natural soundtracks were easily available. Each of the non-selective listeners also showed patterns of mild to moderate language and reading dysfunction in the classroom.

These data confirm other studies in suggesting that approximately 25% of presumed normal children manifest hitherto unrecognized anomalies of selective language listening.

These results strongly suggest the importance of including systematic evaluation of speech-stream receptive language functioning in the assessment of children with language and reading problems.

RECEPTIVE LANGUAGE ANOMALY AND LANGUAGE/READING DYSFUNCTION IN "NORMAL" PRIMARY GRADE SCHOOL CHILDREN[1]

One of the principal requirements for successful language development in children is the ability to listen effectively to speech. Such effectiveness calls for the ability to perceive clearly both the fine-grained phonetic values that make up the structure of words and the larger structures of phrase and intonation with which the stream of speech conveys ideas and meaning. Another requirement for effective psycholinguistic growth is the ability to reject distorting and distracting "noise" that degrades the clarity of speech.

If a child does not perceive the critical sounds of speech as different from and more important than the background noise in which speech is usually embedded, there is substantial reason to believe he will encounter difficulties in other aspects of language learning that depend upon fluent organization of linguistic inputs. It is reasonable to expect that a child whose

listening perception is imprecise, or who places a low demand for perceptual clarity on what he listens to, will fail, in whole or in part, to learn to use his language system adroitly.

Recent studies have shown that presumably normal preschool and school-age children are often remarkably nonselective in listening to speech sequences that contain scrambled properties of syntax, intonation, and language familiarity (Rileigh & Friedlander, 1971). There is increasing recognition of the prospect that problems of listening and receptive language organization may contribute to or be associated with other language learning problems in the classroom--especially reading difficulties (de Hirsch, 1967, 1972; Durrell & Murphy, 1953; Friedlander, 1971a; MacGinitie, 1967; Wepman, 1961). Flowers and Crandell have made perhaps the strongest statement of this relationship. From the results of an elaborate research program, they concluded that "the receptive language function...plays an integral and highly important role in a young child's ability to learn in all areas of academic endeavor" (1967).

Despite the emerging recognition of these concepts, advances in developing their full importance have been handicapped by the absence of simple methods for

evaluating children's competence for integrative listening to extended sequences of the stream of speech. In order to establish even clearer understanding of relationships between receptive language functions and other aspects of linguistic and intellectual development, it is necessary to assess children's listening by methods that approximate children's various modes of listening in their normal experiences of daily life.

The purpose of this study was to apply a precise, systematic data gathering technique to assess one important aspect of receptive language functioning in normal children in regular primary school classes. The aspect of listening selected for study was the ability to select between speech that is clear and highly intelligible and speech which is "degraded" by interfering sounds (multi-voice "cocktail party chatter") to various degrees of unintelligibility.

Two hypotheses were formulated. The first hypothesis was that normal young children, if given a free choice in extended listening sequences, would prefer to listen to natural, easily intelligible language instead of distorted language.

The second hypothesis was that children who do not establish clear patterns of preferential listening when allowed to select between natural and degraded speech

also demonstrate a disability of receptive language organization with serious consequences for language learning during the primary school years (Wardhaugh, 1971).

During the course of this study, the children played with an automated operant TV game (see Method) that permitted each child to select between a video program accompanied by either a natural soundtrack or a soundtrack in which there was a graded series of multiple-voice interference. The TV technique, which has obvious advantages in mobilizing high levels of attention in young children, has proved to be successful in several previous studies in the area of children's receptive language functioning (Friedlander, 1969, 1971a; Friedlander, Hayes & Mitsos, 1969).

Method

Subjects

Forty-four children were drawn from 5-, 6-, 7-, and 8-year age levels in an upper middle class suburban public school that was organized according to ungraded classes. Racial composition of the groups was not designated. There were 5 boys and 5 girls at both the 5- and 6-year levels, 5 boys and 8 girls at the 7-year level, and 5 boys and 6 girls at the 8-year level.

Instrumentation and Stimulus Materials

The children were tested with an automatic PLAYTEST system[2] in individual 6-minute sessions in a quiet room near their regular classrooms. In working with this system the children operated a two-position switch to turn on a preselected program on a closed circuit video-tape console. Their manipulation of this two-choice switch to one position or the other allowed them to choose either the natural or the degraded soundtrack.

The system was programmed so that each movement of the switch turned on the TV system for as long as the child held the switch in the response position, up to a maximum of 15 seconds. In order to continue the TV program the child had to allow the switch to return to its neutral position and then make a new response. The frequency and duration of all responses were separately recorded on different data registers for each of the two soundtracks. The PLAYTEST system provided automatic experimental control for position preference and perseveration.

The TV programs consisted of Muppet dialogue sequences from Sesame Street. The multi-voice interference on the degraded soundtrack could be clearly identified by normal adult listeners, but no single voice could be meaningfully discerned.

This multi-voice speech interference was administered at three different levels of loudness, constituting three levels of soundtrack degradation. At the highest level of degradation the natural soundtrack was entirely unintelligible. At the low level of degradation the voice interference was discernible in the background, but it did not substantially interfere with intelligibility. At the medium level, both the natural soundtrack and the voice interference were of approximately equal loudness. (The signal/noise ratios of the three conditions were: -7 dB for the high level degradation, +5 dB for the low level, and +1 dB for the intermediate level.) The loudness of both soundtracks was held at approximately 78 dB, as measured on the A scale of a B & K model 2203 sound level meter.

Following completion of all test sessions with the PLAYTEST system the children were tested on the listening and reading subtests of the Cooperative Primary Tests, Forms 12A and 12B (Educational Testing Service, 1965).

Procedure

Each child was tested with this PLAYTEST system at the high, medium, and low levels of soundtrack degradation, in that order. Testing was conducted in this order to present first the paired comparison with the greatest difference between the natural and the degraded sound.

The extent of their difference was reduced at the successive levels. The children were presented with each successive level following attainment of a criterion of 65% selectivity for the natural soundtrack. If a child attained this criterion in his first session at each level, he completed the procedure in three sessions. Selectivity, or selective listening, is the percentage of a child's response duration for the natural soundtrack in each test session, bearing in mind that the child could choose at will between the natural and the degraded soundtrack.

Children who did not attain the 65% PLAYTEST selection criterion in the first session at each level were given up to two additional sessions in which to do so. Thus, there was a maximum of nine sessions for the children who were unable to attain the selection criterion at any level of soundtrack degradation. (Two marginal children were allowed several extra test sessions in order to confirm their performance levels.) The 65% criterion has been established as an appropriate basis for determining selective listening in terms of prior research with numerous groups of normal and disabled children at several age levels (Friedlander, 1968, 1971; McPeek, 1972; Putzer, 1972).

Results

The primary data consist of the total frequency and duration of all responses for the natural and degraded soundtrack as recorded separately on the PLAYTEST control for each test session. These data allow analysis of the children's listening response performance in terms of: (a) percentage of the total listening response time that a child selected the natural or the degraded soundtrack; and (b) response time as a percentage of total test time (time-on-task).

The results of the study supported both hypotheses. Thirty-three of the 44 children showed clear, unambiguous preference for the natural soundtrack at all three levels of soundtrack degradation. (See details below.) Eleven children demonstrated persistent failure to attain the 65% criterion of selective listening at various levels of soundtrack degradation. For the group as a whole there was a significant correlation between the selective listening percentages and the scores on the listening subtests of the Cooperative Primary Test. (See below.)

Furthermore, it was established that each of the children who showed frequent failures in attaining the selective listening criterion in the PLAYTEST procedure was in fact encountering moderate to severe language learning problems in the classroom, while no child who

consistently attained criterion with the PLAYTEST was in the group identified as experiencing classroom language performance difficulties.

Thirty-three children consistently attained or surpassed the 65% selection criterion in demonstrating response preference for the natural soundtrack, thereby demonstrating preference for it as opposed to the degraded soundtrack. These children responded to listen to the natural soundtrack 81.5% of the time, and listened to the degraded soundtrack only 19.5% of the time. On the other hand, the remaining 11 children, 6 boys and 5 girls, listened to the natural soundtrack 57.9% of the time and to the degraded soundtrack 42.1% of the time. The t value of the difference between these group's performances was 7.78, which is significant at the .001 level. None of the children in either group listened to the degraded soundtrack more than to the natural soundtrack.

Insert Table 1 about here

It is notable that the performance of the 11 non-selective listeners approached the 50/50 point of altogether random responding between the meaningful and the unintelligible soundtracks. In other words, in the entirely voluntary test setting, these 11 children

did not differentiate between the natural and degraded soundtracks. They listened to the unintelligible soundtrack almost as much as to the soundtrack that was readily understandable.

The meaningfulness of this selective listening data is emphasized by the fact that all the children's participation in the task was very high. Mean time on task for all test sessions was 92%; there was no individual time on task lower than 73% in any test session. The children's time on task was high regardless of whether they were selective listeners (92.1%) or non-selective listeners (92.8%).

The data also strongly uphold the prediction of the second hypothesis that the non-selective listeners would be found to experience difficulties of language performance in the classroom. According to extensive interviews with the children's teachers and the school principal, briefly summarized below, all of the 11 non-selective PLAYTEST listeners presented a variety of language and reading dysfunctions. None of the 33 children who successfully attained the PLAYTEST selective listening criterion were regarded as experiencing these reading and language dysfunctions.

Note that all the children were tested according to a "double-blind" model in which those with known or suspected language difficulties were not identified either by the teachers or to the investigators until after the PLAYTEST and the standardized listening tests were administered. The teachers had no information about the children's performance in the TV test sessions at the time they reported on their pupils' classroom performance.

According to the teachers' observational reports, the various aspects of language deficits in the non-selective children's linguistic performance included: active vocabulary, the length of spoken sentences, explicitness of speech, reading, spelling, and listening acuity.

Among the non-selective listeners, it was not clear whether these children failed to detect the difference between natural and degraded soundtracks or whether they were simply unaffected by the lack of intelligibility. Either interpretation suggests a substantial, hitherto unrecognized, receptive language disability that, as our results indicate, might be related to other aspects of language performance, among which are important measures such as reading and explicitness of speech.

The data show additional provocative evidence that there is a relationship between receptive language organization as measured by the PLAYTEST procedures and other language performance. For the group as a whole, including both selective and non-selective listeners, there is

a significant correlation between the mean PLAYTEST selective listening scores and the scores on the listening subtest of the Cooperative Primary Test ($r=.48$, $p < .01$). The children's performance on the reading subtest of the Cooperative Primary Test was also consistent with their performance on the selective listening TV evaluation and the listening section of the Cooperative Test. Of the 11 non-selective listeners, 3 in the kindergarten group did not read well enough to take the reading test, 6 were below the median for their age groups in reading performance, and 2 were above the median. Of these two, one was a marginal performer in the selective listening test who eventually attained the performance criteria, but only after experiencing repeated difficulty in doing so. This consistency between the selective listening scores and the reading scores was not demonstrable in terms of correlation coefficient due to reduced size of the sample and attentuated range.

Discussion

The remarkable "coincidence" that every non-selective listener in this group proved to have recognized patterns of reading and language dysfunction in the classroom, as described by their teachers and the school principal, indicates a relationship between impaired receptive language

organization and language and reading dysfunctions in the classroom. Details of the relationship between receptive language organization and aspects of early language development have already been discussed elsewhere (Friedlander, 1970, 1971).

The correspondence between the measurement of non-selective listening as assessed by the PLAYTEST procedure and the teachers' reports of deficient language performance in the classroom constitutes what may be a critical educational manifestation of this relationship. While the PLAYTEST scores are based upon a highly discrete aspect of specific listening experience, the teachers' observational judgments were based upon their personal evaluations of such global aspects of language usage as competence in listening acuity to stories and instructions, explicitness of speech, length of spoken sentences, active vocabulary, reading, and spelling.

Inasmuch as reading problems in particular are a major obstacle to educational progress for a substantial proportion of the children in contemporary schools, and the investigation of auditory and listening factors in beginning reading has been substantially neglected (MacGinitie, 1967), the PLAYTEST procedure may constitute a valuable contribution to future educational and reading research.

There is general acknowledgment among authorities that effective organization of language input is a prerequisite for the growth of other language functions, but this topic has not been accorded the importance it deserves in accounting for delayed and distorted language development in education. The data reported here suggest that there is indeed a close relationship between these domains of language function and that the topic deserves far more vigorous and comprehensive examination than it has thus far received.

More extensive research is now in progress to assess the generality of the findings obtained in this initial study. Information from related investigations with 230 other presumed normal primary children supports the observation that approximately 25% of the students thus far tested in advantaged communities show patterns of selective listening anomalies comparable to those reported here (Rileigh & Friedlander, 1971; Bohannon & Friedlander, in progress).

If larger scale studies confirm that a large number of normal primary children do in fact present hitherto unrecognized deficits of specific receptive language functioning, the educational community will be confronted with a problem and a challenge of major magnitude.

References

Bohannon, J. N. & Friedlander, B. Z. Primary school children's listening selection of intonation and meaning in narratives. In preparation.

Cooperative Primary Test, Educational Testing Service, 1965, Princeton, N.J.

de Hirsch, Katrina. Differential diagnosis between aphasic and schizophrenic language in children. Journal of Speech and Hearing Disorders, 1967, 32(1), 3-10.

de Hirsch, Katrina. Personal communication, 1972.

Durrell, D. D. & Murphy, H. A. The auditory discrimination factor in reading readiness and reading disability. Education, 1953, 73(9), 556-560.

Flowers, A. & Crandell, E. W. Relations among central auditory abilities, socio-economic factors, speech delay, phonic abilities and reading achievement: A longitudinal study. Cooperative Research Project No. 6-8313, 1967, Grand Blanc Community Schools, Grand Blanc, Michigan.

Friedlander, B. Z. The effect of speaker identity, voice inflection, vocabulary, and message redundancy on infants' selection of vocal reinforcement. Journal of Experimental Child Psychology, 1968, 6, 443-459.

Friedlander, B. Z. Preschool children's self-measurement of listening discrimination of four loudness levels of natural sounds with an automated videotape free-play game. American Speech and Hearing Association, 1969.

Friedlander, B. Z. Receptive language development in infancy: Issues and problems. Merrill-Palmer Quarterly of Behavior and Development, 1970, 16(1), 7-51.

Friedlander, B. Z. Automated evaluation of selective listening in language-impaired and normal infants and young children. Maternal and Child Health Exchange, 1971, 1(5), 9-12.

Friedlander, B. Z. Listening, language, and the auditory environment: Automated evaluation and intervention. In J. Hellmuth, (Ed.), Exceptional Infant, Vol. 2, New York: Bruner/Mazel, Inc., 1971, 248-275. (a)

Friedlander, B. Z., Hayes, C. A., & Mitsos, S. B. Automated PLAYTEST systems for evaluating infants' and young children's selective listening to natural sound and language. Scientific exhibit at the meeting of the American Speech and Hearing Association, Chicago, 1969. General Description and Instrumentation Bulletin.

MacGinitie, W. H. Auditory perception in reading. Education, 1967, 87, 532-538.

McPeek, D. L. Effects of multiple-voiced speech interference on selective listening in emotionally disturbed and normal preschool children. Unpublished thesis, Memorial Library, University of Wisconsin, Madison, 1972.

Putzer, R. K. Effects of language status and audio stimulus degradation on preschool children's selective listening in an automated operant television game. Unpublished thesis, Memorial Library, University of Wisconsin, Madison, 1972.

Rileigh, K. K. & Friedlander, B. Z. Effect of natural and randomized word order on children's selective listening preferences for stories. Society for Research in Child Development, Minneapolis, 1971.

Wardhaugh, R. Theories of language acquisition in relation to beginning reading instruction. Reading Research Quarterly, 1971, 7(1), 170.

Wepman, J. M. The interrelationship of hearing, speech and reading. The Reading Teacher, 1961, 14, 245-247.

Footnotes

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2. Technical information about the PLAYTEST system may be secured from the Stoelting Co., 424 North Homan Avenue, Chicago, Illinois, 60624.

Table I

PLAYTEST Listening Preference and Standard Test Scores, 44 Primary School Children

Subject	PLAYTEST Performance: Mean Preference Natural Soundtrack	PLAYTEST Performance: Mean Time on Task	Standard Test[1]: Listening Subtest
Age 5			
Girl	71.50	93.6	30
Girl	86.00	95.8	35
Girl	75.60	95.6	23
Girl	70.25	90.4	28
Girl	69.00	94.8	28
Boy*	61.20	92.8	21
Boy*	48.67	91.8	19
Boy	67.40	91.0	26
Boy	96.00	95.0	29
Boy*	55.88	92.0	24
Age 6			
Girl	91.67	96.0	33
Girl	89.64	96.0	40
Girl*	59.68	95.1	25
Girl	88.67	93.5	37
Girl	70.60	87.5	41
Boy	91.00	93.3	32
Boy*	49.00	93.8	21
Boy	77.25	93.4	40
Boy	78.00	93.4	39
Boy	68.50	93.3	39
Age 7			
Girl*	65.00**	88.0	33
Girl	89.67	98.0	45
Girl*	54.83	93.6	38
Girl	87.67	87.5	40
Girl	70.40	81.9	32
Girl	78.25	96.2	40
Girl*	55.00	95.3	37
Girl*	63.20	90.7	36
Boy	98.33	96.8	36
Boy	93.00	91.0	41
Boy*	67.25**	94.6	34
Boy	92.00	92.5	47
Boy	89.00	86.8	37
Age 8			
Girl	79.25	92.6	33
Girl	76.60	90.7	45
Girl	76.67	87.8	44
Girl	76.00	90.0	44
Girl	71.00	87.4	45
Girl	81.33	87.0	48
Boy	88.67	88.0	39
Boy	70.75	88.6	38
Boy	88.00	91.8	38
Boy*	56.67	92.9	35
Boy	93.67	93.5	not

* Non-selective PLAYTEST Listening
** Excessive trials to attain criterion
[1] Cooperative Primary Test