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ABSTRACT

This is the final report of the follow-up phase of a project begun in 1962 and designed to analyze the effect of home and maternal influence on the cognitive development of urban Negro preschool children. Contents include: the child's school achievement in the first and second grades; stylistic aspects of children's behavior and their susceptibility to voluntary control and regulation; the child's cognitive development; cognitive behavior of mother and child; the child's language; and, the child's exploratory behavior and interests. A summary of follow-up phase results is included. Extensive appendixes carry samples of questionnaires, interview forms, and procedures for administering and scoring various tasks, rating scales, and tests. For the final report see UD 009 185. [Because of the size of the print of some of the tables, several will not be clear in hard copy reproduction.] (JM)

THE COGNITIVE ENVIRONMENTS OF URBAN PRESCHOOL CHILDREN: FOLLOW-UP PHASE

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PREFACE

This is the final report of the follow-up phase of a project begun in 1962. The study was designed to analyze the effect of home and maternal influence on the cognitive development of urban Negro preschool children. It was begun in response to the obvious problems of education of minority groups in urban areas and in response to a number of basic research and theoretical issues. The study was modified and revised in various ways in response to our own findings and to the research and writing of others in the field of compensatory education. A number of concepts central to the study were modified during stages of analysis; thus, they are occasionally presented in terms somewhat different from those used in earlier published papers describing the findings.

This is one of two reports to come from this project; the first was a description of data obtained during, and conclusions drawn from, the preschool phase of the project when the children were 4 years old. The present report describes the academic performance and cognitive attainment of the children during their first two years of school.

The project was in no way an intervention effort, but rather was intended to establish empirical base lines and to offer constructs and concepts which might be useful both to other researchers and to programs designed to change the educational opportunities and attainment of children from disadvantaged socioeconomic urban areas.

The research reported in these reports was supported by Research Grant #R34 from the Children's Bureau, Social Security Administration, Department of Health, Education, and Welfare; by the Ford Foundation Fund for the Advancement of Learning; by grants-in-aid from the Social Science Research Committee of the Division of Social Sciences, University of Chicago; by a grant from the Office of Economic Opportunity, Division of Research, Project Head Start; and by the Early Education Research Center at the University of Chicago, funded by the National Laboratory for Early Education, United States Office of Education.

Many people participated in various stages of the project, and we would like to acknowledge their essential roles in the study. The follow-up phase report was completed at Stanford University with the secretarial and research assistance of Lyn Sharpe, Ronda Dave, Nancy

Stein, and Betty Herring. Audra Adelberger's contribution to the data interpretation and writing (plus editing) of the follow-up report was great enough to warrant special mention on the title page as a collaborator in the preparation of the report.

Those who worked on field collection of data included Mrs. Dorothy Runner (who supervised the training and work of the home interviewers, acted as liaison with public agencies, and had primary responsibility for obtaining the sample of subjects), Joan Massaquoi, Rachel Burch, Jennifer Legatt, Rhoda Stockwell, and Mary Tarrer. A number of persons were involved in testing the children and mothers: Marilyn Anderson, Kathryn Austin, Joan Blatt, Ella Mae Branstetter, Alice Dan, Gloria Davis, Rheta DeVries, Ethel Hull, Judy Jensen, Ruth Neisser Kaplan, Adina Kleiman, Nancy Kohn, Jane Lathrop, Phyllis Lett, Pamela Northcott, Margaret O'Neal, Shirley Smith, Phyllis Walesby, Lois Welch, and Linda Willson. Those who worked on the processing of raw data included research associates Patti Gregory Kemper and Ellis Olim; research assistants Harriett Ainbinder, Vera Brodky, Aubrey Eaton, Dina Feitelson, Rogene Fox, Helen Hanesian, Boaz Kahana, Barbara Lee, Mildren Schaefer Levine, Mary Lou Lionells, and Susan Prescott; and coders Mia Beale, Jonathon Birnbaum, Arlene Brophy, Betty Chewning, Jane Crews, Gary Davis, Linda Erinoff, Mirriam Feiler, Alan Fiske, Stanley Greenberg, Rae Isenberg, Gregory Kavka, Mollie Lloyd, Lillian Lynk, Iona Marty, Dean Mitchell, Jerry Neugarten, Roberta Norin, Cathy Sieving, Vicky Slavin, Judy Spivak, Nancy Vogeler, Carolyn Walsh, John Welwood, and Sandra Wilson. Computer programmers were Susan Beal, James Keene, and Eugene Lewis; Darrel Bock, J. David Jackson, and David Wiley served as statistical consultants. Secretarial duties were performed by Judy Anderson, Dorothy Andrews, Shirley Coleman, Kathy Eveland, Rose Glass, Anne Harker, Jane Heron, Nellie Hickman, Melissa Kern, Cynthia Kocher, Carol Lipsky, Helen Little, Sandra Pallett, Linda Pangburn, Louisa Powell, Roberta Reb, Linda Rothstein, Connie Roud, Carol Rubenstein, Arlene Rubin, Joyce Tetrev, and Helene Wijkman. The final typing and reproduction of the follow-up report were done by Editorial Associates (Peter and Jane Arnovick), Los Altos, California. Finally, several other persons assisted the staff in various ways not mentioned above: Donald Baer, Lance Dolphin, Linda Hartough, Russ McNeilly, Ella Pavlinek, and George Wise.

We would also like to thank the families who participated in this study and who gave us the information on which it is based.

The support of colleagues at the University of Chicago has been particularly important. Dean Francis Chase encouraged the study from its early stages and provided funds to supplement our initial grant; his successor, Dean Roald Campbell, gave us administrative support as well as financial assistance; both played more important roles in our project than they realized.

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THE COGNITIVE ENVIRONMENTS OF URBAN PRESCHOOL CHILDREN:

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CHAPTER I

INTRODUCTION

This is a report of the second phase of a study designed to examine the processes through which social and economic disadvantage affect the early cognitive development and educability of urban preschool Negro children. The initial stage, begun in 1962, was intended to identify the specific elements of maternal behavior and home environments which are related to the cognitive performance of children. In this second, or follow-up, phase of the research program, data collected during the children's early school years are examined for the effects of factors in the preschool environment upon later educational performance.

Review of the Background and Conceptual Context of the Research

At the time this project was begun, concern over the educational problems of children in the slums and in lower-working-class sectors of the population was beginning to appear in publications of various kinds and in isolated research and demonstration projects in the United States; this concern had not yet reached the national proportions which later led to massive programs of compensatory education funded by federal legislation through the U.S. Office of Education and the Office of Economic Opportunity. At such a preliminary stage of knowledge and experience, it seemed essential to study systematically the early experience of children from urban working-class areas in order to understand the effects of social and economic experience upon the preschool child's cognitive and motivational capabilities. The rationale for this approach was that programs of intervention could be planned with more effectiveness and efficiency if they were based on knowledge of the abilities and disabilities that the child from a disadvantaged home brought to the nursery school, kindergarten, or first grade. The decision to work with preschool children was influenced by informal reports and observations indicating that in contrast to children from middle-class neighborhoods, many children from disadvantaged homes came to metropolitan school systems not prepared to undertake the typical curriculum of the first grade.

It was this discrepancy between the school readiness of working-class and middle-class children, together with the emerging interest in compensatory education, that led to the decision to study the preschool environments of children from different socioeconomic backgrounds. The purposes of the study could best be achieved by including in the project mothers and children from both middle- and working-class backgrounds, in order to examine variation in maternal behavior between and within social status groups.

This project was conceived not as an intervention effort but as an attempt to understand the processes which link social and cultural environments to the emerging capabilities of young children, with the expectation that an understanding of these processes would assist in planning effective intervention programs. In line with this objective, no attempts were made to interfere with the development of the children or with the behavior of the mothers studied. This project is unusual among studies of cultural disadvantage in that it sought to establish base lines of information about the characteristics of the early environment and the mechanisms which translate external social reality into patterns of behavior.

Broadly speaking, this study was an inquiry into the relationship between social structure and individual behavior, with particular emphasis upon the functional connections linking social and cultural conditions at various socioeconomic levels to motivation and ability to learn in the classroom. The model of socialization upon which this study is based asserts that connections between social structure and individual behavior may usefully be considered in terms of (a) the nature of the physical and social environment, (b) the effects of this environment upon adults, (c) its effects upon the adults' consequent interaction with children, and (d) the behavioral outcomes that emerge in the children: e.g., cognitive skills, school achievement, patterns of interaction with the school, its rules and representatives.*

The Nature of the Physical and Social Environment

In line with the orientation of this study, the characteristics and effects of working-class environments are of special interest. Without denying the importance of economic resources and their effects upon all socioeconomic status levels, the focus of this study was upon the social

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*The comments that follow are a highly oversimplified description of the social structure and of links between it and individual behavior, and serve only to sketch the framework within which the present study is to be interpreted. More extended discussion can be found in Chapter I of the report of this project's preschool phase.

and psychological rather than the economic factors with which status in the socioeconomic hierarchy is associated. The extent to which an individual has power, for example, is one of the most significant dimensions of social structure in the United States; lower-working-class adults have little influence, and powerlessness is one of their central problems. Lower-working-class urban Negroes are also highly vulnerable to disaster, and their life circumstances restrict the availability of alternatives for action. Another dimension of social differentiation is the disparity in prestige enjoyed by members of different levels of the system; urban working-class Negroes command relatively little prestige or esteem and are subject to discrimination of various degrees, and their awareness of this position is a mediating screen through which perceptions and information are filtered. In addition, they are unlikely to take part in the policy- or decision-making process; instead they carry out the decisions of others. Finally, the lower-class adult finds relatively little overlap between his experiences and those of middle-class adults.

The Effects of the Environment Upon Adults

One consequence of low socioeconomic status is that adults tend to perceive and structure relationships in terms of power; thus the lower-class father, for example, tends to equate respect from children with compliance to his wishes and commands. Another consequence of the circumstances of lower-class life is a cluster of attitudes expressing low esteem, a sense of inefficacy, and passivity. These are not so much personality traits as adaptive responses to frustrations and unpredictability; the relatively dependent position in the social structure of the lower-working-class adult is likely to induce magical thought and the tendency to look to super-human sources for support and assistance. A third adaptive consequence of lower-class life is an unusual degree of reliance upon non-work-related friendships and kinship contacts for social support and resources, often expressed in a lack of interaction with voluntary organizations and a consequent isolation from the institutions of the community. Language and linguistic modes of communication are also likely to be restricted. The life style of the poor seems to show a preference for the familiar, a simplification of the experiential world, and a rejection of intellectuality. Finally, anger and resentment as a consequence of low status are becoming more obvious and more of an immediate problem for society as a whole.

The Environment's Effects upon the Adults' Interactions with Children, and the Behavioral Outcomes in Children: the Focus of this Research

For the most part, it is through the mediating behavior of older siblings and adults that the young child learns to comprehend and to attach significance to the social and physical circumstances in which he lives. In considering the socialization of educability, the consequences of social class environments for adults is of particular significance: their adaptations to these external features shape patterns of behavior as well as motivations, aspirations, and expectations of rewards and success. Such adaptations occur at all levels of society: both affluence and poverty elicit patterns of adaptive response. The concerns of this study, however, make the adaptive responses of the urban poor of special relevance. These adult orientations shape the child's world, eliciting, in turn, responses from him which may be functional in relating to the milieu of his family and community, but are much less useful in dealing with the public school as an institution and with the teaching and learning situations it presents.

The point of view offered here is that the mother is particularly influential in transmitting to the young child behaviors and adaptations shaped by the environment. In later years, the environment may increasingly exert direct influence upon the child, but in this study the focus of attention was upon the exchange between mother and child. This exchange seems to be linked to the contingencies of the environment which the mother herself experiences. Her behavior is, of course, a function of her own ability to deal with the problems of her environment. The objective of this project, especially the preschool phase, was to understand how environmental variables are mediated through the mother's behavior in more specific ways than are suggested by IQ scores or social class membership.

A prominent concept in planning the study and in the analysis of data was the concept of educability. Intended to be heuristic and to represent an orientation and point of view that would help organize the data and their interpretation, educability is seen as an intersect of three general orders of characteristics: a cluster of specifically cognitive skills, such as discrimination, concept formation, language facility, numerical and spatial abilities; a motivation to achieve in a formal classroom situation, to accept the goals of the schools as valued objectives; and the acquisition of the role of pupil, a configuration of behavior and attitudes relating the child to the school as an institution and to the procedures, norms, and regulations which are a part of the school's operation. For a number of practical and methodological reasons, the problem of motivation was not considered in a formal or systematic way; attention in both the preschool and follow-up phase of the study centered on cognitive activities and the role of pupil.

Within this broad conceptual framework, the project was designed to identify specific maternal behaviors which mediate between the environment and the development of cognitive ability and educability in young children. This view of the child's early experience in his home as a socialization into cognitive modes was a departure from previous concepts of the socializing roles of parents, which have for the most part emphasized the effects of parents' training in non-cognitive areas. The present study concentrates on input features of the process of socialization into cognitive modes: it attempts to describe how the child becomes aware of the external world, the bases on which he selects and processes information that comes to him from both external and internal sources. It is thus possible to regard the mother as a teacher, and to examine her role in making the child aware of the pattern and profile of stimuli that reach him. To the extent that the mother's behavior affects the cognitive development of her children and prepares them for school, her behavior and attitudes--expressing value patterns on which other behavior might be based--can be regarded as maternal teaching styles.

This study dealt with social class differences in order to show the contrast among groups within an urban population and to assure that a wide range of maternal and child behavior would be included. It was not intended to demonstrate or examine social class differences as such. Rather, social status divergencies represent a point from which to initiate analysis of specific elements of maternal behavior having cognitive consequences for the child's development. We see the exchange between mother and child as an array of behavioral contingencies linking the social structure to the developing behavior of the young child.

The subsequent chapters of this volume deal with the major dimensions of the follow-up study and the results of our investigation into the effects of preschool environment upon later educational performance. The intent of the analysis and of the interpretation is to offer data and a point of view that will lead to new research endeavors with more precise empirical methods and more illuminating theoretical formulations. As further background and supplementary introduction to the interpretations of the follow-up study, a summary of results from the preschool phase of the project is offered below.

Summary of the Preschool Phase of the Project

Procedure

The research group consisted of mother-child pairs from three socio-economic status levels: middle-class, skilled working-class, and unskilled working-class; the unskilled working-class subjects were selected from both father-present and father-absent families. Data were gathered from an extensive interview in the home examining family structure and circumstances, maternal attitudes toward education, availability and use of material resources in the home and community, maternal expectations about the child's behavior, and mother's use of language to convey and expand ideas. Testing sessions at the University included administration of standard IQ tests to both mother and child, a conceptual sorting task to both, an experimental curiosity measure to the child, and measures of personality characteristics and problem-solving abilities to the mother. Mother and child were also observed in a structured interaction in which the mother was asked to teach the child a task she had just learned herself, and the pair were asked to cooperate in performing another task.

Results

The major aspects of the preschool child's cognitive environment found to be significantly related to his cognitive performance were: 1) family resources and maternal life styles; 2) mother's strategies for controlling the child; 3) mother's teaching styles in an experimental situation; and 4) maternal language. Mother's social class and IQ were also, as expected, found to be significant predictors of the child's performance. Since, however, the focus of this study was on more specific ways in which the influence of environment on children's performance is mediated through the mother's behavior, discussion of social class and IQ is subsumed under the four aspects of the cognitive environment listed above.

(1) Family resources and maternal life styles. Families from different social status levels differed as expected in size, structure, and utilization of resources. The working-class families in the sample were larger and lived under more crowded conditions than middle-class families. Physical and material resources are of course quantitatively poorer for working-class families, but utilization of available resources in the community was

also different: working-class mothers were involved in fewer out-of-home activities and made less use of such community facilities as the library and educational-recreational centers.

No conclusive evidence could be found for differential effects of public vs. private housing, or father-presence vs. father-absence. The degree of crowding in the home does, however, apparently influence maternal behavior (e.g., the type of strategy adopted to control the child). So also do the richness of utilization of home resources and the extent of the mother's interaction with the community. A relatively uncrowded home, active community participation, and fairly extensive use of home resources were related to the mother's tendency to see herself as an effective, active member of the community, and to the manner in which she interacted with her child. Mothers who felt more optimistic about their chances to improve their lives and less powerless with respect to the school also tended to put greater pressure for achievement on their children, to have a higher personal-subjective orientation, and, during the teaching tasks, to monitor the child's response, anticipate his needs, and engage his attention in positive ways. Their children in turn showed greater educability (as defined in this study): they manifested less problem behavior and performed better in both the semi-structured interaction and non-standard testing situations.

Maternal attitudes also appeared likely to influence another aspect of educability: the child's readiness to perform in the school situation. Working-class mothers, in their descriptions of what school would be like, tended to emphasize the power structure and expectations for obedience, while middle-class mothers tended to add supportive statements and to view the first school experience as a psychological as well as physical encounter. When partial correlation was used to examine the relative power of maternal attitudes toward education in predicting the child's behavior in a school-like situation (e.g., taking an intelligence test), it was found that maternal attitudes such as powerlessness were significantly associated with the child's behavior: a mother who expressed feelings of powerlessness vis-a-vis institutional authority was likely to have a child who was passively compliant and uncertain of his abilities and who also did less well on the interaction tasks. Further analysis of the data permitted the conclusion that the mother's conveying of positive attitudes toward education and school, and realistic expectations for the child's behavior, are more important than social class in determining the child's readiness and preparation for school. Other basic variables such as mother's IQ, amount of formal schooling, and age were significant predictors of the child's behavior in a task situation; nevertheless, a mother's awareness of the school as more than an authoritative institution and her feeling of efficacy in relating to the school are among the basic factors important to the process of socializing the preschool child into the role of pupil.

(2) Mother's strategies for controlling the child. Attention was focused on types of control strategies, rather than the degree of restriction or regulation used by the mother to guide behavior. Maternal responses to open-ended and semi-structured questions dealing with hypothetical situations involving their children were analyzed for the control maneuvers used. The mothers' responses were grouped into categories described as imperative statements: a tendency to impose norms of the system without giving rationales or to impose their own wishes in a like manner; status-normative statements: a readiness to support the rules and norms of the institutions of the community; and personal-subjective statements: an attempt to consider the individual qualities and inner states of the child, and to see the child's behavior from his own perspective. Social status differences were found in the control strategies: middle-class mothers tended to use a higher percentage of personal-subjective statements and a lower percentage of status-normative and imperative statements than did mothers in any of the three working-class groups. In addition, middle-class mothers tended to use more instructive statements (as opposed to imperatives) than did working-class mothers.

Social status differences in use of control strategies were highlighted by examining the relationship of control strategies to other variables: use of status-normative appeals was related to such family structure and orientation variables as low availability and use of home resources, crowding, and low community interaction. Failure to provide rationales and/or the tendency to use status and power as rationales were related to low maternal IQ and to relatively unelaborated language styles, as well as to poorer cognitive performance by the child. Use of rationales, especially of appeals based on the individual characteristics of persons and situations, was in turn related to rich home resources, better family circumstances, and better cognitive performance by both mother and child.

(3) Mother's teaching styles in an experimental situation. The observed mother-child interactions provided data on maternal communication in a deliberate teaching situation. Each mother had the same information

to communicate or the same goals to accomplish in cooperation with her child, but she was allowed complete freedom of time and method to implement these goals. In the first two tasks, toys were sorted by color or function and blocks were sorted by height and printed symbol. The third task involved the Etch-a-Sketch, a toy screen on which lines can be drawn by manipulating two knobs. The mother was asked to copy designs by manipulating one knob herself and instructing her child to manipulate the other. The typescripts from these interactions were analyzed through a procedure measuring maternal ability to engage the child in the task and to present the relevant task information. Measures of cooperation and learning were obtained for the children in these interactions, and individual task responses were examined for evidence of certain maladaptive coping styles.

Mothers of higher SES and IQ were likely to use teaching behavior that was proactive (initiatory) and varied rather than reactive and repetitious. Ineffective teaching behavior was characterized by coercion, by demonstration without explanation, and by criticism of errors without description of the correct response. When maternal teaching was ineffective, the child began to resist the task, to develop maladaptive coping styles, or to show signs of self-defeating attitudes that, if generalized, could interfere with cognitive development and educability. Coercive control based on imperative demands and appeal to status was ineffective. The repeated use of ineffective teaching methods seemed the result of a repertoire limited by disadvantaged background.

Particular attention was paid to the child's ability to categorize as part of his ability to use language as a cognitive tool. Differences in performance were more sharply revealed in measures tapping abstract and categorical use of language than in those depending on denotative and labeling usage. Children from working-class homes appeared hindered in development of reflective attitudes, in abstraction, and in categorizing.

The data indicate that maternal teaching styles, reflecting the mother's information-processing strategies, techniques for controlling her child's behaviors, and attitudes toward education and the schools, are equal to or better than IQ and social class as predictors of the child's cognitive functioning.

(4) Maternal language. Maternal language samples were obtained in several situations, including mother's response to projective materials and to semi-structured questions about the child, and mother's language to the interviewer and to the child. In general, working-class

mothers showed a picture of language restriction on research measures; when contrasted with middle-class mothers, lower-class mothers consistently spoke in shorter sentences, demonstrated a more constricted perceptual system in responding to semiprojective material, and evidenced deficiencies in elaboration of imaginative thought. A strong relationship, especially in the middle class, was found between maternal language abstraction and the child's abstraction ability.

CHAPTER II

METHODOLOGY

In order to gain additional information about the cognitive environments of the children in the study, and especially to gather additional data on the cognitive development and educability of the children themselves, follow-up interviewing and testing was conducted after the children began their formal schooling. This broadened the scope of the study somewhat, in that the introduction of longitudinal study raised questions of development over time in certain variables taken or measured on the children, as well as questions concerning changes in the relative power of the various preschool measures of cognitive environment for predicting the status of the children at later ages. Follow-up data come from two testing sessions at the University in which both mothers and the children were seen, from an additional testing session in which the child was seen at his school during second grade, and from school records, containing the children's marks, achievement test data, attendance, and conduct data for the first two years at school (usually first grade and second grade).

In the two years (on the average) that intervened between the preschool testing sessions and the first follow-up session, contact with the families was maintained but no other data were gathered and no intervention into the lives of the subjects was attempted. No information, advice, or material assistance was given to the families, and there was no attempt to control such variables as the child's participation in organized preschool experience or kindergarten, the kind of school enrolled in, etc. Every attempt was made to avoid influencing the families in any way. Each family was undoubtedly influenced indirectly (and in an unknown fashion) simply by participation in the study. Direct influence, however, was avoided, even to the extent of refusing parents' requests for advice or reports. This policy was maintained in the interest of preserving as much as possible the naturalistic character of our study. The research design, including as it does the assessment of the usefulness of measures of the preschool environment for predicting cognitive abilities and educability in later years, contains the implicit assumption that the subjects have not been changed by their participation in the study. The nature of each child's cognitive environment and the course of his cognitive development are assumed to be the same as they would have been had he not participated in this research.

As in the preschool phase of the study, subjects received no reimbursement for their participation beyond transportation costs and related expenses (i.e., babysitting). For the testing conducted at the University, subjects were picked up and returned in rented cars driven by project personnel. Testing at the schools was done on ordinary school days, with the child being picked up after he had come to school and returned to his classroom before the end of the half-day. Arrangements to collect school data were made directly with school officials and did not involve the mothers, except for the signing of permission forms. Subjects whose families had moved out of the Chicago area, nevertheless, were followed up; they were transported to Chicago for testing at the University or testers were transported to their new places of residence for testing at the schools.

In contrast to the preschool study, follow-up contacts were tied to the school calendar rather than to the children's birthdays. Because differences in formal school experience seemed more likely than differences in chronological age to affect the children's test performance, each round of follow-up testing was completed at parallel intervals during the school year rather than at intervals determined by the birthdays of the children. The first follow-up testing was done in the summer preceding entrance into first grade, the second follow-up during the summer preceding entrance into second grade, and the testing session at the schools was conducted during the fall and early winter of the child's second year at school (usually the second grade).

For both summer follow-up sessions (after kindergarten and after first grade), mother and child were brought together to the University and tested in a single session lasting on the average about two and one half hours. Each mother and child was tested separately by female examiners (all Caucasian in the case of the children). About midway through the session a play observation was scheduled. This was a fifteen-minute break in the testing schedule during which the children were allowed to play with any of a variety of toys while the mother worked on a pencil-and-paper task in the same room.

Data are not available for all 163 original subjects on any of the follow-up measures. Data are available for over 90 percent of the subjects on each measure, however, and there appear to be no systematic biases on variables such as sex, social status, or housing in the follow-up participation rates. At the end of two full years of follow-up, the project was in contact with 160 of the original 163 subject families, and 158 of those were cooperating with the research by submitting to interviews and testing. All the schools involved cooperated in furnishing testing space and school records data, although in a few cases the school data were not sufficiently specific to allow numerical representation. In general, the numbers of subjects represented in the following study seem adequate to meet logical statistical demands, and no systematic selection factors are known to be operating.

Sources of Maternal Data: Summer Session Tests, Tasks, and Interview

In contrast to the prevalence of open-ended questions and situational tasks presented to the mothers in the preschool study, most of the follow-up data collected from the mothers come from structured tests and inventories designed to measure specific variables. Data were collected in the following areas:

General intellectual functioning. In the preschool study, each mother had been given five of the six verbal subscales of the Wechsler Adult Intelligence Scale (WAIS): information, comprehension, similarities, arithmetic, and vocabulary. At the first follow-up testing session, each mother was given four of the five performance subtests of the WAIS: digit symbol, picture completion, picture arrangement, and block design. The vocabulary subtest of the WAIS was also readministered to the mothers at this time in order to provide information about the stability of intellectual functioning over a two-year period. By prorating from the nine scales used, estimates could be made for each mother of her WAIS Verbal IQ, performance IQ, and full scale IQ.

Symptoms of anxiety and depression. Each mother was administered the "Brief anxiety and depression test" at both the first and the second follow-ups. This inventory, a paper-and-pencil task consisting of a subset of items from the Minnesota Multiphasic Personality Inventory (MMPI), includes only the less obvious items which appear on the anxiety and depression subscales of the larger inventory (Shipman, 1963). Items from the two subscales (anxiety and depression) are intermixed randomly in a single instrument containing a series of forty-four attitudes and behaviors which each mother described as either true or false for herself. This inventory was administered at both the first and the second follow-up testing sessions. Like all other interviewing and questionnaire instruments used with the mothers, it was orally administered. Testers read each question or statement to the mothers and then recorded their verbal response. A standard oral mode of presentation was considered necessary because some mothers had limited reading skills.

Edwards Personal Preference Scales. The mothers were administered eight of the fifteen subscales of the Edwards Personal Preference Scales (EPPS). The achievement, intraception, nurturance, and change subscales were given at the first follow-up, while the dominance autonomy, aggression, and abasement scales were given at the second follow-up. Each subscale is composed of a series of paired statements requiring the mother to choose one of each pair as being more true of her. The various subscales assess the relative permanence in the subjects of personality traits (needs) assumed to be normally distributed in the general population. The particular subscales used were chosen for their possible relationship to the mother's performance of her maternal role (i.e., the nature of her interaction with her children).

Draw-a-Circle Slowly. This task, as the name implies, required the mother to draw a circle as slowly as possible without lifting her pencil from the paper. It measures the degree to which the mother can exert control over this relatively fine and circumscribed motor response. Mothers with relatively longer response times are considered to have demonstrated control, inhibiting impulsiveness, closure needs, and other forces militating toward more rapid completion of the task. This measure was included because of the possible relationship of the behavior-control variable to measures of problem-solving behavior and cognitive style. It was repeated at both the first and the second follow-up sessions.

Reflectivity in problem solving. Each mother was administered the Matching Familiar Figures Test (Kagan, Rosman, Day, Albert, & Phillips, 1964), an instrument used by Kagan and his co-workers to assess subjects' tendencies to ponder alternative solutions when solving problems. In the Matching Familiar Figures task the mother was first shown a stimulus picture and then asked to locate the identical picture in an array of six pictures. Only one of the six pictures was identical to the stimulus, although the other five were similar to it in most ways. Relatively long response latencies (average time before first choice) are considered by Kagan and his associates to be indicative of a reflective approach to problem solving. This measure, included so that each mother's standing on the variable could be compared with her child's, is of interest because a reflective style in young children is known to be positively correlated with reading grades (Kagan, 1965b). The Matching Familiar Figures Test (MFF) was administered to the mothers at both the first and the second follow-up.

Locus of control (internality-externality). This variable, the subject of considerable research in recent years, refers to the degree to which a person feels in control of his own destiny. Persons characterized by an internal locus of control tend to feel that they can exert considerable control over what happens to them, and tend to see success or failure as being dependent primarily upon their own behavior. Persons characterized by an external locus of control, on the other hand, tend to feel that their fate is determined primarily by uncontrollable forces such as chance, luck, or Divine Providence. Locus of control is known to be affected by social class (Battle & Rotter, 1963), and may be expected to affect the kind of attitudes and values that mothers transmit to their children, and the kinds of expectations and demands they make upon them. Two measures of locus of control were administered to the mothers: an inventory, compiled by William James (James, 1957; Phares, 1957), requiring the mother to respond to a series of statements ("strongly agree" through "strongly disagree"), and an internality-externality scale, developed by Julian Rotter (Rotter, 1966), requiring the mother to choose one of a series of pairs of statements as being more true of her. The former measure was administered at the first follow-up, and the latter at the second follow-up.

Interview. In addition to the previously described test and questionnaire data, a follow-up interview was conducted with each mother during the second follow-up session. Included were questions about changes in the family situation (composition of the family, housing type and location, income, etc.), educational activity of either parent since the first interview, preschool and kindergarten experiences of the children, illnesses, accidents, and other experiences that may have affected the child's development, and other events occurring between the time that the child was four years old and the time that he was about to enter the second grade. In addition, each mother was asked to tell three things about her child that particularly pleased her or made her happy, and three things that she was concerned about or disliked in her child.

Sources of Children's Data: (a) Summer Sessions

While the preceding data were being gathered from the mothers during our summer follow-up sessions, a series of tasks measuring variables of cognitive development, cognitive style, and personality were being administered to the children. The number and variety of measures taken of the children at the follow-up was much greater than those taken at age four, since the six- and seven-year-old children could appropriately be assessed on a much greater range of evaluative procedures. Data on the following variables were gathered during those summer sessions:

Conceptual style. The cognitive dimensions used by children in grouping familiar objects were assessed through the use of the children's conceptual sorting task developed by Dr. Irving Sigel (Sigel, Jarman, & Hanesian, 1967). This task involved readministration of the same instrument used previously when the children were four years old. It was administered at both the first and the second follow-up testing, thereby providing longitudinal data on conceptual sorting behavior taken at three points in time spread over a period of about four years.

Reading readiness and achievement. Each child was administered the Lee-Clark Reading Readiness Test during the first follow-up (summer before first grade), and then the following summer, after completing the first grade, was given the Lee-Clark Reading Test (Primer), an objective measure of reading achievement. Reading is of course a key element in the curriculum of the first grade, and a child's progress in reading during that initial school year is an excellent indicator of his overall adjustment to school. The scores from these two standardized tests indicated the relative standing of each child, the degree to which he possessed important skills related to first grade reading progress, and his actual reading achievement after one year of school.

Conservation and related indices of conceptual development. Stimulated by the studies of cognitive development carried out in Geneva by Jean Piaget and his colleagues (Flavell, 1963), American psychologists and educators have become interested in the study of conservation behavior and related phenomena in young children. Conservation behavior refers to the child's ability to distinguish between perceptual and quantitative equivalences: to understand, for example, that liquid volume is unaffected by ("conserved" during) changes in color or shape of the container. The abilities studied by Piaget and his followers are important for educability because they are believed to be basic and intuitive, more related to general experience and maturity than to specific learning or instruction. Often they are prerequisite to understanding the school curriculum. Seven Piagetian tasks were used in the follow-up study. These included conservation of length, number, and volume relationships; conservation of size equivalents against optical illusions; conservation of generic identity despite changes in external appearance; conservation of class inclusiveness and exclusiveness; and an interview investigation of the children's understanding of the nature of dreams. Each task was administered at both follow-up summer sessions.

Preference for visual complexity. The measure of preference for visual complexity that had been used in the preschool research was repeated at both the first and second follow-up sessions. For this task visual stimuli were presented to the children in a viewing box, and they were allowed to look at each stimulus as long as they liked. The task yields information on both the child's persistence in a free-choice situation (total time spent on task) and the child's tendency to respond differentially to contrasting environmental stimuli (viewing time on complex stimuli vs. time on simple stimuli). As with the Sigel task described above, longitudinal data taken at three points in a four-year span are available for this instrument.

Self-management variables. Included in both follow-up sessions were four tasks measuring stylistic aspects of the children's behavior. One of these was Kagan's "Design Recall Test" (Kagan, Rosman, Day, Albert, & Phillips, 1964; Kagan, 1965a, 1965b), which required the child to choose from arrays of ten or twelve figures that figure which corresponded precisely to a previously viewed model. Response latencies (average time for first choice) on this task are considered indices of the degree to which children tend to reflect over alternative hypotheses before making any choice. Children with longer response latencies (and presumably greater reflectiveness) tend to do better on this task and to be better readers in school (Kagan, 1965b). In addition to the Kagan measure which focuses on self-management behavior in a problem-solving context, three other tasks addressed directly to the behavior itself were administered. One of these, also given to the mothers, was the "Draw-a-Circle-Slowly" task. This task taps the child's ability to exert control over the rate of a motor response and to defer closure as long as possible. An additional, more gross measure of control over motoric activity was a task requiring the child to sit quietly in a corner for as long as he could (up to a three-minute maximum). For this task the measure used was the number of seconds in which the child neither spoke out loud nor left his seat. Inability to inhibit these activities for the three-minute period was considered evidence of poor impulse control. The final stylistic measure was a delay of gratification measure taken from the work of Mischel (Mischel, 1958; Mischel & Metzner, 1962). For this measure, the child was shown two different amounts of the same candy and asked to choose between receiving the smaller amount immediately or receiving the larger amount later in the session. Choice of the latter alternative is considered evidence of ability to delay gratification in the interest of a larger long-run gain. Although these four self-management tasks differ in many ways, they all require the children to inhibit impulsive and/or immediate response tendencies in favor of controlled goal-seeking behavior. The measure of total time spent on the "Preference for visual complexity" task mentioned above also has much in common with these four measures.

Locus of control (internality-externality). At the second follow-up each child was given a locus of control picture task for children. This instrument consisted of a series of pictures (cartoons) depicting success or failure in scholastic and social situations. The child was asked to choose between two explanations for each incident, one explanation attributing success or failure to the actor himself (internal locus of control), and one stressing characteristics of other people or circumstances beyond the control of the individual (external locus of control).

Sex-role preference. A picture task for measuring sex-role preference was administered to the children at both follow-up sessions. The task consisted of a series of pictures presented in pairs. One member of each pair showed a "masculine" activity and the other showed a "feminine" activity. The child stated which of each pair of pictures he preferred, and was scored for the total number of sex-appropriate choices.

Play behavior. The final data stemming from the two follow-up summer sessions concerned the child's behavior during the free play intermission period. For a fifteen-minute period, midway through each follow-up session, the child was allowed to play for fifteen minutes while his mother worked nearby in the same room on paper work. The verbal interaction between mother and child was tape-recorded, and a running description of nonverbal behavior was tape-recorded on a second machine by an observer watching through a one-way window. The mothers were aware of being observed, but the children were not. The tape recordings were later analyzed for the choice and use of toys by the child, the exploration of the room and other aspects of the environment by the child, and the quality of the mother-child interaction.

Sources of Children's Data: (b) Testing Sessions at the School

In addition to the data gathered in the summer follow-up sessions, each child was seen by a tester at his school during the early part of his second year in school. This testing was arranged with the cooperation of the schools involved, and was done as a matter of convenience (no transportation problems were involved and the mothers did not have to be inconvenienced). The greater part of the testing time was used to readminister the Stanford-Binet Intelligence Test given previously at age four. This test yielded both an IQ rating and a set of testers' ratings of the children's response to the testing situation. Following the Stanford-Binet the child was given a brief stick figure self-concept task and a doll play interview. In the stick figure task the child was presented with ten stick figures in a row and asked to imagine that these, the children in a class, were lined up in order from the pupil who did the very best work to the pupil who did the very worst. The child was then asked to select one of the ten figures as the one that represented himself. These selections are presumed to indicate the child's own self-image or ideal as a student.

The Doll Play Interview was designed to get a sample of the child's language and to shed light upon his subjective view of the school both as an institution and as an environment. For the interview the child was presented with dolls labeled as teacher, mother, father, and children (four), and was asked to imagine that the children were students in the same grade as he. He was then asked to tell a story about what might be going on at school, and was encouraged to use the dolls in telling the story if he desired. The instructions stressed the telling of a story in the school context, however, and not the physical use of the dolls themselves. Each child's story was recorded verbatim along with any pertinent physical manipulation of the dolls which accompanied it. Transcripts of the stories were then later coded for linguistic variables and for measures of the kinds of activities and interactions occurring in the imagined school.

Sources of Children's Data: (c) School Records

In addition to the data collected in the previously-described summer sessions and in the fall and winter testing sessions at the school, data from the child's school records were obtained each June. These data included grades in academic subject matter and in conduct, attendance data, and scores on readiness, aptitude, and achievement tests administered by the school systems. The data collected included only those data normally kept in the school's records; no teacher ratings or other extraordinary data were collected. With the collection of school data at the end of the second school year, the second follow-up cycle ended.

CHAPTER III

THE CHILD'S SCHOOL ACHIEVEMENT IN THE FIRST AND SECOND GRADES

As part of our larger concern with the influence of cultural experience on educability, in this chapter we present data on one aspect of the measure of educability: the child's achievement as reflected in standardized school tests and in school grades. School tests and grades have somewhat limited usefulness as measures of educability. They are not completely effective indicators of past achievement or predictors of subsequent achievement; indeed, achievement as presently measured may not be the best indicator of educability. Moreover, standard tests and grades are not always congruent with the criteria for success in the child's reference group (Davis, 1948; Loban, 1963). Within these limits, however, they can be treated as relevant criteria for measuring achievement, for they are widely used in our society to evaluate attainment of academic and societal goals and to determine opportunities for higher educational experiences.

The data reported in this chapter on the child's academic development came from two sources, standardized tests and teachers' judgments (grades). As will be seen, all independent variables (preschool and contemporaneous maternal behavior, preschool and contemporaneous children's behavior) tended to correlate most strongly with scores on standardized tests, next strongly with academic grades, and least strongly with conduct grades. In addition, changes over time were found in the correlations of conduct grades with standardized test scores and with academic grades: in both cases, correlations were regularly lower at the end of the second grade than at the end of the first semester. Thus the discussion of data centers around the following questions:

1) What factors appear to affect differences found between standardized measures of academic development and teachers' judgments of academic achievement and classroom conduct?

2) To what extent do maternal behavior and environment appear to influence differing measures of the child's performance in school? In particular, is the preschool maternal influence on educability reported in the preschool study (q.v.) maintained when the child goes to school?

3) To what extent is the child's performance in experimental situations related to long-term learning (i.e.,

measures of school performance)? In particular, can various measures of behavior and cognitive development obtained during both preschool and school years be used to predict the child's school performance?

Achievement in the Classroom:

the Dependent Variables

Description of Measures

The measures used to evaluate achievement in different areas of academic development can be grouped into three categories:

1. Reading readiness and achievement tests. The Lee-Clark Reading Readiness Test, administered by the research staff in the summer before first grade, and the Metropolitan Reading Readiness Test (Form R, 1949 edition), administered by the schools at the beginning of first grade, were used to predict the child's first-grade reading achievement and to assess the attainment of certain concepts and aptitudes believed prerequisite to reading. The Lee-Clark Reading Test (Primer), administered by the research staff in the summer following first grade, provided an objective measure of reading achievement that also indicated overall adjustment to school.

The Lee-Clark Reading Readiness Test is divided into three parts: LC-RR1--Letter Symbols; LC-RR2--Concepts; LC-RR3--Word Symbols. In the first part, the child matches similar letters or crosses out dissimilar letters; in the second part, he shows his grasp of selected critical concepts; in the third part, he matches a standard word to one of four alternative words. A total score, LC-RRT, is then obtained on the basis of the three subtests given.

The Metropolitan Readiness Test is composed of six subtests. In tests 1 and 2, the child shows his understanding of word and sentence meaning by selecting from four pictures the one that illustrates the word or sentence spoken by the examiner. In test 3, a vocabulary test, the pupil selects from a row of four pictures the one that best suits the examiner's description. Test 4 is a test of visual perception similar to the Lee-Clark letter and word recognition. Knowledge of numbers is measured in test 5, and test 6 measures the kind of combined visual perception and motor control required in learning to write.

The Lee-Clark Reading Test (Primer) contains three subtests. In the first subtest the child is asked to hear, remember, and select from four alternatives a word pronounced by the teacher. The second subtest measures word recognition by requiring the child to relate a number of words to a number of pictures. The third subtest involves marking pictures in prescribed ways on the basis of directions given in sentence form.

2. Grades in academic areas. The first-grade dependent measures to be examined are grades in reading, writing, and arithmetic at the end of the first and second semesters. The second-grade dependent measures include year-end grades in reading, arithmetic, writing, science, spelling, speaking, art, and music. A combined first- and second-grade score was also obtained in both reading and arithmetic.

3. Grades in conduct. The child was evaluated at the end of both first-grade semesters and again at the end of the second year in areas of conduct appropriate to the school setting. It was thought that a measure in this area might be of significant value in assessing the influence of maternal and environmental variables on the child's adaptation to non-academic school requirements.

Standardizing grades. An inventory of the data revealed that only reading, writing, and arithmetic were consistently graded in the first grades of the schools involved, but that science, speaking, spelling, art, and music were also graded in most second grades. It was also found that both the public and Catholic school systems changed their marking practices beginning with the children's second year in school and that, as expected, a certain number of the children were not promoted to second grade. In addition, public, Catholic, and other schools used differing systems of grading. These differences in systems of marking and between first and second grades required that a means of standardizing grades be developed. In the following paragraphs the procedure for converting first-year grades to a standardized system will be described and then followed by an explanation of changes made for the second-year grades.

For the first-grade children, public schools recorded only semester grades, while Catholic schools recorded quarterly grades. The practices in other schools varied from the preservation of complete monthly grades to the deliberate exclusion of all grades. Since more than 75% of the children attended public schools, the public school data were treated as the norm, and data from Catholic and private schools were converted accordingly. As a first step in the process of assigning conversion numbers to the grades, distributions of grades in the public and Catholic systems were compiled. Those distributions were then used as empirical estimates of the grading practices (number and relative use of separate gradations) in the two systems. Using the distributions as a guide, numerical values were assigned to convert the more differentiated Catholic school grades to the public school distribution. The system used is as follows:

Public Schools			Catholic Schools		
Assigned Value	Grade	Frequency (%)	Frequency (%)	Grade	Assigned Value
1	U	9	8	U or S	1
			10	L	2
			3	L+	2.5
3	F	36	4	G-	3
			32	G	3.5
4	G	42	15	G+	4
			22	VG	5
5.5	E	13	1	VG+	5.5
			6	E	6

Public school grades were converted by assigning to each grade twice the numerical value given above (thus E = 11, G = 8, F = 6, U = 2). The corresponding semester grades for academic subjects for Catholic school children were obtained by adding the numerical values for the two quarterly grades (thus G and G+ = 3.5 + 4 = 7.5; VG and E = 5 + 6 = 11). Since Catholic schools give check marks but not grades in conduct, conduct grades were estimated rather than transformed directly. Children with no checks were scored "11" for the semester, equivalent to a conduct grade of "E" in the public schools. Other grades were assigned according to the number of checks, the kinds of behavior checked, and the comments (if any) of the teachers. Children with 1 to 3 checks were ordinarily scored "8" (G). Others were scored "6," "4," or "2" depending on the types of problems checked. The lowest scores were given when disobedience, discourtesy, or inability to get along with classmates were mentioned as problems.

Grades of children from outside the two major school systems were estimated from the available data. Usually it was easy to assign one of the four public school grades as a general or "halo" grade. Distinctions among the academic subjects were not always possible, so that some of the estimated grades include a leveling or central tendency error of unknown magnitude.

In recording and interpreting the second-year grades, the following considerations were taken into account. First, although the majority of the children were promoted to second grade, a few were held back in first grade and a few others were assigned to what the Chicago Public School System calls "primary level--ungraded" classrooms. These classrooms represent part of a more general change introduced in the public schools which is meant to get teachers to focus more specifically on the individual child and his unique needs. One facet of this is the introduction of ipsative marking systems in which children are marked according to their progress during the grading period relative to their initial individual standing, rather than by their relative standing with respect to general grade level norms. Assignment of children to ungraded classrooms represents an extension of these ideas to the class unit. In practice, assignment to an ungraded classroom seems to be equivalent to the previous procedure of holding children back in a grade in most instances, although there is great variation from one school to another. The presence of a small number of children in these "ungraded" classrooms, plus a few other children held back in first-grade classrooms, introduced a certain amount of ambiguity in the school grade data. "Second-grade" data include all grades for the second school year, or the school year following first grade, and not just those for the second grade itself.

Second, changes in public schools' marking systems necessitated recording only a single year-grade in each subject for all children in the second year of school. The public schools maintained the same letters and attached meanings that had been used in the first year, but began to record only a single set of data for the forty-week school year. This meant that for a large number of children recording of separate data by semester would be impossible, so it was decided to record a single grade for the entire year for all children.

Finally, the Catholic schools changed their entire grading system in the second year, reverting to the letters A, B, C, D in place of their previous, more complicated system. It was found that in general the distribution of the four grades used in the Catholic schools tended to parallel the distribution of the four grades used in the public schools, despite theoretical differences. Consequently, the system previously described for use with public school grades (first-grade data) was applied to Catholic school grades for the children's second year data.

Differences among Social Status and Sex Groups

Social status differences. As Table III-1 indicates, significant differences were found on every dependent measure between the middle-class group and one or more of the working-class groups.* Some significant differences were

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*This consistent difference between group 1 and groups 2-4 suggests that for statistical reasons groups 2-4 should be examined as a sub-group of the total sample. Thus correlations for the total group and the working-class groups are

TABLE III-1

Social Status Differences in Reading Readiness Mean Scores, Reading Primer Mean Scores (End of First Grade), and Mean Grades for Two School Years

Measures	Social Status				Significant Differences in Group Means
	Middle Class	Working-class			
		Skilled	Unskilled		
			Father Present	Father Absent	
	1	2	3	4	
Metropolitan Readiness Test	80.32	67.43	63.78	63.18	1 x 2*** 1 x 3*** 1 x 4***
Lee-Clark Reading Readiness Test					
Letter Recognition	20.44	19.62	18.40	18.25	1 x 4*
Concept Knowledge	17.64	16.57	16.16	15.98	1 x 2** 1 x 3** 1 x 4***
Symbol Recognition	14.95	13.08	11.32	11.42	1 x 2* 1 x 3*** 1 x 4***
Total Score	53.03	49.27	45.89	45.65	1 x 2* 1 x 3*** 1 x 4***
Lee-Clark Reading Primer					
Auditory Stimuli	13.26	11.10	10.29	9.54	1 x 2** 1 x 3*** 1 x 4***
Visual Stimuli	8.53	5.77	5.51	4.67	1 x 2*** 1 x 3*** 1 x 4***
Following Directions	8.89	6.60	6.49	5.33	1 x 2* 1 x 3** 1 x 4***
Total Score	30.68	23.47	22.29	19.54	1 x 2*** 1 x 3*** 1 x 4***

TABLE III-1 (continued)

	1	2	3	4	
Conduct					
Semester 1	8.74	7.59	7.62	6.89	1 x 3* 1 x 4**
Semester 2	8.97	7.95	7.48	7.00	1 x 3** 1 x 4***
Year 2	9.40	7.52	8.17	6.87	1 x 2*** 3 x 4** 1 x 3** 1 x 4***
Two-year Total	36.27	30.64	31.68	27.57	1 x 2** 3 x 4* 1 x 3** 1 x 4***
Reading					
Semester 1	7.74	6.54	6.84	5.96	1 x 2* 1 x 4***
Semester 2	8.51	7.49	7.41	6.39	1 x 3* 1 x 4***
Year 2	8.86	7.47	7.40	6.82	1 x 2** 1 x 3** 1 x 4**
Two-year Total	33.97	28.79	29.10	25.75	1 x 2** 1 x 3** 1 x 4**
Arithmetic					
Semester 1	7.62	6.56	7.15	6.16	1 x 2* 1 x 4**
Semester 2	7.89	7.11	7.44	6.56	1 x 4*
Year 2	7.83	7.44	7.65	6.65	1 x 4* 3 x 4*
Two-year Total	31.01	28.38	29.84	26.01	1 x 4* 3 x 4*

TABLE III-1 (continued)

	1	2	3	4		
Writing						
Semester 1	8.47	6.64	7.25	6.40	1 x 2*** 1 x 3* 1 x 4***	
Semester 2	8.93	7.29	7.79	6.71	1 x 2*** 1 x 3* 1 x 4***	3 x 4*
Year 2	8.84	7.41	7.38	7.37	1 x 2** 1 x 3** 1 x 4***	
Speaking						
Year 2	9.24	7.74	7.68	6.90	1 x 2*** 1 x 3*** 1 x 4***	2 x 4* 3 x 4*
Spelling						
Year 2	9.21	7.69	7.72	6.45	1 x 2** 1 x 3* 1 x 4***	2 x 4* 3 x 4*
Science						
Year 2	8.69	7.80	7.68	7.00	1 x 4*	2 x 4* 3 x 4***
Art						
Year 2	9.03	7.89	7.89	7.85	1 x 2** 1 x 3*** 1 x 4**	
Music						
Year 2	8.91	8.05	7.80	7.33	1 x 2* 1 x 3** 1 x 4***	2 x 4**

* $p \leq .05$
** $p \leq .01$
*** $p \leq .001$

also found between the father-present working-class groups (both skilled and unskilled) and the father-absent, unskilled working-class group.

Differences between father-presence and father-absence. In the preschool study, father-absence as an element of family structure was found unimportant in differentiating either dependent or independent variables. Table III-1, however, suggests that there may be a cumulative effect of father-absence on children's school performance: it can be seen that more significant differences between father-absent and father-present groups appear in the second grade than in the first. Father-absence differentiates between writing grades in the first year, and between arithmetic, speaking, spelling, science, music, and conduct grades in the second year. In addition, as later chapters will show, several other variables measured in the follow-up study (especially children's scores on behavior management measures and Piagetian conservation tasks) show significant differences between father-present and father-absent groups.

Sex differences. When means and T-tests of the dependent measures were computed for boys and girls in the total sample, significant sex differences were found in reading readiness, reading achievement (as measured by the Lee-Clark Primer), conduct, and grades in reading, art, and music (Table III-2). Even when not significantly different from boys' means, girls' means were consistently higher. These results accord with other research on sex differences: girls tend to be better-behaved and to receive higher grades than boys, especially in subject areas heavily dependent on verbal skills (Maccoby, 1966).

The Teacher's Judgments on Conduct and Academic Achievement Related to Standardized Test Scores and to Each Other

The data describing the children's school performance comes from two sources: standardized tests and teacher's judgments (grades). Our first source of concern was the extent to which these two sources of evidence would agree with each other: if they were highly correlated, we could safely conclude that the child's ability is an element common to the reported levels of achievement.

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presented separately in this chapter's tables. (For similar reasons, the working-class group was treated as a sub-group of the total sample in the report of the preschool study.)

TABLE III-2

Sex Differences in Reading Readiness Mean Scores, Reading Primer Mean Scores (End of First Grade), and Mean Grades for Two School Years (Total Group)

Measures	Males	Females	Significance*
Metropolitan Readiness Test	67.70	68.77	
Lee-Clark Reading Readiness Test			
Letter Recognition	18.44	19.88	$p < .05$
Concept Knowledge	16.51	16.67	
Symbol Recognition	11.79	13.58	$p < .05$
Total Score	46.73	50.13	$p < .05$
Lee-Clark Primer			
Auditory Stimuli	10.56	11.51	
Visual Stimuli	5.53	6.66	$p < .05$
Following Directions	6.10	7.49	$p < .05$
Total Score	22.19	25.66	$p < .05$
Conduct			
Semester 1	7.28	8.08	
Semester 2	7.35	8.30	$p < .05$
Year 2	7.41	8.47	$p < .01$
Reading			
Semester 1	6.45	7.05	
Semester 2	7.00	7.88	$p < .05$
Year 2	7.14	8.10	$p < .01$
Two-year Total	27.55	31.12	$p < .01$

TABLE III-2 (continued)

	Males	Females	Significance*
Arithmetic			
Semester 1	6.60	7.10	
Semester 2	6.96	7.51	
Year 2	7.15	7.60	
Two-year Total	27.81	29.67	
Writing			
Semester 1	7.02	7.32	
Semester 2	7.49	7.84	
Year 2	7.44	8.03	
Speaking			
Year 2	7.67	8.10	
Spelling			
Year 2	7.34	8.13	
Science			
Year 2	7.56	7.86	
Art			
Year 2	7.85	8.41	$p < .05$
Music			
Year 2	7.67	8.29	$p < .05$

* if $p \leq .05$

Using the total sample, all children's reading readiness and classroom performance measures were indeed found to correlate with each other significantly ($p < .01$); the magnitude of the correlations ranged from .23 to .88 (see Table III-3). When the middle-class group was excluded from the analysis, similar results were found for the intercorrelations of dependent measures in the working-class group: 98% of the correlations were significant at the 1% level, and the magnitude ranged from .15 to .89. The strength of the correlations, however, was regularly less for the working-class group than for the total group. It was concluded that the child's ability is an element common to the reported levels of achievement.

Our second source of concern was the degree to which the two kinds of teacher's judgments (conduct grades and academic grades) would agree with each other. Provocative differences were in fact found between the level of correlations of conduct grades with standardized test scores and the level of correlations of academic grades with standardized test scores. Sex differences and changes related to the passage of time also seemed to influence intercorrelations among dependent measures. (See Tables III-4 and III-5). The available data does not permit complete explanation of the sources of differences between conduct and academic grades; our discussion, however, will suggest the following tentative interpretations:

1) Teachers tend to be more "fair" in grading boys' academic achievement than in grading girls' academic achievement. This is particularly true in subject-matter areas depending heavily for their evaluation on oral skills and cooperative classroom interactions (conduct).

2) The proportion of academic grades dependent on the child's conduct appears to decrease in the first two years of school.

3) Accommodation of the child to the system and the teacher to the child has a greater effect on conduct grades than on academic grades.

The relationships of the two types of teacher's judgments (conduct and academic grades) to standardized tests are reported in Table III-4. Before discussing the table, it should be stated that both the Lee-Clark and Metropolitan Reading Readiness Tests correlate strongly and significantly with each other and with the Lee-Clark Reading Primer ($r \geq .58$; $p < .01$). The correlations for boys, girls, total group, and working-class group are approximately the same. Second, the high correlation of reading readiness with reading achievement (Lee-Clark Primer) means that for the research group the readiness tests were reasonably good predictors of reading achievement. In Table III-4 it can be seen that the readiness tests are also fairly useful predictors of the teacher's judgment of the child's performance; in addition, the reading achievement test given at the end of the first grade tends to confirm the first-grade teacher's judgments and to predict with considerable accuracy the child's second-year grades. Inspection of the table reveals that although all conduct grades (with one exception: boys, grade 2) are significantly correlated with the standardized reading readiness and achievement tests, the strength of the correlations declines with time. This trend is clear and consistent for girls, less so for boys. On the other hand, the correlations of reading and arithmetic grades with standardized tests show no regular decline for boys or girls. A likely reason for finding a decline in correlations of conduct grades with standardized tests but not in correlations of arithmetic and reading grades with standardized tests is that, as time goes on, teachers increasingly differentiate between conduct and academic achievement when assigning grades (see additional discussion based on Table III-5, p.36).

The teacher's "fairness."* "Fairness" in assigning grades implies that judgments are both impartial and subject-specific. If the teacher is impartial, he treats all children the same, ignoring both his sympathies and antipathies. If his judgments are subject-specific, they are uninfluenced by any behaviors not defined as directly related to mastery of the subject-matter. In Table III-4, generally higher correlations between grades (reading and arithmetic) and objective tests (reading readiness and achievement) are reported for boys than for girls. This suggests that teachers' judgments of boys' subject-area work are related more closely to standardized measures than are their judgments of girls' work. If standardized tests are taken as impartial, subject-specific measures, then it appears that the teacher is more "fair" in rating boys than girls. He seems less likely to generalize from one area (e.g., his sex preferences, the child's conduct) to another (subject-matter) in assigning grades. That this may be true is supported by the correlations of the remaining academic grades (writing *et al.*) with reading achievement (Lee-Clark Primer) scores.

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*In discussing the teacher's "fairness," it is assumed that sex differences in the level of correlation coefficients result primarily from sex differences in the teacher's judgments of performance and not from differences in boys' and girls' actual performance. The data gathered in the present study do not permit differentiation between the teacher's judgment of performance and the child's "actual" performance; however, assuming the teacher's judgment to be the chief source of sex differences permits us to present for possible future study an hypothesis about teacher's "fairness."

TABLE

INTERCORRELATIONS OF

	1	2	3	4	5	6	7	8	9	10
1 Metropolitan Readiness Test	--	.75 .75 .77	.68 .69 .68	.45 .47 .43	.50 .53 .47	.50 .52 .46	.55 .60 .49	.51 .53 .49	.52 .57 .42	.47 .50 .44
2 Lee-Clark Reading Readiness Total		--	.65 .60 .67	.52 .53 .49	.50 .51 .47	.53 .49 .53	.59 .59 .54	.51 .56 .43	.46 .52 .38	.52 .58 .43
3 Lee-Clark Reading Primer			--	.65 .77 .52	.68 .71 .64	.65 .73 .53	.75 .85 .61	.60 .72 .46	.59 .71 .47	.51 .59 .42
4 Reading - Semester 1				—	.78 .76 .80	.63 .59 .66	.86 .85 .87	.73 .76 .69	.64 .62 .64	.54 .57 .51
5 Reading - Semster 2					—	.62 .55 .55	.86 .83 .89	.61 .60 .64	.73 .73 .72	.47 .47 .46
6 Reading - Year 2						—	.91 .90 .92	.54 .56 .48	.58 .55 .57	.64 .55 .57
7 Reading - Two-year Total							—	.68 .72 .62	.72 .71 .72	.65 .71 .58
8 Arithmetic — Semester 1								—	.74 .72 .62	.50 .54 .44
9 Arithmetic — Semester 2									—	.58 .53 .57
10 Arithmetic — Year 2										—
11 Arithmetic — Two-year Total										
12 Writing - Semester 1										
13 Writing - Semester 2										
14 Writing - Year 2										
15 Speaking - Year 2										
16 Spelling - Year 2										
17 Science - Year 2										
18 Art - Year 2										
19 Music - Year 2										
20 Conduct — Semester 1										
21 Conduct — Semester 2										
22 Conduct — Year 2										

* The first (top) coefficient in each group is for the total sample; the two coefficients below are for

For the total group, $p \leq .05$ if $r \geq \pm .17$; $p \leq .01$ if $r \geq \pm .23$. For both boys and girls, $p \leq .05$ if

III-3

SCHOOL PERFORMANCE MEASURES*

11	12	13	14	15	16	17	18	19	20	21	22
.57 .62 .51	.48 .37 .58	.47 .42 .51	.43 .35 .52	.41 .33 .49	.58 .63 .52	.31 .44 .30	.29 .34 .33	.33 .51 .43	.45 .41 .49	.40 .39 .42	.37 .25 .39
.56 .63 .47	.45 .30 .56	.45 .37 .51	.41 .30 .49	.40 .29 .47	.52 .55 .48	.43 .43 .42	.28 .28 .25	.32 .25 .35	.39 .29 .47	.37 .35 .35	.23 .15 .24
.66 .81 .49	.58 .63 .52	.51 .57 .45	.44 .50 .35	.58 .65 .51	.69 .78 .59	.50 .62 .38	.31 .45 .14	.44 .57 .25	.54 .56 .51	.54 .58 .47	.40 .42 .32
.72 .74 .68	.64 .65 .62	.52 .47 .56	.41 .37 .42	.55 .54 .55	.64 .66 .59	.44 .55 .33	.42 .39 .42	.45 .47 .38	.63 .67 .56	.54 .58 .49	.39 .30 .46
.68 .68 .67	.59 .60 .58	.61 .57 .64	.42 .37 .43	.52 .47 .55	.67 .65 .67	.46 .53 .40	.41 .44 .34	.49 .51 .42	.56 .58 .52	.58 .61 .51	.38 .29 .43
.71 .74 .67	.53 .52 .54	.49 .42 .57	.65 .60 .65	.68 .71 .65	.76 .76 .74	.67 .71 .65	.56 .63 .44	.55 .62 .41	.44 .38 .46	.41 .32 .46	.37 .30 .38
.79 .83 75	.64 .66 .63	.60 .54 .65	.59 .55 .67	.68 .67 .77	.80 .81 .77	.63 .71 .56	.54 .59 .46	.57 .62 .45	.59 .59 .56	.55 .53 .53	.43 .35 .46
.80 .85 .74	.60 .60 .59	.54 .52 .57	.39 .34 .42	.47 .39 .54	.58 .58 .56	.46 .52 .41	.35 .33 .35	.44 .46 .40	.49 .56 .52	.49 .52 .46	.37 .35 .35
.85 .85 .84	.52 .58 .46	.57 .59 .56	.43 .39 .47	.47 .42 .47	.61 .61 .61	.41 .43 .39	.35 .35 .34	.44 .51 .34	.48 .45 .50	.50 .53 .45	.37 .29 .43
.88 .87 .89	.43 .41 .44	.45 .40 .49	.58 .57 .58	.56 .55 .56	.67 .72 .62	.43 .54 .33	.28 .41 .14	.37 .42 .28	.42 .39 .44	.33 .29 .34	.28 .27 .26
—	.58 .60 .56	.60 .57 .62	.57 .52 .61	.61 .56 .64	.74 .76 .71	.51 .57 .44	.37 .42 .29	.47 .52 .39	.55 .54 .55	.48 .49 .45	.38 .37 .37
	—	.78 .77 .78	.54 .54 .54	.48 .51 .45	.63 .65 .61	.46 .50 .42	.47 .45 .49	.49 .51 .46	.52 .55 .48	.49 .54 .42	.35 .36 .31
		—	.59 .61 .58	.52 .51 .52	.62 .60 .63	.45 .45 .44	.42 .41 .43	.46 .46 .47	.44 .37 .51	.46 .45 .47	.33 .25 .39
			—	.61 .63 .58	.68 .68 .64	.49 .52 .45	.52 .55 .47	.53 .55 .48	.36 .31 .38	.35 .35 .32	.55 .33 .35
				—	.68 .68 .67	.68 .73 .56	.64 .74 .51	.61 .74 .63	.43 .35 .50	.42 .31 .51	.34 .28 .37
					—	.63 .64 .62	.51 .52 .48	.59 .66 .47	.50 .50 .47	.54 .55 .49	.48 .52 .38
						—	.59 .67 .50	.61 .70 .51	.50 .45 .32	.54 .42 .30	.48 .41 .28
							—	.73 .67 .78	.29 .41 .32	.28 .22 .31	.31 .22 .33
								—	.35 .46 .30	.39 .34 .28	.34 .32 .28
									—	.83 .77 .91	.55 .44 .68
										—	.53 .39 .65
											—

boys (middle) and girls (bottom).

r ≤ ± .23; p ≤ .01 if r ≥ ± .30.

Correlations are consistently higher for boys, and thus suggest sex-influenced differences in the fairness of the teacher's judgments. However, the correlations of reading readiness scores with the remaining grades (writing et al.) do not show such a clear picture: writing and speaking show higher relationships for girls; science and spelling are higher for boys; sex differences in levels of correlation of reading readiness with music are inconsistent and with art are insignificant.

The data reported in Table III-5 can be interpreted as further supporting the notion of sex-related influences on the teacher's "fairness." In the correlations of conduct, grade 2, with second-grade measures in areas depending heavily for their evaluation on oral skills and cooperative classroom interactions (reading, writing, and speaking), girls' correlations are found to be somewhat higher than boys'. On the other hand, in those areas in which grades are likely to be more objective (spelling, science, and arithmetic), the boys' correlations are the same as or higher than the girls'. These differences suggest that girls' greater verbal skills are seen by the teacher as better behavior, or that the teacher's judgment that girls behave better (perhaps a "halo" effect, especially if the teacher is a woman) influences his judgment of performance in reading, writing, and speaking. In spelling, arithmetic, and science--subjects in which answers tend to be unambiguously right or wrong, and grades thus less susceptible to subjective influences on the teacher--the girls' conduct is found to correlate less strongly with grades.

Changes in the proportion of academic grades dependent upon conduct.* Table III-5 indicates that correlations of arithmetic and reading grades with conduct grades are significant and show a fairly consistent decline from the end of the first semester to the end of second grade. This decline is found both when comparing correlations within the first grade measures to correlations within the second grade measures and when comparing correlations of first grade to second grade measures.

The decline in magnitude of correlations between conduct grades and academic grades (and, also, standardized tests--see Table III-4) perhaps reflects a change in the proportion of academic grades based on conduct. If this is so, we suggest it happens for the following reasons: when the child completes his first semester, the teacher has relatively little demonstrated academic achievement to use

*In this discussion it is again assumed that the child's behavior is constant.

TABLE III-4

Relationship of Teacher's Judgments (grades) to Standard Reading Readiness and Achievement Scores by Sex

Teachers' Judgments (grades)	Preschool Reading Readiness Tests				In-School Reading Achievement Test:	
	Lee-Clark		Metropolitan		Lee-Clark Primer	
	Boys	Girls	Boys	Girls	Boys	Girls
Conduct						
Semester 1	.29*	.47**	.41**	.49**	.56**	.51**
Semester 2	.35**	.35**	.39**	.42**	.58**	.47**
Year 2	.15	.24*	.43**	.31*	.42**	.32**
Reading						
Semester 1	.53**	.49**	.47**	.43**	.77**	.52**
Semester 2	.49**	.47**	.53**	.47**	.71**	.64**
Year 2	.49**	.53**	.52**	.46**	.73**	.53**
Two-year Total	.59**	.54**	.60**	.49**	.85**	.61**
Arithmetic						
Semester 1	.56**	.43**	.53**	.49**	.72**	.46**
Semester 2	.51**	.38**	.57**	.42**	.71**	.47**
Year 2	.58**	.43**	.50**	.44**	.59**	.42**
Two-year Total	.63**	.47**	.62**	.51**	.81**	.49**
Writing						
Semester 1	.30**	.56**	.37**	.58**	.63**	.52**
Semester 2	.37**	.51**	.42**	.51**	.57**	.45**
Year 2	.30**	.49**	.35**	.52**	.50**	.35**
Speaking						
Year 2	.29**	.47**	.33**	.49**	.65**	.51**
Spelling						
Year 2	.55**	.48**	.63**	.52**	.78**	.59**
Science						
Year 2	.43**	.42**	.44**	.30*	.62**	.38**
Music						
Year 2	.25*	.35**	.51**	.43**	.57**	.25*
Art						
Year 2	.28**	.25*	.34**	.33**	.45**	.14

*p $\leq$ .05; ** p $\leq$ .01

TABLE III-5

Relationship of Subject Area Grades to Conduct Grades and Reading Achievement Test Scores, by Sex*

Subject Area Grade	Conduct Grades						Lee-Clark Reading Test: Primer	
	Semester 1		Semester 2		Year 2			
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Reading								
Semester 1	.67	.56	.58	.49	.30	.46	.77	.52
Semester 2	.58	.52	.61	.51	.29**	.43	.71	.64
Year 2	.38	.46	.32	.46	.30	.38	.73	.53
Two-year Total	.59	.56	.53	.53	.35	.46	.85	.61
Arithmetic								
Semester 1	.56	.52	.52	.46	.35	.35	.72	.46
Semester 2	.45	.50	.53	.45	.29**	.43	.71	.47
Year 2	.39	.44	.29	.34	.27	.26	.59	.42
Two-year Total	.54	.55.	.49	.45	.37	.37	.81	.49
Writing								
Semester 1	.55	.48	.54	.42	.36	.31	.63	.52
Semester 2	.37	.51	.45	.47	.25	.39	.57	.45
Year 2	.31	.38	.35	.32	.33	.35	.50	.35
Speaking								
Year 2	.35	.50	.31	.51	.28	.37	.65	.51
Spelling								
Year 2	.50	.47	.55	.49	.52	.38	.78	.59
Science								
Year 2	.45	.32**	.42	.30**	.41	.28**	.62	.38
Music								
Year 2	.46	.30	.34	.28**	.32	.28**	.57	.25
Art								
Year 2	.41	.32	.22	.31	.22	.33	.45	.14

* For boys: $p \leq .05$ if $\underline{r} \lessgtr \pm .22$; $p \leq .01$ if $\underline{r} \lessgtr \pm .28$
For girls: $p \leq .05$ if $\underline{r} \lessgtr \pm .22$; $p \leq .01$ if $\underline{r} \lessgtr \pm .28$

** $p \leq .05$ (exceptions to the values for p given above) in judging the child's learning; he is likely, however, to know the child's reading readiness score, and he has observed for several weeks the child's conduct in the classroom. Expecting more from the child with high reading readiness and cooperative behavior (and less from the child with low reading readiness and poor behavior), the teacher may tend to see him as more (or less) successful in learning. Thus fairly high correlations would be found among reading readiness scores, conduct, and academic grades. And a fairly high proportion of the academic grades could be assumed to be based on the child's conduct. Because the teacher has little in the way of past academic records or present academic achievement to consider, his judgment tends to be based on estimates of general ability and likeliness to succeed rather than on subject-matter mastery; he is likely to interpret good conduct as indicative of the qualities that will eventually make the child a successful student, and poor conduct as indicating a poor student.

It is suggested that these reasons for expecting conduct to heavily influence grades would become less and less important as time went on. As differences in the children's learning became more obvious, the teacher would in turn become more able to differentiate between conduct and academic behavior. More measures could be taken of the child's actual subject-matter mastery and grades would thus become more subject-specific. As this happened, the magnitude of correlation between academic grades and conduct grades could be expected to decline.

The effects of accommodation. The data reported in Tables III-4 and III-5 can also be interpreted as reflecting the effects of the child's accommodation to the system and the teacher's accommodation to the child. The declining correlations of conduct with academic grades and standardized tests were interpreted above as resulting from the teachers' growing ability to measure subject-matter mastery; the decline may also, however, arise from changes in the teacher's judgment of conduct. A number of factors could influence the teacher's evaluation of conduct and might not simultaneously influence his judgment of academic growth: he could, for example, revise his picture of the child in light of information about home problems, becoming more accepting and less likely to see disruptive behavior as threatening his authority. Or, at the other extreme, he could become less flexible and less accepting, feeling that after a period of orientation, the child should not only know the rules but also abide by them. Thus conduct grades could begin to vary in a way unrelated to academic grades.

From Table III-5 it is apparent that reading achievement (Lee-Clark Primer) has a stronger relationship with academic grades than with conduct grades. This can be interpreted as supporting the notion that although the child's ability to conform to adults' standards of behavior may be related to his attainment of academic goals, it is also in part independent of them. The best-behaved child does not necessarily learn the most. But, if teacher's judgments are now assumed constant and possible changes in the children's performance are considered, the decline in magnitude of correlations between academic grades and conduct grades suggests further that the child accommodates himself to the system. The initially well-behaved--perhaps cautious--child may learn how to break rules while continuing to earn good academic grades. The poorly-behaved child whose conduct originally interferes with his academic success may learn to redirect his behavior: for example, he may learn to become more attentive to instructions and explanations, or he may learn to adopt the system's values as his values and thus choose to cooperate. These changes might or might not cause the child to earn better academic grades, but they would certainly gain him higher marks in conduct. If there is indeed a tendency for the "good" first-grader to become more mischievous and for the "bad" first-grader to become more obedient, without affecting academic grades in either case, then conduct grades would become progressively less related to academic grades.

The Relationship between Preschool Environment, Preschool Maternal Behavior, and Subsequent School Achievement

In the preschool study, a number of specific maternal behaviors mediating between children's environments and their development of cognitive ability and educability were identified. In the present follow-up study data have been obtained on the child's readiness for school and his performance in school. It now becomes possible, therefore, to examine the extent to which preschool maternal behaviors associated with the preschool child's cognitive performance appear to influence the child in school.

Several aspects of the preschool child's cognitive environment are considered relevant: (1) circumstances of the home and community environment, (2) mother's orientation toward the non-family world, (3) mother's strategies for controlling the child, (4) mother's teaching techniques in an experimental situation, (5) maternal language, and (6) mother's affective interaction with the child. These may be described briefly as follows:

1. Measures of home and community environment. The variables chosen to reflect aspects of family and community circumstances are (1) an index of crowding indicated by the ratio of rooms to people in the home; (2) home resources factor score, a measure combining a number of variables reflecting the mother's use of resources in the home (such as reading to the child, use of toys and other equipment to stimulate play, etc.), and of space both within the house and in the neighborhood to maximize the child's cognitive growth.

As will be seen in Tables III-6 to III-11, variables which reflect the circumstances of the home and the mother's use of the resources of home and community are related to the child's readiness to begin school and to his later performance in school. A number of other variables not reported here do not correlate with the child's readiness or his later school achievement. Examples of these variables are whether or not the child engages in play unsupervised by the mother, the type of playmates available to him, and where in the house, yard, or neighborhood the child plays. Some other variables, such as the amount of time the mother reads to the child and the number of persons in the home, do correlate with either readiness or school achievement in a pattern of correlation that emphasizes the behavior of the mother and the degree of crowding in the home.

2. Maternal orientation toward the non-family world. Part of the cognitive environment provided for the child follows from the mother's view of herself and her relations to the institutions and opportunities of her community. These attitudes are expressed in part through her participation in the organizations of the community and in her own feelings of effectiveness and ability to achieve her goals. These attitudes are accompanied by a willingness to confront the environment rather than to surrender and accept circumstances passively. Such feelings also indicate faith that consequences follow action in some orderly way and trust that there is some point in setting goals and working toward them.

In this chapter, the mother's participation in non-family organizations (excluding social visiting), her attitudes toward the non-family world, and her ability to deal with it are indicated in three measures: total number of memberships in community organizations, feelings of effectiveness in dealing with the school and other community institutions, and optimistic feelings that there are opportunities "to improve your life."

3. Strategies of maternal control. Mothers exert control by various combinations of requesting, suggesting, arguing, commanding, pleading, scolding, and punishing. These techniques can be grouped into three general types of control:

a) Appeals to norms, status, and generally accepted rules and regulations (Imperative or Status-Normative). Essential to these strategies is the acceptance of the status quo as appropriate and unquestionable. Although sometimes useful and necessary to inform the child about authority structures and rules and to procure unquestioning obedience in times of crisis, these strategies ask for no thought or reflection by the child and may lead to a passive learning style when used exclusively first by the family and later by the teacher.

b) Appeals to subjective, internal states of the child, the mother, or other persons with whom he interacts (Personal-Subjective). Statements such as "How would you feel if you were the teacher and the kids didn't mind?" call the child's attention to effects of his behavior. This strategy demands of the child a more complex cognitive process and role-playing, and induces a less passive learning style, requiring attention to peers and authority figures and ability to see a situation from several perspectives.

c) Appeals based on arguments relating to the task and to future consequences of behavior (Cognitive-Rational). This strategy, based on a rationale of cause and effect, is much more complex than the previous two since it asks the child to project himself into other times or places and to reflect on long-range effects of his behavior. The child is asked to internalize cognitive control, providing himself with the general guidelines to apply to new situations.

The measures of maternal control strategies reported in this chapter are based on mothers' responses to questions about what they would say before sending their children off to the first day of school, and what they would do if their children misbehaved. The mothers' responses were grouped into categories described as imperative statements: a tendency to impose norms of the system without giving rationales or to impose their own wishes in a like manner; status-normative statements: a readiness to support the rules and norms of the institutions of the community; and personal-subjective statements: an attempt to consider the individual qualities and inner states of the child, and to see the child's behavior from his own perspective.

4. Maternal teaching styles. In the preschool study, measures of maternal teaching behaviors were gathered from three experimental tasks. In the first two tasks, toys were sorted by color or function and blocks were sorted by height and printed symbol. The third task involved the Etch-a-Sketch, a toy with a screen on which lines can be drawn by manipulating two knobs. The mother was asked to cooperate with the child in copying geometric designs.

A number of measures of the mother's teaching behavior were found to correlate significantly with both the preschool child's performance and his later readiness for school and achievement in school. Only a few measures, selected because they were found most effective in differentiating effective from ineffective teaching, are reported in this chapter: from the Etch-a-Sketch task, the mother's tendency to provide explicit directions and her tendency to show the child the model to be copied; from the block sorting task, the mother's tendency to orient the child to the task, to engage and praise him, to give specific feedback, and to request a physical response from the child (i.e., to request block placement).

5. Maternal language. A number of specific language scales were used in analyzing maternal language samples and were later combined to form a single language factor score. In a general way, this score indicates the complexity of the mother's language and her facility in the use of standard English. It does not indicate her competence in the use of non-standard dialects. However, since school readiness and achievement measures are based upon the use of standard English, it would be expected that the mother's language usage in this regard would influence the child's acquisition of school-related skills.

6. Affective behavior of the mother. Although the focus of the preschool study was upon the cognitive features of maternal behavior, scales evaluating mother's warmth were included in order to compare the relative effects of cognitive as contrasted with affective dimensions. In this chapter, we report three measures of maternal warmth, one based on the rating of an interviewer who saw the mother in the home in interaction with the children, and two, one of them a factor score, based on her behavior in the teaching situations.

The Child's Readiness to Begin School Related to Preschool Home Environment and Preschool Maternal Behavior

Because the reading readiness tests measure abilities predictive of success in school, they offer an empirical tie between the maternal measures at the preschool level and later school performance of the child. In this study, it was found that for the total group both the Lee-Clark and Metropolitan Readiness Tests correlated significantly with maternal and environmental variables (see Table III-6). In most cases, however, the correlations for the Metropolitan Readiness Test were considerably higher than those for the Lee-Clark Reading Readiness Test. A number of factors probably contribute to this difference. The Metropolitan shows more SES differences than the Lee-Clark; it also

TABLE III-6

The Relationship of Reading Readiness to Home Environment and Maternal Behavior[a]
(Total Group; Working-Class [groups 2-4 combined])

Maternal Preschool Variables	Lee-Clark Reading Readiness Test Total Score		Metropolitan Readiness Test	
	Total Group	Working-class Group	Total Group	Working-class Group
Rooms per Person	.24**	.03	.35**	.14
Availability and Use of Home Resources	.35**	.27**	.61**	.53**
Mother's Out-of-Home Activities	.34**	.30**	.45**	.31**
"Powerlessness"	-.27**	-.21*	-.36**	-.27**
Personal Optimism	.28**	.20*	.33**	.17
First Day: % Imperative	-.22**	-.18	-.43**	-.38**
Mastery: % Status-Normative	-.20**	-.12	-.33**	-.17
Mastery: % Personal-Subjective	.22**	.15	.35**	.23*
Number of Models Mother Shows Child (Etch-a-Sketch)	.27**	.14	.39**	.20
Number of Specific Turning Directions (Etch-a-Sketch)	.27**	.14	.50**	.39**
Maternal Orientation in Block Sorting Task	.28**	.25**	.36**	.28**
Praise and Engagement in Block Sorting Task	.26**	.28**	.43**	.45**
Specificity of Maternal Feedback in Block Sorting Task	.18*	.16	.41**	.35**
Maternal Requests for Block Placement	-.39**	-.31**	-.44**	-.36**
Language Factor Score	.24**	.15	.37**	.22*
Maternal Support toward Child (Interviewer's Rating)	.29**	.23*	.50**	.50**
Maternal Warmth in Block Sorting Task	.18*	.15	.20**	.20
Maternal Affectionateness in Teaching Tasks	.29**	.26**	.28**	.30**

* $p \leq .05$; ** $p \leq .01$

[a] In all tables in the follow-up study, signs of correlation coefficients denote the direction of relationship between variables as labeled, not necessarily between actual scales.

samples a broader range of the child's abilities, including more items based on abstraction, ordering, structuring, and differentiation. The Lee-Clark leans heavily on measures of perception. In addition, the reading readiness tests were administered at different times and under different conditions, the Metropolitan in a school setting under the direction of school personnel and the Lee-Clark in an experimental setting under the direction of the research staff.

Table III-6 further reports the correlation of readiness tests with preschool maternal variables for the three working-class groups. Coefficients for the Metropolitan Readiness Test are again higher than for the Lee-Clark Reading Readiness Test. Moreover, only two-thirds of the correlations of the Lee-Clark with the maternal variables are significant for the working-class group.

Measures of home and community environment. In the total group, the degree of crowding in the home was significantly related to the child's readiness for school; in the working-class groups it was not. Crowding therefore seems to be an important predictor of readiness only across social class, not within the working-class. The mother's use of the resources of the home is much more strongly related to the child's reading readiness than is the degree of crowding; although significant in all cases, the correlations for home resources are higher for the total group than for the working-class.

Maternal orientation toward the non-family world. The total number of organized (as contrasted with informal, social) community activities in which the mother participates, her feelings of effectiveness (or powerlessness) in relation to the administrative structure of the public schools, and the degree of her optimism about opportunities for improving her life, were all significantly correlated with reading readiness. The correlation between the mother's feelings of optimism and effectiveness and reading readiness parallels the association of these measures with child performance measures at age four. It seems possible that the mother's belief in a world offering alternatives for action and possibilities of success is transmitted to the child in ways that increase his alertness and attentiveness to the environment and his willingness to deal with it. The correlation between the mother's activities in the community and the child's readiness for school suggests that the mother's willingness to confront and to engage in exchange with organizations of her neighborhood provides the child with incentives, information, or learning opportunities in ways that are not revealed by these data. Such opportunities are not available for children whose mothers tend to be isolated from the communities in which they live and who do not make use of the resources available to them. Thus the initiative of the mother and her tendency to interact with the environment appear to be important variables in the development of educability in the young child. (A similar conclusion was suggested by Minuchin and his associates, 1967.)

The three maternal measures (out-of-home activities, "powerlessness," and personal optimism) show considerable social class differences, with middle-class mothers reporting more participation in community organizations, and more feelings of effectiveness and optimism.

Strategies of maternal control. As predicted, the mothers of children who do well on reading readiness tests tend to use personal-subjective control strategies; lower scores in reading readiness are associated with maternal use of imperative and status-normative control strategies. The rationale for expecting these strategies of maternal control to affect the child's cognitive development is given in the preceding pages and elaborated in more detail in other papers (Hess & Shipman, 1967). In brief, it has been found that maternal control strategies were similarly related to the child's performance at age four. The magnitude of these correlations varies from one measure to another but the directions are consistent. These results are consistent, also, with the finding that children of age four whose mothers tended to use imperative control strategies were likely to use nonverbal responses on the Block Sorting task.

Although the Lee-Clark test is not associated significantly with maternal control strategies in the working-class groups, the direction of the correlations is consistent with the other data.

Maternal teaching styles. Children who do well on reading readiness tests are likely to have mothers whose teaching is specific, informative, and engaging. Mothers of children who do poorly on reading readiness tests are less specific in giving directions and feedback, fail to orient the child to his task, less likely to elicit attention and to give praise --but more likely to demand physical actions (as in requesting block placement) without explaining precisely how or why. Similar patterns of correlation to mother's teaching styles were found in the performances of the children when four years old. Problems arising from a lack of meaning in mother-child interactions were clearly exemplified during the Etch-a-Sketch task. A mother might demand that her child turn the knob but fail to explain why or relate his action to what appeared on the screen. She might not show him the model or give specific turning directions. Such techniques hinder the child's learning from one response to the next, yet his responses are rewarded or punished--without his knowing why. The parallel between this situation and the experimental designs used by Maier (1949) to deliberately produce frustration in subhuman organisms is strikingly close. In spite of a mother's good intentions, if she fails to inject sufficient cognitive meaning into her interaction with her child, he may fail to learn and may also develop a negative response toward adult-oriented learning.

Such failures to communicate may be a primary factor in the mother-child interaction patterns of disadvantaged children and have far-reaching and cumulative effects on their cognitive development (cf. Minuchin et al., 1967). A mother's teaching styles reflect her response to her own circumstances and, if ineffective, may induce in her child maladaptive learning styles and orientation to school.

Maternal language. The development of reading skills is presumably closely related to the development of language, and one would expect a positive relationship between the mother's language facility and her child's reading readiness. As Table III-6 shows, the data indicate that this is indeed so. The correlations obtained between the measure of maternal linguistic ability and the children's performance are, however, of roughly the same magnitude and effective direction as the correlations with other maternal variables. This comparison of the language factor with other predictive measures suggests that maternal language should not be overestimated in its effect on the verbal capabilities of the young child; it should rather be viewed as one of a cluster of significant behaviors and circumstances affecting the child's positive development.

Affective behavior of the mother. The mother's affective behavior ranks along with other maternal variables in magnitude of correlation with the children's scores. The Metropolitan Readiness Test correlates much more strongly with the interviewer's ratings than with the ratings of maternal warmth in the teaching sessions. This raises the possibility that the interviewers' ratings of support were based on a range of behavior including some of the items categorized here as cognitive aspects of the mother's interaction with the child. Because the Lee-Clark Readiness Test does not show the same differences, however, this interpretation is tentative.

Table III-7 reports sex differences in the relationship of preschool maternal variables to reading readiness. Inspection of the table reveals that the Metropolitan Readiness Test has generally higher correlations with maternal variables for both boys and girls than does the Lee-Clark Reading Readiness Test; at first glance it also appears that correlations for girls are higher than those for boys on both tests.

TABLE III-7
The Relationship of Reading Readiness to
Home Environment and Maternal Behavior, by Sex*

Maternal Preschool Variables	Lee-Clark Reading Readiness Test Total Score		Metropolitan Readiness Test	
	Boys	Girls	Boys	Girls
Rooms per Person	.19	.29	.31	.40
Availability and Use of Home Resources	.16	.55	.51	.72
Mother's Out-of-Home Activites	.19	.50	.43	.46
"Powerlessness"	-.13	-.43	-.27	-.45
Personal Optimism	.14	.45	.26	.44
First Day: % Imperative	-.17	-.28	-.49	-.37
Mastery: % Status-Normative	-.12	-.31	-.27	-.40
Mastery: % Personal-Subjective	.18	.29	.32	.38
Number of Models Mother Shows Child (Etch-a-Sketch)	.13	.39	.35	.44
Number of Specific Turning Directions (Etch-a-Sketch)	.28	.22	.48	.52
Maternal Orientation in Block Sorting Task	.22	.37	.33	.38
Praise and Engagement in Block Sorting Task	.20	.36	.43	.44
Specificity of Maternal Feedback in Block Sorting Task	.14	.26	.38	.46
Maternal Requests for Block Placement	-.36	-.41	-.44	-.46
Language Factor Score	.08	.41	.25	.50
Maternal Support toward Child (Interviewer's Rating)	.18	.39	.43	.58
Maternal Warmth in Block Sorting Task	.21	.14	.24	.15
Maternal Affectionateness in Teaching Tasks	.32	.20	.35	.19

*$p \leq .05$ if $\underline{r} \geq \pm .22$
$p \leq .01$ if $\underline{r} \geq \pm .28$

The data in Table III-7 support the notion that cognitive environment (as defined by measures from the six areas discussed previously) has a greater impact on girls' readiness for school than on boys' readiness for school. Looking at the correlations for both readiness tests, it can be seen that girls' scores are somewhat more closely related to crowding in the home and considerably more related to the use of home resources. Girls, apparently, are more influenced by the mother's feelings of effectiveness and optimism, her use of status-normative control strategies, the complexity and facility of her language (standard English), and her affective support (as rated by the interviewer). The girls' reading readiness is associated rather more strongly than is boys' with maternal teaching styles and with use of a personal-subjective control strategy. Curiously enough, girls' readiness is less influenced by the mother's affective behavior in the teaching tasks.

When sex differences in correlations with maternal variables are compared for the two readiness tests, it is found that the direction of correlation is reversed for two measures: the Lee-Clark shows a stronger association for boys between number of specific turning directions (Etch-a-Sketch), whereas the Metropolitan produced a greater correlation for girls on the same measure; the Lee-Clark shows girls as more responsive to imperative control strategies, the Metropolitan reveals a stronger association for boys. The magnitude of sex differences in correlation coefficients also varies between the two tests, with the Lee-Clark usually showing the greater--in some cases very much greater--differences. Furthermore, nearly three-fourths of the boys' correlations for the Lee-Clark are not significant, whereas all boys' correlations are significant for the Metropolitan. Does this perhaps reflect a difference in testing conditions, suggesting that boys may be more susceptible to changes in conditions? Or perhaps the contrast comes from differences between the two readiness tests. The Metropolitan tests a wider range of cognitive behaviors than does the Lee-Clark. If it is true that the Lee-Clark is more limited to perceptual measures, it can perhaps be inferred that boys are less influenced by their mothers' perceptual views than are girls, possibly because there is greater contact between mother and daughter, or because mother and daughter share similar roles and innate tendencies.

The Teacher's Judgment and the Child's Academic Performance

The influence of maternal behavior on the child's readiness for school (as measured by standardized reading readiness tests) has been seen to be significant; Table III-8 indicates that parallel patterns of significant associations are found with the child's academic achievement. In this table the child's school performance is represented by a standardized measure of reading achievement given at the end of the first grade (Lee-Clark Reading Test, Primer) and by two measures based on teachers' judgments: two-year accumulated (mean) grades in arithmetic and reading. Correlations of maternal variables with the two-year accumulated reading and arithmetic grades and with other academic grades were very much the same; thus only those for arithmetic and reading are reported here. The direction of correlations with maternal variables remained consistent for all academic grades; the magnitudes varied, but in no meaningful pattern except that maternal teaching styles were rather more strongly connected with arithmetic and reading than with other grades. There was some tendency for correlations of arithmetic and reading grades with maternal variables to increase slightly from the end of the first semester to the end of second grade.

For the total group, all correlations of the Lee-Clark Primer scores with preschool maternal variables are significant and in the same direction as those of the reading readiness tests (cf. Table III-6); the magnitude of the correlations for the reading achievement test tends to fall between that of the correlations for each of the two readiness tests. Nothing can be concluded therefore, about changes over time in the association of maternal variables with the standard measures used; it can be noted, however, that the effects of the child's preschool cognitive environment do seem to persist into school.

When correlations of maternal variables with grades for the total group are examined, very little difference is found between reading and arithmetic, although reading seems to be more highly correlated with maternal variables than is arithmetic. The biggest differences between reading and arithmetic are found in the correlations with use of home resources, feelings of effectiveness, the language factor, and interviewer's ratings of maternal support. Both arithmetic and reading grades tend to correlate less strongly than do reading achievement scores with preschool maternal behavior, suggesting perhaps that the teacher's judgments of academic achievement are influenced by factors not assessed in the standardized reading test. For example, his cognitive style, personality, and reactions to the children may influence either his judgment or the child's performance, or both.

On the whole, correlation coefficients for all variables are less for the working-class groups than for the total group, and about one-third are found not significant: degree of crowding in the home, maternal warmth in the block sorting task, mother's optimism, powerlessness (in relation to arithmetic grades), number of turning directions and orientation

TABLE III-8

Selected Measures of the Child's Academic Performance
Related to Preschool Maternal Behavior and Environment*
(Total Group; Working-Class Groups)

Maternal Preschool Variables	Grades Given by Teacher				In-School Reading Achievement Test	
	Two-year Total					
	Reading		Arithmetic		(L-C Primer)	
	Total Group	W-C Group	Total Group	W-C Group	Total Group	W-C Group
Rooms per Person	.24	-.03	.17	-.06	.32	.07
Availability and Use of Home Resources	.42	.36	.33	.35	.50	.41
Mother's Out-of-Home Activities	.32	.21	.32	.27	.38	.26
"Powerlessness"	-.31	-.25	-.22	-.16	-.32	-.25
Personal Optimism	.23	.11	.16	.10	.24	.10
First Day: % Imperative	-.25	-.22	-.22	-.25	-.28	-.21
Mastery: % Status-Normative	-.29	-.18	-.27	-.24	-.37	-.26
Mastery: % Personal-Subj.	.28	.19	.28	.27	.38	.28
Number of Models Mother Shows Child (Etch-a-Sketch)	.32	.24	.26	.24	.32	.16
Number of Specific Turning Directions (Etch-a-Sketch)	.27	.15	.26	.21	.33	.16
Maternal Orientation in Block Sorting Task	.29	.18	.30	.26	.27	.15
Praise and Engagement in Block Sorting Task	.20	.22	.21	.27	.32	.28
Specificity of Maternal Feedback in Block Sorting Task	.32	.30	.27	.23	.33	.37
Maternal Requests for Block Placement	-.39	-.33	-.34	-.30	-.36	-.27
Language Factor Score	.34	.26	.27	.30	.35	.21
Maternal Support toward Child (Interviewer's Rating)	.37	.36	.27	.28	.45	.40
Maternal Warmth in Block Sorting Task	.13	.17	.08	.16	.18	.16
Maternal Affectionateness in Teaching Tasks	.23	.27	.21	.27	.29	.27

* For Total Group, $p \leq .05$ if $\underline{r} \geq \pm .16$
$p \leq .01$ if $\underline{r} \geq \pm .20$

For Working-Class Groups, $p \leq .05$ if $\underline{r} \geq \pm .19$
$p \leq .01$ if $\underline{r} \geq \pm .25$

to the task (in relation to both reading measures). The degree of crowding and maternal warmth in the block sorting task were also not significantly correlated with reading readiness. Some measures for the working-class show slightly higher relationships to grades than to reading readiness: use of home resources, use of status-normative and personal-subjective control strategies, number of models shown in the Etch-a-Sketch task, and the language factor. And some measures seem to be more highly related to grades than to reading achievement (Lee-Clark Primer): requests for block placement, language factor, number of models shown, orienting the child to the task. It is interesting that the language factor is more highly related to grades than to either reading readiness or reading achievement: it seems possible that the child may learn more fluent standard English from his mother, and this in turn may influence the teacher's judgment of his academic performance.

Sex differences in the relationship of academic performance to maternal behavior are shown in Table III-9. On the standardized measure of reading achievement, correlations with maternal variables for boys and girls are all in the same direction, and the majority are significant. The magnitude of correlation is a bit larger for girls; the greatest differences between boys and girls are found in measures of home and community environment, of maternal orientation toward the non-family world, and of maternal support (as rated by interviewer). Correlations of school performance measures with maternal teaching styles and control strategies, taken as a group, tend to show fewer meaningful sex differences: coefficients for girls are higher than coefficients for boys on a third of the measures, approximately the same on another third, and lower on the rest. However, some individual measures of control strategies and teaching styles show sex differences which may be meaningful. Maternal use of the imperative control strategy is consistently related more highly to boys' reading grades than to girls' reading grades. Arithmetic grades show more relationship for girls than for boys to the mother's use of orienting techniques, but are more highly related for boys than for girls to the mother's tendency to praise and engage the child in interaction. As was found in correlation of maternal variables with the standardized tests of reading readiness, there is no significant relationship for girls between maternal warmth in the teaching tasks and the standardized reading achievement test.

It was mentioned earlier that there is a tendency for correlations between maternal variables and reading and arithmetic grades to rise from the end of the first semester to the end of the second grade; in Table III-9 the full array of grades for two years permits elaboration of the point. Looking at correlations of reading grades for boys,

TABLE III-9

The Relationship of the Child's Academic Performance to Preschool Maternal Behavior and Environment, by Sex*

Preschool Maternal Variables	Reading							
	Boys				Girls			
	Sem. 1	Sem. 2	Year 2	Total	Sem. 1	Sem. 2	Year 2	Total
Rooms per Person	.11	.09	.12	.16	.27	.24	.32	.31
Availability and Use of Home Resources	.28	.26	.38	.38	.42	.44	.40	.47
Mother's Out-of-Home Activities	.23	.13	.22	.24	.29	.31	.40	.39
"Powerlessness"	-.04	-.21	-.20	-.20	-.36	-.34	-.44	-.42
Personal Optimism	.01	.23	.19	.19	.35	.32	.18	.28
First Day: % Imperative	-.24	-.29	-.26	-.31	-.15	-.06	-.17	-.15
Mastery: % Status-Normative	-.22	-.14	-.35	-.31	-.26	-.30	-.23	-.28
Mastery: % Personal-Subjective	.23	.21	.32	.32	.21	.29	.20	.25
Number of Models Mother Shows Child (Etch-a-Sketch)	.13	.17	.29	.25	.28	.39	.33	.38
Number of Specific Turning Directions (Etch-a-Sketch)	.19	.10	.44	.33	.22	.22	.08	.16
Maternal Orientation in Block Sorting Task	.04	.11	.26	.20	.18	.22	.39	.41
Praise and Engagement in Block Sorting Task	.21	.10	.26	.25	.18	.15	.13	.16
Specificity of Maternal Feedback in Block Sorting Task	.30	.33	.29	.37	.30	.25	.29	.32
Maternal Requests for Block Placement	-.34	-.26	-.28	-.38	-.35	-.35	-.36	-.40
Language Factor Score	.19	.20	.24	.25	.43	.39	.39	.45
Maternal Support toward Child (Interviewer's Rating)	.20	.18	.37	.33	.34	.41	.39	.41
Maternal Warmth in Block Sorting Task	.11	.05	.27	.20	.05	-.01	.03	.03
Maternal Affectionateness in Teaching Tasks	.19	.40	.34	.29	.06	.06	.13	.11

*For boys, $p \leq .05$ if $r \geq \pm .23$; $p \leq .01$ if $r \geq \pm .30$. For girls, $p \leq .05$ if $r \geq \pm .22$; $p \leq .01$ if $r \geq \pm .28$

TABLE III-9 (continued)

Preschool Maternal Variables	Arithmetic								In-school Reading Achievement Test (L-C Primer)	
	Boys				Girls					
	Sem 1	Sem 2	Year 2	Total	Sem 1	Sem 2	Year 2	Total	Boys	Girls
Rooms per Person	.06	.07	.06	.11	.23	.22	.15	.20	.22	.40
Availability and Use of Home Resources	.27	.19	.24	.26	.41	.42	.28	.39	.41	.59
Mother's Out-of-Home Activities	.22	.14	.23	.24	.32	.31	.34	.38	.25	.49
"Powerlessness"	-.10	-.17	-.07	-.17	-.26	-.28	-.18	-.25	-.16	-.46
Personal Optimism	.06	.12	.16	.14	.27	.13	.15	.18	.06	.44
First Day: % Imperative	-.26	-.16	-.20	-.28	-.16	-.15	-.11	-.15	-.32	-.24
Mastery: % Status-Normative	-.20	-.16	-.29	-.29	-.30	-.26	-.19	-.25	-.37	-.38
Mastery: % Personal-Subjective	.28	.24	.29	.35	.21	.24	.15	.19	.39	.38
Number of Models Mother Shows Child (Etch-a-Sketch)	.22	.14	.22	.21	.22	.37	.18	.28	.24	.36
Number of Specific Turning Directions (Etch-a-Sketch)	.25	.25	.30	.30	.22	.25	.14	.20	.36	.29
Orientation	.14	.23	.22	.24	.34	.27	.33	.39	.20	.35
Praise and Engagement	.33	.25	.29	.35	.01	.04	.06	.03	.35	.32
Specificity of Maternal Feedback	.21	.29	.15	.27	.34	.24	.20	.30	.28	.42
Maternal Requests for Block Placement	-.31	-.24	-.30	-.38	-.27	-.26	-.25	-.30	-.35	-.38
Language Factor Score	.17	.11	.22	.22	.33	.38	.20	.33	.35	.38
Maternal Support toward Child (Interviewer's Rating)	.25	.10	.23	.26	.42	.35	.12	.27	.37	.53
Maternal Warmth in Block Sorting Task	.19	.16	.23	.24	-.05	-.10	-.05	-.08	.24	.12
Maternal Affectionateness in Teaching Tasks	.30	.31	.28	.35	.05	.01	.03	.00	.37	.18

it can be seen that fully half of them rise markedly from first to second grade. Using first-year grades alone, there would seem to be no correlation between boys' reading and mother's affectionateness and language factor, and little significant correlation between boys' reading and maternal teaching styles and attitudes toward the non-family world. Using second-year data, however, significant and frequently strong correlations can be seen between reading grades and all of these (except for attitudes toward the non-family world). The second-year data also reveal stronger correlations of boys' reading grades with maternal control strategies and use of home resources. A similar but weaker pattern of change over two school years is found in the correlations between boys' arithmetic grades and the maternal variables, except that the language factor is never found to correlate significantly with arithmetic grades.

Correlations between maternal variables and measures of girls' school performance do not, however, show the same pattern of change over time as do similar correlations for boys. Some correlations of girls' reading grades with maternal variables rise from first to second grade, a couple drop, but most show no marked change. Changes in arithmetic correlations, when they occur, are in the downward direction. As a result of these differences in patterns of change for boys and girls, we find that while maternal control strategies are seen to become more strongly correlated with boys' academic performance, they become less strongly correlated with girls' grades; by the end of the second grade, in fact, no maternal control strategy is significantly associated with girls' grades in arithmetic. And maternal teaching styles (e.g., number of specific turning directions, number of models shown) that in the first grade seemed more strongly and significantly associated with girls' academic performance now seem more related to the boys' academic achievement. The association of grades with environmental circumstances (degree of crowding in the home, use of home resources) remains higher for girls, but the gap seems to be narrowing.

Since the maternal variables were measured some three to four years before the child was graded in school, there is no way to assess whether or not changes in correlations from first to second grade reflect changes in maternal environment (see pages 62 ff.for discussion of maternal variables contemporary with the child's first two years in school). The maternal variables must be treated as constant, and interpretation of changes sought in the child or in the school. It would seem that for boys, grades in the second school year reflect more strongly than first-year grades those aspects of cognitive development found related to maternal behaviors, whereas girls show no consistent change in reading and less relationship to maternal environment in arithmetic.

The Teacher's Judgment and the Child's Classroom Behavior

Using the data in Table III-10 it is possible to compare the association of preschool maternal variables with conduct grades to the association of preschool maternal variables with academic grades.

For the total group, correlations between conduct grades and maternal variables are similar in direction to the correlations of academic achievement measures with maternal variables. Conduct correlations tend over the whole group of maternal variables to be slightly lower than academic grade correlations; and clearly lower than the Lee-Clark Primer correlations; fewer are significant. The most interesting differences between conduct and academic grades occur in correlations with the mother's orientation toward the non-family world and with maternal teaching styles. One might expect that the mother's sense of effectiveness, optimism, and active participation in the community would affect the child's classroom behavior even more than his academic performance: if the mother conveys a sense of well-being in conformity with community norms, surely her child will reflect this in his own adaptation to social demands? In fact, however, the correlations of conduct with the mother's orientation toward the non-family world are lower than those for academic performance; most tend to be low and one of them (the association of second-year conduct grades with powerlessness) is nonsignificant. Maternal teaching styles are also less associated with conduct in the first grade than with academic performance, and conduct correlations for both specificity measures show a decline in the second grade. The other teaching measures, however, are more strongly associated with conduct in the second grade than in the first grade. An inconsistent change from first to second grade is also found in correlations of conduct grades with maternal control strategies: mother's use of imperative statements is found more highly associated in second grade with lower grades in conduct, whereas her use of status-normative strategies is less strongly associated. Correlations of conduct with use of personal-subjective strategies show an even greater decline from first to second grade.

For the working-class groups, conduct grades are not significantly related to maternal orientation toward the non-family world or to measures of affective behavior. Conduct grades are also not significantly associated with the majority of maternal teaching style variables. All three of these areas of maternal behavior show higher, more significant correlations with academic achievement than with the teacher's judgment of the child's classroom behavior. These results contain an implication for future intervention programs dealing with working-class families: even if, as

TABLE III-10

The Relationship of Teacher's Judgments (Grades) and Reading Achievement (Lee-Clark Primer) to Preschool Maternal Behavior and Environment (Total Group; Working-Class Group)*

Preschool Maternal Variables	Teacher's Judgments (Grades) Conduct					
	Total Group			Working-class Group		
	Sem.1	Sem.2	Year 2	Sem.1	Sem.2	Year 2
Rooms per Person	.22	.20	.28	.04	.04	-.02
Availability and Use of Home Resources	.35	-.04	.42	.30	.36	.26
Mother's Out-of-Home Activities	.18	.25	.23	.10	.17	.09
"Powerlessness"	-.19	-.19	-.15	-.13	-.11	-.10
Personal Optimism	.16	.18	.19	.03	.06	.09
First Day % Imperative	-.24	-.23	-.37	-.25	-.20	-.33
Mastery: % Status-Normative	-.28	-.28	-.21	-.23	-.23	-.06
Mastery: % Personal-Subjective	.28	.28	.16	.24	.23	.02
Number of Models Mother Shows Child (Etch-a-Sketch)	.17	.16	.30	.02	.06	.11
Number of Specific Turning Directions (Etch-a-Sketch)	.23	.17	.17	.04	.06	.01
Maternal Orientation in Block Sorting Task	.14	.15	.23	.09	.07	.10
Praise and Engagement in Block Sorting Task	.17	.19	.28	.24	.20	.24
Specificity of Maternal Feedback in Block Sorting Task	.28	.30	.11	.31	.28	.01
Maternal Requests for Block Placement	-.19	-.13	-.25	-.13	-.05	-.12
Language Factor Score	.28	.26	.35	.23	.18	.19
Maternal Support toward Child (Interviewer's Rating)	.25	.20	.23	.10	.14	.09
Maternal Warmth in Block Sorting Task	.10	.12	.04	.13	.13	-.03
Maternal Affectionateness in Teaching Tasks	.08	.12	.11	.11	.14	.06

* For total group, $p \leq .05$ if $r \geq \pm .16$; $p \leq .01$ if $r \geq \pm .21$. For working-class group, $p \leq .05$ if $r \geq \pm .19$; $p \leq .01$ if $r \geq \pm .25$

TABLE III-10 (continued)

Preschool Maternal Variables	Teacher's Judgments (Grades)				In-School Reading Achievement Test (Lee-Clark Primer)	
	Reading		Arithmetic		End of First Grade	
	Two-year Total		Two-year Total			
	Total	W-C	Total	W-C	Total	W-C
Rooms per Person	.24	-.03	.17	-.06	.32	.07
Availability and Use of Home Resources	.42	.36	.33	.35	.50	.41
Mother's Out-of-Home Activities	.32	.21	.32	.27	.38	.2[illegible]
"Powerlessness"	-.31	-.25	-.22	-.16	-.32	-.25
Personal Optimism	.23	.11	.16	.10	.24	.10
First Day: % Imperative	-.25	-.22	-.22	-.25	-.28	-.21
Mastery: % Status-Normative	-.29	-.18	-.27	-.24	-.37	-.26
Mastery: % Personal-Subjective	.28	.19	.28	.27	.38	.28
Number of Models Mother Shows Child (Etch-a-Sketch)	.33	.24	.26	.24	.32	.16
Number of Specific Turning Directions (Etch-a-Sketch)	.27	.15	.26	.21	.33	.16
Maternal Orientation in Block Sorting Task	.29	.18	.30	.26	.27	.15
Praise and Engagement in Block Sorting Task	.20	.22	.21	.27	.32	.28
Specificity of Maternal Feedback	.32	.30	.27	.23	.33	.37
Maternal Requests for Block Placement	-.39	-.33	-.34	-.30	-.36	-.27
Language Factor Score	.34	.26	.27	.30	.35	.21
Maternal Support toward Child (Interviewer's Rating)	.37	.36	.27	.28	.45	.40
Maternal Warmth in Block Sorting Task	.13	.17	.08	.16	.18	.16
Maternal Affectionateness in Teaching Tasks	.23	.27	.21	.27	.29	.27

this study suggests, children's academic performance can be enhanced by modifying maternal variables in the child's cognitive environment, there may not occur a similar enhancement in classroom behavior (as judged by the teacher). Conduct and academic achievement apparently need to be approached as different (even if interrelated) aspects of educability requiring different programs for change.

In Table III-11, sex differences are reported for the correlation of maternal variables with conduct and academic achievement. The direction of all correlations is the same, but there are striking differences between boys and girls in the magnitude of correlations of <u>conduct</u> with maternal behavior: most of the girls' coefficients are significant at the 1% level, whereas very few of the boys' coefficients are significant even at the 5% level.

In the first grade, significant correlations for boys of conduct with maternal variables are found only in the use of home resources, of imperative control strategies, and of specific feedback in the block sorting task. In the second grade, praise during the block sorting task, the interviewer's rating of maternal support, and language factor must be added to the list of variables relating significantly to the boys' conduct. The degree of crowding in the home, and maternal feelings of effectiveness and optimism, are associated with neither conduct nor academic achievement, but all other maternal variables for boys are found to be significantly correlated with one or more of the academic variables (reading and arithmetic grades; Lee-Clark Primer).

When on the other hand girls' correlations of conduct with maternal variables are examined, we find that only in the variables describing maternal affective behavior are girls' correlations similar to boys': no significant relationships are found. In the other 5 areas of maternal variables, girls' correlations (unlike boys') are in the majority of cases significant and fairly strong for these data. Sex differences in the effects of maternal control strategies are particularly interesting: both boys and girls with mothers who tended to rely on an imperative strategy were likely to get lower grades in conduct in the first grade and even lower grades in the second grade. But boys' conduct grades were not significantly associated with either the status-normative or personal-subjective control strategies, whereas girls' conduct grades were significantly related to both.

Table III-11 also suggests that it is the boys who are responsible for the total group's low correlation of conduct with maternal orientation toward the non-family world. For girls, the mother's belief in her own effectiveness in dealing with the outside world is reflected in the child's ability to adapt to external standards represented by the teacher's norms of conduct. For boys, however, there seems

TABLE III-11

The Relationship of Teacher's Judgments (Grades) and Reading Achievement (Lee-Clark Primer) to Preschool Maternal Behavior and Environment, by Sex*

Preschool Maternal Variables	Teacher's Judgments (Grades)					
	Conduct					
	Boys			Girls		
	Sem 1	Sem 2	Year 2	Sem 1	Sem 2	Year 2
Rooms per Person	.14	.15	.21	.31	.26	.33
Availability and Use of Home Resources	.22	.34	.36	.49	.46	.49
Mother's Out-of-Home Activities	-.02	.11	.15	.39	.38	.27
"Powerlessness"	-.05	-.06	-.11	-.25	-.35	-.16
Personal Optimism	-.04	.02	.10	.42	.37	.31
First Day: % Imperative	-.26	-.23	-.39	-.22	-.24	-.36
Mastery: % Status-Normative	-.12	-.15	-.22	-.50	-.46	-.22
Mastery: % Personal-Subjective	.18	.20	.15	.45	.41	.20
Number of Models Mother Shows Child (Etch-a-Sketch)	.06	.19	.21	.26	.24	.35
Number of Specific Turning Directions (Etch-a-Sketch)	.02	.06	.18	.26	.23	.11
Maternal Orientation in Block Sorting Task	.07	.03	.19	.36	.29	.31
Praise and Engagement in Block Sorting Task	.17	.21	.33	.20	.18	.24
Specificity of Maternal Feedback in Block Sorting Task	.19	.26	.10	.43	.39	.17
Maternal Requests for Block Placement	-.18	-.10	-.17	-.21	-.15	-.33
Language Factor Score	.18	.17	.24	.42	.39	.49
Maternal Support toward Child (Interviewer's Rating)	.10	.16	.27	.21	.24	.20
Maternal Warmth in Block Sorting Task	.13	.16	-.07	.04	.05	-.01
Maternal Affectionateness in Teaching Tasks	.10	.17	.15	.01	.01	.00

* For boys, $p \leq .05$ if $r \geq \pm .23$ For girls, $p \leq .05$ if $r \geq \pm .22$
$p \leq .01$ if $r \geq \pm .30$ $p \leq .01$ if $r \geq \pm .28$

TABLE III-11 (continued)

Preschool Maternal Variables	Teacher's Judgments (Grades) Two-year Total				In-School Reading Achievement Test (Lee-Clark Primer)	
	Reading		Arithmetic			
	Boys	Girls	Boys	Girls	Boys	Girls
Rooms per Person	.16	.31	.11	.20	.22	.40
Availability and Use of Home Resources	.38	.47	.26	.39	.41	.59
Mother's Out-of-Home Activities	.24	.39	.24	.38	.25	.49
"Powerlessness"	-.20	-.42	-.17	-.25	-.16	-.46
Personal Optimism	.19	.28	.14	.18	.06	.44
First Day: % Imperative	-.31	-.15	-.28	-.15	-.32	-.24
Mastery: % Status-Normative	-.31	-.28	-.29	-.25	-.37	-.38
Mastery: % Personal-Subjective	.32	.25	.35	.19	.39	.38
Number of Models Mother Shows Child (Etch-a-Sketch)	.25	.38	.21	.28	.24	.36
Number of Specific Turning Directions (Etch-a-Sketch)	.33	.16	.30	.20	.36	.29
Maternal Orientation in Block Sorting Task	.20	.41	.24	.39	.20	.35
Praise and Engagement in Block Sorting Task	.25	.16	.35	.03	.35	.32
Specificity of Maternal Feedback in Block Sorting Task	.37	.32	.27	.30	.28	.42
Maternal Requests for Block Placement	-.38	-.40	-.38	-.30	-.35	-.38
Language Factor Score	.25	.45	.22	.33	.35	.38
Maternal Support toward Child (Interviewer's Rating)	.33	.41	.26	.27	.37	.53
Maternal Warmth in Block Sorting Task	.20	.03	.24	-.08	.24	.12
Maternal Affectionateness in Teaching Tasks	.29	.11	.35	.00	.37	.18

to be no relationship between the mother's feelings of effectiveness and the child's conduct.

The Child's School Performance Related to Measures of Contemporaneous Maternal Behavior

During the summer following kindergarten and again during the summer following first grade, the children's mothers were given a series of structured tests and inventories believed to measure varied aspects of cognitive behaviors. In this section the relationship of these maternal variables to the children's school performance is discussed. As described in Chapter II, maternal data were collected in the following areas:

1. General intellectual functioning. At the first follow-up testing session (after kindergarten), the vocabulary subtest of the WAIS was readministered to the mothers who at the same time took four performance subtests of the WAIS: digit symbol, picture completion, picture arrangement, and block design. Correlations between the child's school performance and the estimates made of each mother's WAIS performance IQ and full IQ are reported in this section.

2. Symptoms of anxiety and depression. An "anxiety and depression" test was administered at both follow-up testing sessions. Excessive anxiety is known to interfere with cognitive performance; in order to discuss the possibility of mother's anxiety influencing the children's cognitive behaviors, the measure of mother's anxiety has been correlated with the dependent variables (school performance) and reported in this section.

3. Edwards Personal Preference Scales. Of the eight EPPS subscales measured, the intraception score most frequently showed significant correlation with dependent measures and therefore has been selected for discussion in this section.

4. Behavior control: Draw-a-Circle Slowly. This measure was included in the testing sessions because of the possibility that it might be related to problem-solving behavior and cognitive style. Since, however, almost no significant correlations were found between it and the child's performance variables, discussion of the Draw-a-Circle Slowly task has been omitted from this section.

5. Reflectivity in problem-solving. Each mother was administered the Kagan Matching Familiar Figures Test at both

follow-up testing sessions. Relatively long delays before responding to the demand to select identical figures are believed generally to indicate a reflective approach to problem-solving. Both the average time before the first choice and the score for errors made in choosing figures are reported in this section.

6. Locus of control (internality-externality). The degree to which a mother feels in control of her own destiny may be expected to affect the values and attitudes she transmits to her child as well as her expectations for him and demands upon him. In this section we report both the James-Phares inventory of locus of control (administered at the testing session following kindergarten) and the Rotter internality-externality scale (administered at the second testing session, following first grade).

Relationship of the Child's School Performance to Contemporaneous Maternal Behavior in Total Group and Working-Class Groups

Table III-12 reports the associations found between the child's school performance and maternal measures obtained in the two follow-up sessions. Directions of significant correlations were consistent throughout, but maternal measures tended to correlate more highly with the standardized measures of the child's performance than with the teacher's judgments of his achievement and behavior.

For the total group, all maternal variables reported were found to be significantly related to the child's performance on standardized tests of reading readiness and achievement (one exception: the association of Lee-Clark Primer with Kagan response latencies measured in the second follow-up). The strongest predictors of the child's performance are mother's IQ, feelings of control over her destiny, low Kagan error scores, and low feelings of anxiety (first follow-up). Although IQ and Kagan errors are almost equally good predictors of academic grades, feelings of anxiety and control over destiny are found to be less significantly correlated with academic grades. Neither measure of feelings of control over destiny is significantly associated with first semester reading grades nor with first-grade arithmetic grades, although they are found significantly correlated with second semester and second-grade measures. It is tempting to speculate that if the mother's attitudes do indeed shape the child over the long-run, their short-term effects may be obscured at times of great uncertainty and change for the child. In other words, the first-grader not yet adjusted to his role of pupil appears temporarily unlike himself--or unaffected by his mother's

TABLE III-12

The Relationship of Child's School Performance to Contemporaneous Maternal Behaviors (Total Group; Working-class Group)

Maternal Measures	Standardized Measures of Reading Readiness and Achievement					
	Lee-Clark Reading Readiness Total		Metropolitan Readiness Test		Lee-Clark Primer	
	Total Group	Working-class Group	Total Group	Working-class Group	Total Group	Working-class Group
Anxiety						
Follow-up 1	-.32**	-.25**	-.36**	-.27**	-.33**	-.24**
Follow-up 2	-.23**	-.13	-.24**	-.11	-.24**	-.11
Kagan Matching Familiar Figures Errors						
Follow-up 1	-.28**	-.24**	-.37**	-.30**	-.33**	-.34**
Follow-up 2	-.24**	-.19*	-.33**	-.20*	-.31**	-.27**
Average Reaction Time						
Follow-up 1	.22**	.21*	.28**	.21*	.12	.09
Follow-up 2	.19*	.12	.22*	.05	.20*	.14
Edwards Personal Preference Score (Intraception Scale)	.25**	.28**	.22*	.19*	.22**	.19*
Locus of Control (high-score = external locus)	-.25**	-.17	-.40**	-.20*	-.40**	-.35**
Internality-Externality (high-score = external locus)	-.37**	-.26*	-.53**	-.40**	-.35**	-.28**
WAIS						
Performance IQ	.24**	.32**	.36**	.27**	.43**	.32**
Full IQ	.30**	.40**	.40**	.39**	.50**	.41**

TABLE III-12 (continued)

Maternal Measures	Teacher's Judgments (Grades)							
	Reading							
	Semester 1		Semester 2		Year 2		Two-year Total	
	Total Group	Working-class Group	Total Group	Working-class Group	Total Group	Working-class Group	Total Group	Working-class Group
Anxiety								
Follow-up 1	-.20*	-.15	-.19*	-.15	-.22**	-.14	-.25**	-.19*
Follow-up 2	-.15	-.07	-.10	-.02	-.21**	-.12	-.19*	-.10
Kagan Matching Familiar Figures								
Errors								
Follow-up 1	-.23**	-.25**	-.28**	-.32**	-.20*	-.21*	-.27**	-.30**
Follow-up 2	-.28**	-.25**	-.29**	-.25**	-.23**	-.15	-.29**	-.23*
Average Reaction Time								
Follow-up 1	.12	.14	.13	.15	.15	.10	.16*	.15
Follow-up 2	.15	.16	.10	.09	.23**	.19*	.19*	.16
Edwards Personal Preference Score (Intraception Scale)	.19*	.19*	.14	.15	.22**	.24**	.21**	.23*
Locus of Control (high-score = external locus)	-.13	-.06	-.21**	-.15	-.30**	-.21*	-.26**	-.16
Internality-Externality (high-score = external locus)	-.17	-.04	-.19*	-.06	-.20*	-.08	-.22*	-.08
WAIS								
Performance IQ	.28**	.23**	.24**	.17	.32**	.23**	.32**	.24*
Full IQ	.36**	.33**	.33**	.29**	.40**	.31**	.42**	.35**

TABLE III-12 (continued)

Maternal Measures	Teacher's Judgments (Grades)							
	Arithmetic							
	Semester 1		Semester 2		Year 2		Two-year Total	
	Total Group	Working-class Group	Total Group	Working-class Group	Total Group	Working-class Group	Total Group	Working-class Group
Anxiety								
Follow-up 1	-.20*	-.19*	-.16*	-.16	-.21**	-.23**	-.23**	-.24*
Follow-up 2	-.15	-.11	-.03	-.14	-.12	-.11	-.13	-.10
Kagan Matching Familiar Figures								
Errors								
Follow-up 1	-.29**	-.30**	-.25**	-.25**	-.11	-.15	-.25**	-.29**
Follow-up 2	-.33**	-.33**	-.29**	-.20*	-.12	-.12	-.27**	-.27**
Average Reaction Time								
Follow-up 1	.21**	.15	.17*	.10	.16*	.24**	.19*	.21*
Follow-up 2	.10	.11	.09	.11	.20*	.24*	.16	.19*
Edwards Personal Preference Score (Intraception Scale)	.25**	.21*	.17*	.15	.27**	.29**	.26**	.26**
Locus of Control (high-score = external locus)	-.13	-.06	-.09	-.06	-.22**	-.24*	-.17*	-.15
Internality-Externality (high-score = external locus)	-.14	-.05	-.11	-.03	-.31**	-.24*	-.25**	-.17
WAIS								
Performance IQ	.28**	.25**	.25**	.23*	.22**	.20*	.29**	.27**
Full IQ	.38**	.37**	.31**	.30**	.32**	.32**	.39**	.39**

TABLE III-12 (continued)

Maternal Measures	Teacher's Judgments (Grades)					
	Conduct					
	Semester 1		Semester 2		Year 2	
	Total Group	Working-class Group	Total Group	Working-class Group	Total Group	Working-class Group
Anxiety						
Follow-up 1	-.10	-.10	-.20*	-.19*	.09	-.09
Follow-up 2	-.01	.05	-.07	.01	-.15	-.03
Kagan Matching Familiar Figures						
Errors						
Follow-up 1	-.19*	-.19*	-.27**	-.27**	-.15	.00
Follow-up 2	-.24**	-.22*	-.25**	-.20*	-.10	-.05
Average Reaction Time						
Follow-up 1	.26**	.28**	.18*	.18	.12	.03
Follow-up 2	.25**	.24*	.19*	.12	.17*	.09
Edwards Personal Preference Score (Intraception Scale)	.12	.11	.10	.04	.05	.00
Locus of Control (high-score = external locus)	-.11	-.11	-.24**	-.05	-.17*	-.01
Internality-Externality (high-score = external locus)	-.18	-.18	-.23*	-.14	-.22*	-.11
WAIS						
Performance IQ	.21**	.14	.18*	.05	.14	-.03
Full IQ	.29**	.24*	.28**	.16	.22**	.04

* $p \leq .05$ ** $p \leq .01$

dominant attitudes. Some weak but suggestive support for this speculation is provided by the correlation of conduct grades with the mother's feelings of control over her own destiny: in the first semester, there is not the significant correlation that is found later, raising the possibility that the child's behavior at the beginning of school is less influenced by the maternal environment. A similar if weak pattern of increases in coefficients for academic grades from first semester to second grade is found in other measures of the mother's attitudes: anxiety and intraception. Neither of these, however, is found significantly correlated with conduct grades. The relative weakness of mothers' response latencies (average time before making a response) as a predictor of academic achievement is somewhat surprising; later in this chapter it is reported that the child's Kagan response latencies do correlate significantly and relatively strongly with his school performance.

For the working-class groups, correlation coefficients are usually lower than for the total group, and fewer are significant. The largest differences between the working-class and total groups are found in the mother's feelings of anxiety and control over her destiny. For the working-class, the Rotter internality-externality score is significantly correlated with only one set of school grades, second-grade arithmetic; the James-Phares locus of control score is related only to second-grade reading and arithmetic. And maternal anxiety, especially that measured after the first grade, shows effectively no correlation with the child's performance.

Sex Differences in the Relationship of the Child's School Performance to Contemporaneous Maternal Behavior

When data on the relationship of preschool maternal variables to the child's classroom performance were presented in the second section of this chapter, it was reported that correlations for girls tended to be higher than those for boys and more were significant. This was particularly true in the correlations between conduct grades and preschool maternal behaviors. Table III-13 shows that a less consistent pattern of sex differences is found in the correlation of conduct grades with maternal measures obtained at the time of the child's first two years in school. It remains true that girls show more significant correlations than boys, but the contrast is less marked. Moreover, the correlations for girls are not generally higher than those for boys. When preschool maternal behaviors were correlated with academic grades, it was found that for boys coefficients were greater in the second grade than in the first; Table III-13, however, reveals no comparable consistent change in the coefficients for either boys or girls.

TABLE III-13

The Relationship of Child's School Performance
to Contemporaneous Maternal Behaviors, by Sex

Maternal Measures	Standardized Measures of Reading Readiness and Achievement					
	Lee-Clark Reading Readiness Total		Metropolitan Readiness Test		Lee-Clark Primer	
	Boys	Girls	Boys	Girls	Boys	Girls
Anxiety						
Follow-up 1	-.32**	-.32**	-.37**	-.36**	-.32**	-.36**
Follow-up 2	-.29*	-.18	-.31**	-.19	-.33**	-.19
Kagan Matching Familiar Figures						
Errors						
Follow-up 1	-.37**	-.20	-.50**	-.22	-.42**	-.26*
Follow-up 2	-.20	-.29*	-.39**	-.25*	-.35**	-.27*
Average Reaction Time						
Follow-up 1	.18	.27*	.16	.39**	.13	.12
Follow-up 2	.17	.22*	.18	.28*	.23*	.18
Edwards Personal Preference Score (Intraception Scale)	.33**	.21	.24	.22	.28**	.19
Locus of Control (high score = external locus)	-.29*	-.25*	-.41**	-.40**	-.33**	-.51**
Internality-Externality (high score = external locus)	-.30*	-.44**	-.53**	- 55**	-.27*	-.49**
WAIS						
Performance IQ	.28**	.51**	.45**	.47**	.36**	.50**
Full IQ	.35**	.56**	.49**	.60**	.41**	.58**

TABLE III-13 (continued)

Maternal Measures	Teacher's Judgments (Grades)							
	Reading							
	Semester 1		Semester 2		Year 2		Two-year Total	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Anxiety								
Follow-up 1	-.21	-.20	-.18	-.23*	-.28*	-.18	-.31**	-.21
Follow-up 2	-.22	-.10	-.14	-.09	-.35**	-.08	-.33**	-.09
Kagan Matching Familiar Figures								
Errors								
Follow-up 1	-.28*	-.17	-.38**	-.19	-.26*	-.15	-.35**	-.21
Follow-up 2	-.29*	-.25*	-.34**	-.22	-.21	-.24*	-.30**	-.27*
Average Reaction Time								
Follow-up 1	.07	.18	.11	.16	.13	.20	.13	.20
Follow-up 2	.08	.24*	-.02	.27*	.16	.38**	.09	.35**
Edwards Personal Preference Score (Intraception Scale)	.29*	.09	.20	.10	.31**	.14	.30**	.15
Locus of Control (high score = external locus)	-.17	-.11	-.27*	-.19	-.34**	-.31**	-.32**	-.24*
Internality-Externality (high score = external locus)	-.14	-.20	-.17	-.21	-.06	-.35*	-.13	-.31*
WAIS								
Performance IQ	.28*	.27*	.17	.31**	.29*	.35**	.29*	.35**
Full IQ	.32**	.38**	.24*	.41**	.33**	.47**	.35**	.47**

TABLE III-13 (continued)

Maternal Measures	Teacher's Judgments (Grades)							
	Arithmetic							
	Semester 1		Semester 2		Year 2		Two-year Total	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Anxiety								
Follow-up 1	-.25*	-.16	-.23*	-.12	-.29*	-.13	-.34**	-.14
Follow-up 2	-.26*	-.04	-.15	.07	-.30**	.03	-.32**	.04
Kagan Matching Familiar Figures								
Errors								
Follow-up 1	-.43**	-.14	-.36**	-.13	-.12	-.10	-.34**	-.15
Follow-up 2	-.35**	-.30**	-.31**	-.25*	-.15	-.08	-.30**	-.22
Average Reaction Time								
Follow-up 1	.14	.30**	.13	.22*	.20	.13	.19	.19
Follow-up 2	.10	.09	.04	.15	.28*	.11	.17	.15
Edwards Personal Preference Score (Intraception Scale)	.40**	.08	.24*	.10	.42**	.12	.40**	.13
Locus of Control (high score = external locus)	-.24*	-.01	-.17	-.02	-.25*	-.20	-.25*	-.12
Internality-Externality (high score = external locus)	-.17	-.17	-.05	-.38*	-.15	-.44**	-.13	-.37*
WAIS								
Performance IQ	.32**	.23*	.24*	.25*	.22	.22*	.31**	.26*
Full IQ	.40**	.34**	.27*	.34**	.29*	.33**	.38**	.38**

TABLE III-13 (continued)

Maternal Measures	Teacher's Judgments (Grades)					
	Conduct					
	Semester 1		Semester 2		Year 2	
	Boys	Girls	Boys	Girls	Boys	Girls
Anxiety						
Follow-up 1	.02	-.28**	-.14	-.32**	-.20	-.20
Follow-up 2	.03	-.07	-.07	-.09	-.22	-.12
Kagan Matching Familiar Figures						
Errors						
Follow-up 1	-.12	-.29**	-.28*	-.29**	-.11	-.01
Follow-up 2	-.23*	-.24*	-.25*	-.23*	-.08	-.12
Average Reaction Time						
Follow-up 1	.22	.34**	.12	.27*	.14	.12
Follow-up 2	.33**	.12	.25*	.10	.20	.15
Edwards Personal Preference Score (Intraception Scale)	.05	.24*	.07	.16	.10	.02
Locus of Control (high score = external locus)	-.04	-.21	-.12	-.28*	-.26*	-.13
Internality-Externality (high score = external locus)	-.14	-.35*	-.19	-.28	-.29*	-.17
WAIS						
Performance IQ	.18	.24*	.14	.20	.12	.15
Full IQ	.21	.38**	.19	.35**	.17	.25*

* $p \leq .05$ ** $p \leq .01$

The most consistent and noticeable sex differences in this section are found in the coefficients between maternal anxiety, intraception, and IQ, and the child's school performance. Mothers who expressed anxiety tended to have sons who received lower grades in arithmetic during both first and second grade, lower grades in reading during the second grade, and lower grades on the standardized tests of reading readiness and achievement. On the other hand, mothers' anxiety did not correlate significantly with the teachers' judgments of girls' school performance except in second semester reading and in first-grade conduct; it can be seen, however, that daughters of mothers who expressed anxiety at the first follow-up testing session did tend to do less well on the standardized tests. Also, intraception scores of boys' mothers tended to correlate significantly with their sons' academic grades and scores on standardized tests, whereas the intraception scores of girls' mothers for the most part bore no relationship to the girls' school performance. In contrast to anxiety and intraception, maternal IQ tended to be correlated more strongly with girls' performance measures than with boys'.

The measures of maternal reflectivity and locus of control seemed to show no clear, consistent pattern of sex differences, partly because there were relatively few significant correlations for either sex. Response latencies on the Kagan reflectivity measure might be useful in predicting girls' reading readiness and grades, and Kagan error scores seemed to be better predictors of boys' school performance. The maternal locus of control measures seem to be better predictors of girls' school performance, with the Rotter internality-externality scale somewhat more powerful as a predictor than the James-Phares locus of control score.

It is disappointing that, when comparing preschool with school-year maternal variables in their relationships to the child's school performance, there seems to be no consistent pattern of sex differences in the maternal variables relating to feelings of power and effectiveness. It was reported in Section Two of this chapter that mothers' feelings of personal optimism and effectiveness (preschool measures) show scarcely any relationship with boys' school performance, whereas here we have reported that mothers' feelings of anxiety and control over her destiny do show some significant correlations to boys' performance. A feeling of powerlessness vis-à-vis the schools and a feeling of being unable to control one's destiny would seem to be closely related, as would optimism and lack of anxiety, but the pattern of correlations suggests that they are not (at least as defined by the measures used), or that the mothers' attitudes changed from the time of the preschool testing sessions to the time of the follow-up sessions (perhaps affected by the civil rights movement), or both. It was also reported that mothers' preschool attitudes of effectiveness and optimism do correlate with girls' school performance (they did not with boys' performance), whereas among the follow-up maternal variables the locus of control measures show only an inconsistent relationship with the girls' performance, and the anxiety measures show almost none.

The Child's Preschool Behavior Related to His School Performance

In the preschool study, data were obtained on a variety of measures believed indicative of the child's cognitive functioning. Intelligence test scores were treated as just one indication of the cognitive component in the child's developing readiness for school. The Sigel Conceptual Style Sorting Task was used to obtain further information on the child's ability to categorize, to discriminate, to reflect, and to express himself verbally. Measures of the child's success at copying designs (Etch-a-Sketch task) and sorting blocks were obtained, and to these measures of performance were added ratings of the child's behavior during the teaching and testing periods: his ability to verbalize his actions, his tendency to resist the task or his mother, his tendency to make non-meaningful responses to the task's demands. In the preschool analyses, all of these variables were found meaningfully related to the cognitive environments provided by the mothers and, as appropriate, to the child's success in the interaction tasks.

It was hypothesized that these same variables would be found significantly related to the child's school performance; in this section is presented the extent to which these selected measures of the preschool child's behavior are in fact predictive of his performance in school. Correlations between months of preschool experience (excluding kindergarten and Head Start) and the first and second grade measures are also included, in order to check for a possible mediating influence of preschool experience on the child's readiness for and achievement in school.

The Predictive Power of Preschool Behaviors for the Total Group and for the Working-Class Groups

Table III-14 reports correlations for both the total group and the working-class groups between measures of school performance and measures of preschool behaviors. In the total group, almost all preschool measures are significant predictors of the child's school performance, although months of preschool experience and scores on the Etch-a-

TABLE III-14

Selected Measures of the Child's Behaviors
Related to his School Performance
(Total Group; Working-class Group)

Child's Measures	Standardized Measures of Reading Readiness and Achievement					
	Lee-Clark Reading Readiness Total		Metropolitan Readiness Test		Lee-Clark Primer	
	Total Group	Working-class Group	Total Group	Working-class Group	Total Group	Working-class Group
Sigel (Conceptual Style Sorting Task) Nonverbal	-.29**	-.22*	-.39**	-.34**	-.34**	-.28**
Scorable	.37**	.32**	.48**	.34**	.39**	.23**
Binet IQ Age 4	.56**	.48**	.59**	.48**	.47**	.38**
Confidence Factor	.25**	.16	.34**	.29**	.30**	.24**
Activity Factor	-.19*	-.16	-.22*	-.12	-.16*	-.08
Optimal Behavior during Testing (General Factor)	.32**	.26**	.35**	.30**	.32**	.25**
Etch-a-Sketch Score	.18*	.05	.37**	.24*	.26**	.13
Block Sorting Task Score	.28**	.18*	.40**	.28**	.33**	.23**
Teaching Period Combination Score (high score = detrimental or ineffective behaviors)	-.37**	-.35**	-.44**	-.32**	-.40**	-.37**
Resistance during Interaction	-.12	-.21*	-.17*	-.13	-.20*	-.29**
Errors (Block Sorting Task)	-.38**	-.37**	-.37**	-.36**	-.33**	-.34**
Use of Correct Labels	.25**	.12	.35**	.19	.34**	.27**
Months in Preschool	.16	.13	.20*	.25*	.18*	.21*

TABLE III-14 (continued)

Child's Measures	Teacher's Judgments (Grades)							
	Reading							
	Total Group				Working-class Group			
	Sem 1	Sem 2	Year 2	Total	Sem 1	Sem 2	Year 2	Total
Sigel (Conceptual Style Sorting Task)								
Nonverbal	-.20*	-.31**	-.23**	-.27**	-.12	-.25**	-.10	-.16
Scorable	.30**	.36**	.31**	.36**	.16	.28**	.12	.19*
Binet								
IQ Age 4	.42**	.48**	.48**	.53**	.35**	.45**	.38**	.47**
Confidence Factor	.27**	.19*	.36**	.36**	.23**	.19*	.30**	.33**
Activity Factor	-.13	-.21*	-.16*	-.20*	-.11	-.21*	-.13	-.18
Optimal Behavior during Testing (General Factor)	.34**	.29**	.39**	.42**	.36**	.28**	.40**	.45**
Etch-a-Sketch Score	.22**	.16*	.20*	.22**	.16	.10	.08	.11
Block Sorting Task Score	.32**	.35**	.34**	.39**	.24**	.26**	.22*	.29**
Teaching Period Combination Score (high score = detrimental or ineffective behaviors)	-.35**	-.34**	-.38**	-.41**	-.34**	-.32**	-.34**	-.38**
Resistance during Interaction	-.20*	-.23**	-.22**	-.24**	-.31**	-.30**	-.34**	-.37**
Errors (Block Sorting Task)	-.30**	-.30**	-.19*	-.29**	-.29**	-.32**	-.18*	-.30**
Use of Correct Labels	.28**	.35**	.42**	.41**	.22*	.29**	.33**	.33**
Months in Preschool	.21*	.22*	.21*	.25**	.19*	.24*	.21*	.26**

TABLE III-14 (continued)

Child's Measures	Teacher's Judgments (Grades)							
	Arithmetic							
	Total Group				Working-class Group			
	Sem.1	Sem.2	Year 2	Total	Sem.1	Sem.2	Year 2	Total
Sigel (Conceptual Style Sorting Task) Nonverbal	-.24**	-.26**	-.17*	-.25**	-.18	-.24*	-.12	-.20*
Scorable	.21**	.31**	.26**	.29**	.09	.26**	.20*	.21*
Binet IQ Age 4	.40**	.49**	.35**	.49**	.36**	.48**	.28**	.44**
Confidence Factor	.18*	.13	.29**	.30**	.14	.12	.24**	.27**
Activity Factor	-.03	-.16	-.17*	-.18*	.00	-.14	-.09	-.13
Optimal Behavior during Testing (General Factor)	.18*	.20*	.33**	.34**	.17	.23*	.31**	.36**
Etch-a-Sketch Score	.22**	.20*	.15	.22**	.19*	.15	.08	.15
Block Sorting Task Score	.27**	.33**	.30**	.37**	.26**	.32**	.26**	.35**
Teaching Period Combination Score (high score = detrimental or ineffective behaviors)	-.32**	-.35**	-.34**	-.38**	-.33**	-.35**	-.37**	-.41**
Resistance during Interaction	-.14	-.25**	-.23**	-.26**	-.29**	-.36**	-.28**	-37**
Errors (Block Sorting Task)	-.29**	-.26**	-.20*	-.29**	-.29**	-.26**	-.21*	-.30**
Use of Correct Labels	.24**	.32**	.35**	.37**	.18	.26**	.31**	.31**
Months in Preschool	.22**	.23**	.17*	.24**	.19*	.22*	.22*	.26**

TABLE III-14 (continued)

Child's Measures	Teacher's Judgments (Grades)					
	Conduct					
	Total Group			Working-class Group		
	Sem.1	Sem.2	Year 2	Sem.1	Sem.2	Year 2
Sigel (Conceptual Style Sorting Task)						
Nonverbal	-.14	-.27**	-.23**	-.11	-.23*	-.16
Scorable	.22**	.27**	.22**	.11	.18	.05
Binet						
IQ Age 4	.35**	.39**	.35**	.25**	.27**	.22*
Confidence Factor	.26**	.27**	.26**	.23*	.24*	.28**
Activity Factor	-.16*	-.21**	-.12	-.11	-.14	-.10
Optimal Behavior during Testing (General Factor)	.32**	.28**	.33**	.26**	.20*	.31**
Etch-a-Sketch Score	.12	.09	.07	-.02	-.01	-.07
Block Sorting Task Score	.27**	.23**	.27**	.21*	.15	.12
Teaching Period Combination Score (high score = detrimental or ineffective behaviors)	-.30**	-.22**	-.27**	-.29**	-.22*	-.17
Resistance during Interaction	-.19*	-.09	-.14	-.28**	-.18	-.16
Errors (Block Sorting Task)	-.24**	-.21**	-.20*	-.23*	-.20*	-.13
Use of Correct Labels	.25**	.27**	.25**	.19	.19*	.17
Months in Preschool	.08	.14	.03	.12	.15	.01

* p ≤ .05   ** p ≤ .01

Sketch task bear no relationship to the child's grades in conduct. The direction of all coefficients is consistent, although the magnitude varies; Binet IQ and the absence of detrimental or ineffective behaviors in the preschool teaching situations are most strongly associated with school measures. Most preschool variables are better predictors of scores on the standardized tests than of the teachers' judgments of the child; only the child's resistance in the teaching situations and the number of months of preschool experience seem to be more influential on grades than on standardized test scores. No meaningful pattern of differences is found in the relationship of preschool behaviors to types of academic grades, i.e., reading vs. arithmetic, although there is a tendency for conduct grades to correlate less strongly with the preschool variables.

For the working-class group, correlation coefficients are regularly lower than for the total group. The one exception is the correlation of school performance with preschool resistance during the teaching tasks (a factor score measuring apparent and verbalized refusal to cooperate, inattention, disinterest, and frustration). The Etch-a-Sketch score, the Binet activity factor, and the Sigel scorable responses are of little use as predictors of the working-class children's school grades; they were found to be considerably more powerful for the total group.

Sex Differences in the Power of Preschool Behaviors to Predict School Performance

For both boys and girls, as for the total group, Binet IQ and the absence of detrimental behaviors in the teaching situations are the strongest predictors of school performance; IQ, however, correlates more strongly with girls' reading and conduct grades, whereas the teaching period combination score (a measure of detrimental behaviors) shows a stronger association with all boys' school measures.

As Table III-15 indicates, the preschool measures are much better predictors of girls' conduct grades than of boys' conduct grades. Binet measurements of IQ and behavior during testing are all useful in predicting girls' (but not boys') classroom behavior; so also are scores from the conceptual style sorting task and the block sorting task, and measures of the tendency to verbalize correct responses and to avoid detrimental behaviors in interactions with mothers.

Both types of scores from the conceptual sorting task (and especially scorable responses) are better predictors of school performance for girls than for boys. On the other hand, Binet confidence and general factors, and resistance and verbalization of correct responses in

TABLE III-15

The Relationship of Children's Preschool
Behaviors to Their School Performance, by Sex

Child's Measures	Standardized Measures of Reading Readiness and Achievement					
	Lee-Clark Reading Readiness Total		Metropolitan Readiness Test		Lee-Clark Primer	
	Boys	Girls	Boys	Girls	Boys	Girls
Sigel (Conceptual Style Sorting Task)						
Nonverbal	-.12	-.43**	-.29*	-.50**	-.18	-.48**
Scorable	.33**	.40**	.53**	.42**	.32**	.43**
Binet						
IQ Age 4	.57**	.52**	.62**	.56**	.45**	.45**
Confidence Factor	.28**	.16	.44**	.23	.44**	.11
Activity Factor	-.21	-.17	-.25*	-.19	-.08	-.24*
Optimal Behavior During Testing (General Factor)	.37**	.24*	.43**	.28*	.36**	.26*
Etch-a-Sketch Score	.11	.22*	.24	.48**	.20	.29**
Block Sorting Task Score	.32**	.26*	.52**	.39**	.31**	.36**
Teaching Period Combination Score (high-score = detrimental or ineffective behaviors)	-.43**	-.32**	-.48**	-.40**	-.42**	-.40**
Resistance during Interaction	-.08	-.17	-.17	-.16	-.24*	-.16
Errors (Block Sorting Task)	-.43**	-.34**	-.36**	-.38**	-.26*	-.40**
Use of Correct Labels	.32**	.17	.38**	.31*	.36**	.34**
Months in Preschool	.15	.17	.22	.18	.21	.14

TABLE III-15 (continued)

Child's Measures	Teacher's Judgments (Grades)							
	Reading							
	Boys				Girls			
	Sem.1	Sem.2	Year 2	Total	Sem.1	Sem.2	Year 2	Total
Sigel (Conceptual Style Sorting Task)								
Nonverbal	-.13	-.24*	-.07	-.12	-.24*	-.33**	-.37**	-.39**
Scorable	.29*	.29*	.25*	.31**	.29**	.41**	.37**	.41**
Binet								
IQ Age 4	.31**	.40**	.43**	.46**	.51**	.54**	.51**	.59**
Confidence Factor	.28*	.12	.42**	.37**	.22**	.22*	.21	.29**
Activity Factor	-.06	-.20	-.12	-.14	-.19	-.20	-.20	-.26*
Optimal Behavior During Testing (General Factor)	.32**	.23*	.37**	.39**	.34**	.31**	.37**	.41**
Etch-a-Sketch Score	.17	.06	.22	.18	.23*	.21	.16	.21
Block Sorting Task Score	.24*	.36**	.31**	.36**	.38**	.34**	.39**	.43**
Teaching Period Combination Score (high score = detrimental or ineffective behaviors)	-.37**	-.39**	-.48**	-.50**	-.34**	-.32**	-.31**	-.35**
Resistance during Interaction	-.31**	-.35**	-.24*	-.32**	-.11	-.13	-.22*	-.19
Errors (Block Sorting Task)	-.23*	-.21	-.16	-.22*	-.36**	-.38**	-.23*	-.35**
Use of Correct Labels	.32**	.41**	.46**	.46**	.25	.31**	.38**	.36**
Months in Preschool	.26*	.26*	.17	.26*	.16	.19	.26*	.24*

TABLE III-15 (continued)

Child's Measures	Teacher's Judgments (Grades)							
	Arithmetic							
	Boys				Girls			
	Sem.1	Sem.2	Year 2	Total	Sem.1	Sem.2	Year 2	Total
Sigel (Conceptual Style Sorting Task)								
Nonverbal	-.14	-.21	-.15	-.18	-.32**	-.28**	-.17	-.30**
Scorable	.19	.27*	.25*	.27*	.22*	.33**	.25*	.30**
Binet								
IQ Age 4	.40**	.50**	.35**	.50**	.37**	.46**	.49**	.45**
Confidence Factor	.25*	.14	.38**	.36**	.08	.09	.16	.19
Activity Factor	.01	-.15	-.12	-.12	-.06	-.15	-.21	-.23*
Optimal Behavior During Testing (General Factor)	.22	.21	.34**	.37**	.12	.16	.31**	.28**
Etch-a-Sketch Score	.19	.18	.09	.17	.23*	.20	.18	.24*
Block Sorting Task Score	.20	.29*	.24*	.30**	.33**	.37**	.35**	.43**
Teaching Period Combination Score (high score = detrimental or ineffective behaviors)	-.32**	-.42**	-.47**	-.47**	-.33**	-.29**	-.23*	-.30**
Resistance during Interaction	-.23*	-.38**	-.24*	-.34**	-.06	-.15	-.21	-.19
Errors (Block Sorting Task)	-.23	-.21	-.22	-.25*	-.34**	-.30**	-.17	-.31**
Use of Correct Labels	.24*	.32**	.40**	.39**	.25*	.32**	.31**	.35**
Months in Preschool	.24*	.29*	.10	.23*	.20	.16	.24*	.25*

TABLE III-15 (continued)

Child's Measures	Teacher's Judgments (Grades)					
	Conduct					
	Boys			Girls		
	Sem.1	Sem.2	Year 2	Sem.1	Sem.2	Year 2
Sigel (Conceptual Style Sorting Task) Nonverbal	-.05	-.23*	-.09	-.20	-.26*	-.32**
Scorable	.07	.12	.11	.36**	.39**	.31**
Binet IQ Age 4	.22	.31**	.20	.46**	.42**	.47**
Confidence Factor	.18	.18	.08	.31**	.32**	.44**
Activity Factor	-.04	-.16	-.03	-.30**	-.25*	-.22*
Optimal Behavior During Testing (General Factor)	.28*	.16	.22	.33**	.36**	.41**
Etch-a-Sketch Score	.07	.01	.01	.13	.12	.07
Block Sorting Task Score	.23*	.18	.18	.31**	.28**	.35**
Teaching Period Combination Score (high score = detrimental or ineffective behaviors)	-.31**	-.15	-.35**	-.31**	-.32**	-.20
Resistance during Interaction	-.35**	-.08	-.34**	-.04	-.08	.03
Errors (Block Sorting Task)	-.18	-.10	-.16	-.30**	-.30**	-.23*
Use of Correct Labels	.20	.16	.20	.32**	.38**	.32**
Months in Preschool	.07	.16	-.09	.08	.11	.14

* $p \leq .05$ ** $p \leq .01$

teaching situations, are better predictors of boys' academic grades and standardized test scores. In fact, the measure of resistance shows no significant correlation with girls' school performance. The total scores and errors on the block sorting task are of roughly equal use in predicting boys' and girls' reading readiness, but of more use in predicting girls' reading achievement (Lee-Clark Primer) and academic grades.

School Performance Related to Contemporaneous Measures of the Children's Behaviors

In the summers following kindergarten and first grade, and also during second grade, the children were administered a number of tasks measuring variables of cognitive development, cognitive style, and personality. The Sigel conceptual style sorting task used in the preschool study was readministered at both follow-up sessions. To this were added measures of IQ, of locus of control, of sex role preference, of self-management, and of Piagetian tasks indicating conceptual development. (See Chapter Two for descriptions of these measures.)

In this section those variables are discussed which relate significantly to the child's school performance.

The Relationship of School Performance to Contemporaneous Children's Behaviors in the Total Group and in the Working-Class Groups

For the total group, IQ is, of course, strongly related to school performance; so also are the measures from the Kagan Design Recall test (Table III-16). Both IQ and the Design Recall test are most useful as predictors of standardized test scores and least useful as predictors of conduct grades. The Design Recall test is believed to measure the child's tendency to reflect over alternative responses, an aspect of self-management presumably vital to successful learning. Additional measures of the child's ability to inhibit some behaviors for the sake of others are found related to his school performance, although the coefficients are lower: the Draw-a-Circle Slowly task, a measure of the ability to act slowly when haste conflicts with success, is approximately as strong a predictor of school performance as Design Recall test response latencies (average reaction time), another measure of the ability to take one's time. Delayed reward (less candy now vs. more candy later) is a considerably less powerful predictor of school performance, consistently useful only in relation to reading readiness

TABLE

SCHOOL PERFORMANCE RELATED
CHILDREN'S BEHAVIORS

Child Measures	Standardized Measures of Reading Readiness and Achievement					
	Lee-Clark Reading Readiness Total		Metropolitan Reading Test		Lee-Clark Primer	
	Total Group	W-C Group	Total Group	W-C Group	Total Group	W-C Group
Binet IQ (age 7)	.63**	.58**	.72**	.68**	.63**	.60**
Total Days Absent						
Follow-up 1	-.11	-.10	-.06	.05	-.17	-.10
Follow-up 2	.03	.05	-.02	.02	-.11	-.07
Internality-Externality						
Total Internalized Choices	.30**	.30**	.37**	.31**	.38**	.37**
Sears Sex-Role Activity Preference Score						
Follow-up 2	.26**	.21*	.24**	.18	.19*	.17*
Sigel Conceptual Style Sorting Task						
Scorables						
Follow-up 1	.27**	.24**	.35**	.28**	.30**	.25**
Follow-up 2	.42**	.36**	.37**	.30**	.42**	.35**
Draw-a-Circle-Slowly Task						
Follow-up 1	.22**	.13	.27**	.22*	.27**	.25**
Follow-up 2	.23**	.21*	.26**	.26*	.27**	.30**
Delayed Reward Task (Mischel) (high score = willingness to delay)						
Follow-up 1	.21**	.15	.25**	.20*	.12	.04
Follow-up 2	.29**	.29**	.27**	.24*	.27**	.25**
Child's Kagan Design Recall						
Average Reaction Time						
Follow-up 1	.28**	.23**	.23**	.21*	.30**	.27**
Follow-up 2	.23**	.16	.33**	.25*	.34**	.29**
Total Number of Errors						
Follow-up 1	-.44**	-.44**	-.51**	-.49**	-.48**	-.44**
Follow-up 2	-.50**	-.47**	-.54**	-.52**	-.50**	-.47**
Good First Responses						
Follow-up 1	.45**	.39**	.49**	.48**	.53**	.48**
Follow-up 2	.54**	.58**	.62**	.65**	.46**	.44**
Non-meaningful Response Sequences						
Follow-up 1	-.51**	-.46**	-.57**	-.51**	-.53**	-.46**
Follow-up 2	-.40**	-.37**	-.52**	-.52**	-.38**	-.35**

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TO SELECTED CONTEMPORANEOUS

ESPECIALLY SELF-MANAGEMENT

Teacher's Judgments (Grades)							
Reading							
Total Group				Working - class Group			
Sem. 1	Sem. 2	Year 2	Total	Sem. 1	Sem. 2	Year 2	Total
.46**	.49**	.56**	.59**	.36**	.42**	.47**	.49**
-.25**	-.18	-.13	-.20*	-.26*	-.17	-.09	-.18
-.22*	-.07	-.18*	-.17*	-.21*	-.03	-.18*	-.16
.19*	.26**	.28**	.29**	.18	.28**	.28**	.31**
.17*	.18*	.11	.18*	.21*	.23*	.11	.21*
.20*	.20*	.02	.30**	.14	.16	.28**	.25**
.42**	.42**	.31**	.41**	.38**	.41**	.27**	.38**
.28**	.29**	.29**	.33**	.30**	.29**	.26**	.32**
.24**	.31**	.22**	.30**	.27**	.35**	.21*	.33**
.13	.11	.0[illegible]	.14	.08	.04	-.01	.06
.14	.13	.23**	.22**	.17*	.19*	.22*	.25**
.24**	.21**	.27**	.29**	.21*	.22*	.24**	.27**
.16*	.18*	.22**	.25**	.14	.25**	.17*	.21*
-.36**	-.37**	-.39**	-.42**	-.34**	-.32**	-.38**	-.40**
-.34**	-.36**	-.35**	-.40**	-.31**	-.34**	-.32**	-.38**
.41**	.38**	.38**	.44**	.36**	.35**	.33**	.39**
.32**	.38**	.30**	.37**	.33**	.37**	.26**	.37**
-.40**	-.40**	-.43**	-.46**	-.35**	-.35**	-.36**	-.40**
-.25**	-.24**	-.31**	-.32**	-.21*	-.20*	-.28**	-.29**

TABLE

Child Measures	Teacher's Judgments (Grades)					
	Arithmetic					
	Total Group				Working -	
	Sem. 1	Sem. 2	Year 2	Total	Sem. 1	Sem. 2
Binet IQ (age 7)	.46**	.52**	.48**	.58**	.41**	.49**
Total Days Absent						
Follow-up 1	-.11	-.08	-.11	-.12	-.09	-.06
Follow-up 2	-.23*	-.13	-.13	-.13	-.25*	-.16
Internality-Externality						
Total Internalized Choices	.13	.20*	.19*	.21*	.22*	.20*
Sears Sex-Role Activity Preference Score						
Follow-up 2	.10	.08	.02	.07	.14	.10
Sigel Conceptual Style Sorting Task						
Scorables Follow-up 1	.18*	.21**	.23**	.26**	.10	-.04
Follow-up 2	.38**	.35**	.31**	.39**	.34**	.35**
Draw-a-Circle-Slowly Task						
Follow-up 1	.21**	.29**	.21**	.27**	.24**	.28**
Follow-up 2	.21**	.21**	.11	.20**	.24**	.21*
Delayed Reward Task (Mischel) (high score = willingness to delay)						
Follow-up 1	.14	.12	.21**	.21**	.01	.06
Follow-up 2	.12	.17*	.15	.17*	.11	.21*
Child's Kagan Design Recall						
Average Reaction Time Follow-up 1	.25**	.17*	.23**	.26**	.24*	.20*
Follow-up 2	.18*	.24**	.25**	.26**	.19*	.22*
Total Number of Errors Follow-up 1	-.27**	-.29**	-.29**	-.34**	-.30**	-.31**
Follow-up 2	-.35**	-.34**	-.39**	-.44**	-.35**	-.32**
Good First Response Follow-up 1	.40**	.37**	.30**	.42**	.43**	.42**
Follow-up 2	.36**	.33**	.36**	.40**	.38**	.34**
Non-meaningful Response Sequences Follow-up 1	-.39**	-.38**	-.30**	-.41**	-.40**	-.38**
Follow-up 2	-.34**	-.30**	-.34**	-.41**	-.31**	-.29**

* $p \leq .05$
** $p \leq .01$

I I I - 1 6 (continued)

		Teacher's Judgments (Grades)					
		Conduct					
class Group		Total Group			Working - class Group		
Year 2	Total	Sem. 1	Sem. 2	Year 2	Sem. 1	Sem. 2	Year 2
.45**	.55**	.41**	.41**	.40**	.34**	.31**	.28**
-.10	-.10	-.24*	-.26**	-.05	-.19	-.19	.01
-.17*	-.16	-.16	- 23*	-.19*	-.16	-.25*	-.17
.16	.23*	.36**	.31**	.44**	.39**	.33**	.39**
.02	.08	.11	.16*	.05	.11	.17	.00
.20*	.20*	.15	.18*	.16*	.09	.12	.08
.30**	.38**	.41**	.39**	.24**	.38**	.36**	.20*
.13	.25**	.19*	.19*	.20*	.19*	.13	.13
.13	.23*	-.23**	-.25**	.12	.13	.14	.04
.13	.12	.06	-.03	.03	.02	-.11	-.02
.16	.19*	.00	.05	.05	.20*	.20*	-.01
.24**	.28**	.22**	.18*	.11	.23*	.16	.09
.22*	.25**	.25**	.20*	.22**	.20*	.15	.13
-.30**	-.36**	-.30**	-.29**	-.17*	-.23*	-.22*	-.08
-.40**	-.45**	-.30**	-.19*	-.18*	-.23*	-.11	-.04
.31**	.44**	.34**	.28**	.21**	.30**	.24*	.13
.38**	.43**	.30**	.27**	.22**	.22*	.19*	.13
-.29**	-.40**	-.33**	-.28**	-.23**	-.28**	-.22*	-.13
-.33**	-.40**	-.21**	-.12	-.08	-.17	-.05	-.00

scores. Further discussion of these self-management variables is given in Chapter IV and thus will not be repeated here. It should be noted, however, that correlations of these behavior management measures are highest with scores produced by the child himself and affected directly by his test-taking behavior (standardized tests), next highest with grades presumably highly influenced by test scores (academic grades), and least highest with grades presumably based on other than test scores (conduct grades). The aspects of self-management reported here thus seem not to be synonymous with the control of behavior evaluated by the teacher as "good conduct."

Possible insight into aspects of the child's behavioral styles leading to teachers' judgments of "good conduct" is given by another variable correlating significantly with school performance: the measure of locus of control or internality-externality. As Table III-16 indicates, the child who tends to explain success (or failure) by attributing it to the individual rather than to factors outside individual control is a child likely to receive good grades in conduct. He is likely also to receive nearly as good grades on standardized tests; academic grades, however, are less strongly although still significantly associated with an internal locus of control. Locus of control, unlike the aspects of self-management reported above (Design Recall test, *et al.*), appears to represent an attitude of responsibility for achievement more than the possession of skills necessary for achievement. It is interesting that what is apparently an attitude of responsibility is found to correlate strongly with conduct grades. Of all independent variables reported in this chapter, only use of home resources by preschool mothers (Table III-10) and children's scorable responses on the conceptual style sorting task following first grade (Table III-16) show, for the total group, correlations with conduct grades of nearly comparable magnitude.

For both total and working-class groups, Sigel scorable responses (follow-up 2) function as a strong predictor of school performance. Differences between total and working-class groups are, in fact, small for all variables except perhaps second-grade conduct grades; most differences in magnitude favor the total group. Although absence from school shows very little significant correlation with school performance measures, Table III-16 indicates that absence influences conduct and reading grades rather more in the total group than in the working-class groups. The child's sex-role activity preference is a weak predictor of reading grades for both total and working-class groups, and a slightly better predictor of standardized test scores for the total group; otherwise, sex-role activity preferences show no relationship to school performance.

TABLE III-17

School Performance Related to Piagetian Tasks: Conservation and Dream Interview[a] (Total Group; Working-class Group)

Piagetian Measures	Standardized Measures of Reading Readiness and Achievement						Teacher's Judgments (Grades)	
	Lee-Clark Reading Readiness Total		Metropolitan Readiness Test		Lee-Clark Primer		Reading	
	Total Group	W-C Group	Total Group	W-C Group	Total Group	W-C Group	Total Group Year 2	Total Group Total
Conservation								
Class inclusion, Total score								
Follow-up 1	.18*	.13	.16	.15	.17*	.19*	.12	.21
Follow-up 2	.19*	.14	.27**	.22*	.17*	.10	.08	.09
Number conservation, Total score								
Follow-up 1	.35**	.35**	.46**	.40**	.29**	.33**	.30**	.29**
Follow-up 2	.40**	.33**	.43**	.28**	.31**	.24**	.31**	.34**
Length conservation, Pass-fail								
Follow-up 1	.23**	.21*	.34**	.34**	.20*	.17*	.20*	.17*
Follow-up 2	.26**	.28**	.30**	.27**	.25**	.29**	.19*	.19*
Dream Interview								
Total score								
Follow-up 1	.42**	.39**	.49**	.46**	.38**	.36**	.31**	.33**

TABLE III-17 (continued)

Piagetian Measures	Teacher's Judgments (Grades)							
	Reading		Arithmetic				Conduct	
	W-C Group		Total Group		W-C Group		Total	W-C
	Year 2	Total	Year 2	Total	Year 2	Total	Year 2	Year 2
Conservation								
Class inclusion, Total score								
Follow-up 1	.09	.20*	.12	.18*	.06	.15	.10	.17
Follow-up 2	-.03	-.02	.06	.04	-.01	-.03	.09	.02
Number conservation, Total score								
Follow-up 1	.28**	.25**	.26**	.24**	.25**	.22*	.14	.00
Follow-up 2	.21*	.25**	.33**	.38**	.26**	.32**	.11	.03
Length conservation, Pass-fail								
Follow-up 1	.19*	.17	.30**	.21**	.32**	.25**	.04	-.02
Follow-up 2	.24**	.23*	.24**	.28**	.19*	.27**	.09	.07
Dream Interview								
Total score								
Follow-up 1	.31**	.32**	.32**	.34**	.30**	.32**	.20*	.09

* $p \leq .05$
** $p \leq .01$

[a] See Table V-10 for a more complete presentation of these relationships.

Table III-17 reports correlations of school performance with Piagetian indices of conceptual development. (See Chapter V for further discussion of the Piagetian variables.) Number and length conservation both show significant correlations with scores on standardized tests, and with reading and arithmetic grades, although there are fewer significant correlations of length conservation with academic grades. Class inclusion scores, especially those from the second follow-up, seem to be useless as predictors of school performance, but as discussed in Chapter V the class inclusion scores are themselves open to doubt as useful measures for the research group. The dream interview total score is significantly associated with the child's performance on reading readiness and achievement tests, and with reading and arithmetic grades.

Sex Differences in the Relationship of School Performance to Contemporaneous Children's Behavior

There are few if any meaningful sex differences to be found in the relationship of school performance to measures of contemporaneous behaviors in the children. Table III-18 indicates that there are no differences in the direction of correlations and that differences in magnitude and significance of correlation, when found, tend to favor the boys. This is most apparent in arithmetic grades: IQ, locus of control, delayed reward, and the Kagan measures show quite a consistent pattern of higher correlation with arithmetic grades for boys than for girls. Yet we find that IQ correlates more strongly with conduct grades for girls than for boys, and the relationship of Kagan behavior control measures to standardized tests also tends to be greater for girls. The scorable responses from the Sigel conceptual sorting task (follow-up 2) are very much more highly associated with girls' school performance than with that of the boys.

Table III-19 reports correlations for boys and girls of the Piagetian tasks and dream interview with school performance measures. As can be seen, no consistent pattern of sex differences was found in the correlations of Piagetian measures with standardized tests, but there was a tendency for boys' correlations of academic grades with number and length conservation to be higher than those for girls.

TABLE

THE RELATIONSHIP OF SCHOOL

OF CONTEMPORANEOUS

Child Measures	Standardized Measures of Reading Readiness and Achievement					
	Lee-Clark Reading Readiness Total		Metropolitan Reading Test		Lee-Clark Primer	
	Boys	Girls	Boys	Girls	Boys	Girls
Binet IQ (age 7)	.65**	.65**	.74**	.70**	.66**	.63**
Total Days Absent						
Follow-up 1	.13	-.32**	.07	-.22	-.04	-.28*
Follow-up 2	-.01	.10	-.15	.15	-.23	.02
Internality-Externality						
Total Internalized Choices	.26*	.29*	.44**	.30*	.40**	.33**
Sears Sex-Role Activity Preference Score						
Follow-up 2	.26*	.13	.32**	.16	.16	.09
Sigel Conceptual Style Sorting Task						
Scorables						
Follow-up 1	.34**	.29**	.37**	.39**	.35**	.31**
Follow-up 2	.35**	.52**	.32**	.44**	.31**	.55**
Draw-a-Circle-Slowly Task						
Follow-up 1	.12	.30**	.23	.32**	.24*	.29**
Follow-up 2	.32**	.13	.38**	.18	.30**	.21
Delayed Reward Task (Mischel) (high-score = willingness to delay)						
Follow-up 1	.37**	.08	.20	.31*	.18	.09
Follow-up 2	.36**	.22*	.32**	.21	.28*	.25*
Child's Kagan Design Recall						
Average Reaction Time						
Follow-up 1	.24*	.38**	.21	.29*	.32**	.33**
Follow-up 2	.05	.42**	.28*	.41**	.27*	.40**
Total Number of Errors						
Follow-up 1	-.28*	-.61**	-.48**	-.55**	-.43**	-.51**
Follow-up 2	-.35**	-.64**	-.55**	-.53**	-.52**	-.48**
Good First Responses						
Follow-up 1	.36**	.55**	.62**	.46**	.53**	.52**
Follow-up 2	.47**	.61**	.64**	.61**	.47**	.44**
Non-meaningful Response Sequences						
Follow-up 1	-.37**	-.67**	-.57**	-.57**	-.53**	-.52**
Follow-up 2	-.34**	-.47**	-.55**	-.48**	-.43**	-.34**

III-18

PERFORMANCE TO SELECTED MEASURES

CHILDREN'S BEHAVIORS, BY SEX

Teacher's Judgments (Grades)							
Reading							
Boys				Girls			
Sem. 1	Sem. 2	Year 2	Total	Sem. 1	Sem. 2	Year 2	Total
.52**	.53**	.60**	.65**	.39**	.46**	.54**	.54**
-.16	-.06	-.10	-.12	-.32**	-.29*	-.16	-.26*
-.26	-.13	-.29*	-.27*	-.20	-.02	-.05	-.07
.26*	.36**	.28*	.36**	.09	.14	.22*	.18
.24*	.15	.06	.15	-.01	.08	-.04	.03
.20	.23*	.43**	.37**	.24*	.23*	.33**	.32**
.29*	.31**	.17	.26*	.58**	.57**	.51**	.60**
.25*	.28*	.26*	.28*	.29**	.29**	.31**	.34**
.22	.27*	.27*	.31**	.24*	.32**	.14	.26*
.25*	.19	.11	.22	.03	.08	.10	.11
.25*	.16	.29*	.31**	.01	.09	.15	.11
.34**	.26*	.17	.26*	.16	.19	.46**	.38**
.17	.23*	.17	.20	.16	.32**	.30**	.31**
-.34**	-.34**	-.31**	-.36**	-.36**	-.38**	-.47**	-.47**
-.37**	-.39**	-.36**	-.43**	-.29**	-.32**	-.34**	-.37**
.41**	.39**	.33**	.42**	.40**	.35**	.43**	.45**
.28*	.39**	.25*	.35**	.35**	.36**	.33**	.38**
-.41**	-.39**	-.39**	-.45**	-.38**	-.39**	-.48**	-.48**
-.23*	-.22	-.29*	-.30**	-.26*	-.26*	-.33**	-.34**

TABLE

Child Measures	Teacher's Judgments (Grades)					
	Arithmetic					
	Boys				Girls	
	Sem. 1	Sem. 2	Year 2	Total	Sem. 1	Sem. 2
Binet IQ (age 7)	.55**	.58**	.52**	.66**	.36**	.45**
Total Days Absent						
Follow-up 1	.05	.11	-.10	.00	-.28*	-.29*
Follow-up 2	-.25	-.11	-.22	-.17	-.23	-.17
Internality-Externality						
Total Internalized Choices	.20	.25*	.21	.27*	.04	.12
Sears Sex-Role Activity Preference Score						
Follow-up 2	.12	.08	.13	.11	-.03	-.01
Sigel Conceptual Style Sorting Task						
Scorables						
Follow-up 1	.27*	.22	.23*	.28*	.14	.26*
Follow-up 2	.27*	.26*	.18	.27*	.52**	.46**
Draw-a-Circle-Slowly Task						
Follow-up 1	.14	.23*	.15	.20	.26*	.33**
Follow-up 2	.20	.25*	.17	.24*	.19	.17
Delayed Reward Task (Mischel) (high-score = willingness to delay)						
Follow-up 1	.27*	.23*	.26*	.31**	.02	.04
Follow-up 2	.15	.23*	.26*	.27*	.07	.10
Child's Kagan Design Recall						
Average Reaction Time						
Follow-up 1	.33**	.26*	.28*	.31**	.17	.09
Follow-up 2	.24*	.24*	.30**	.30**	.13	.24*
Total Number of Errors						
Follow-up 1	-.28*	-.31**	-.26*	-.31**	-.24*	-.24*
Follow-up 2	-.44**	-.43**	-.47**	-.55**	-.24*	-.24*
Good First Response						
Follow-up 1	.48**	.46**	.34**	.48**	.30**	.25*
Follow-up 2	.34**	.32**	.42**	.44**	.37**	.34**
Non-meaningful Response Sequences						
Follow-up 1	-.45**	-.44**	-.31**	-.44**	-.31**	-.30**
Follow-up 2	-.42**	-.39**	-.42**	-.51**	-.21	-.18

* $p \leq .05$
**$p \leq .01$

I I I - 1 8 (continued)

Teacher's Judgments (Grades)							
		Conduct					
Girls		Boys			Girls		
Year 2	Total	Sem. 1	Sem. 2	Year 2	Sem. 1	Sem. 2	Year 2
.44**	.49**	.34**	.42**	.34**	.50**	.42**	.49**
-.11	-.23	-.15	-.18	.00	-.34**	-.32**	-.21
-.02	-.10	-.23	-.35**	-.25	-.11	-.10	-.14
.15	.14	.35**	.25*	.55**	.34**	.32**	.34**
-.21	-.10	.07	.18	-.12	.00	-.04	.03
.27*	.28**	.02	.10	.10	.31**	.29**	.28**
.43**	.53**	.29*	.31**	.07	.59**	.52**	.44**
.24*	.32**	.18	.20	.13	.18	.15	.24*
.04	.15	.13	.17	.13	.17	.16	.07
.19	.14	-.14	-.03	.07	-.01	.00	.04
.03	.06	.24*	.29*	.04	.09	.07	.05
.21	.24*	.36**	.33**	.13	.08	.04	.15
.20	.23*	.32**	.23*	.20	.19	.18	.24*
-.30**	-.35**	-.24*	-.27*	-.13	-.35**	-.28**	-.18
-.31**	-.34**	-.30**	-.20	-.31**	-.27*	-.15	-.03
.25*	.33**	.34**	.31**	.20	.33**	.23*	.19
.34**	.36**	.27*	.27*	.25*	.34**	.24*	.16
-.41**	-.36**	-.38**	-.31**	-.26*	-.25*	-.22*	-.18
-.22*	-.30**	-.24*	-.12	-.16	-.15	-.08	.02

TABLE III-19

The Relationship of School Performance to Piagetian Tasks: Conservation and Dream Interview, by Sex[a]

Piagetian Measures	Standardized Measures of Reading Readiness and Achievement						Teacher's Judgments (Grades)	
	Lee-Clark Reading Readiness Total		Metropolitan Readiness Test		Lee-Clark Primer		Reading	
							Boys	
	Boys	Girls	Boys	Girls	Boys	Girls	Year 2	Total
Conservation								
Class inclusion, Total score								
Follow-up 1	.31**	.06	.18	.16	.28**	.19	.11	.24*
Follow-up 2	.10	.26*	.25*	.29*	.03	.28**	-.04	.00
Number conservation, Total score								
Follow-up 1	.33**	.41**	.52**	.24	.34**	.29**	.40**	.40**
Follow-up 2	.37**	.48**	.35**	.53**	.31**	.35**	.35**	.38**
Length conservation, Pass-fail								
Follow-up 1	.22	.24*	.37**	.31*	.26*	.13	.32**	.23*
Follow-up 2	.21	.37**	.31*	.31*	.17	.38**	.28**	.24*
Dream Interview								
Total score								
Follow-up 1	.50**	.35**	.49**	.51**	.31**	.45**	.34**	.35**

TABLE III-19 (continued)

Piagetian Measures	Teacher's Judgments (Grades)							
	Reading		Arithmetic				Conduct	
	Girls		Boys		Girls		Boys	Girls
	Year 2	Total	Year 2	Total	Year 2	Total	Year 2	Year 2
Conservation								
Class inclusion, Total score								
Follow-up 1	.12	.17	.27	.30	.01	.07	.14	.07
Follow-up 2	.20	.15	-.04	-.05	.14	.11	-.11	.25**
Number conservation, Total score								
Follow-up 1	.22*	.23*	.30**	.27*	.25*	.23*	.24*	.08
Follow-up 2	.31**	.33**	.36**	.44**	.31**	.35**	-.02	.29**
Length conservation, Pass-fail								
Follow-up 1	.04	.10	.42**	.28*	.18	.14	.10	-.03
Follow-up 2	.19	.22*	.25*	.33**	.28**	.30**	.12	.13
Dream Interview								
Total score								
Follow-up 1	.30**	.33**	.46**	.43**	.20	.26*	.11	.29**

* $p \leq .05$
** $p \leq .01$

[a] See Table V-11 for a more complete presentation of these relationships.

Summary

Intercorrelations among the two sources of data on the children's school performance, standardized tests and teachers' judgments (grades), were sufficiently strong (tending to be over .40) and significant (p tending to be less than .01) to permit the conclusion that some consistent ability factor was being measured by teachers as well as by standardized tests. It was also found that, on the whole, all independent variables--preschool and contemporaneous maternal behavior, preschool and contemporaneous children's behavior--correlated most strongly with scores on standardzied tests, next strongly with academic grades, and least strongly with conduct grades. In addition, changes over time were found in the correlation of conduct grades with objective test scores and with academic grades: in both cases, correlations were regularly lower at the end of the second grade than at the end of the first semester. It was concluded, therefore, first that the independent variables were more closely related to the aspects of cognitive development measured by standardized tests than to the teachers' operational definitions of cognitive achievement, and second that conduct must be treated as an aspect of performance substantially different from academic achievement. The need to consider conduct and academic achievement as significantly different aspects of educability contains an implication for intervention programs: techniques designed to enhance academic performance cannot necessarily be expected to improve classroom behavior. And because there may be long-term interrelationships of conduct and subject-matter mastery, failure to include in intervention studies techniques specifically designed for influencing conduct may lead to at least partial failure of the techniques designed to enhance academic performance.

Factors Affecting the Teacher's Judgment

Data from the present study cannot be used to demonstrate the influence conduct has on learning and vice versa nor the degree to which teachers' evaluations of conduct correlate with more objective measures of children's classroom behavior. The data do, however, suggest directions in which future studies of conduct grades might go. The locus of control measure, for example, was found to be an unusually strong predictor of conduct grades for all groups examined: the total group, working-class group, boys, and girls. It appears that what the teacher perceives as "good conduct" may be closely related to children's behaviors arising from a sense of responsibility or of control over destiny. The suggestion that a sense of responsibility and good classroom behavior are highly related deserves additional study.

The teacher's perceptions of conduct may also be influenced by the child's sex. Mean grades and test scores on all school measures were higher for girls than for boys (significantly higher on measures of reading readiness, reading achievement, and conduct). It was also found that girls' conduct grades showed greater relationship to reading, writing, and speaking than did boys' conduct grades. The pattern of correlation raises the possibility that girls' greater verbal skills are seen by the teacher as better behavior, or that the teacher's judgment of girls as better behaved (perhaps a "halo" effect, especially if the teacher is a woman) influences evaluation of performance. There is also, of course, the possibility that girls' conduct is in fact better than boys', and that better behavior enhances learning. It is suggested that future research investigate teachers' sex-related perceptions of differences in behavior as distinguished from actual sex-related differences in behavior.

A number of tentative interpretations were presented for other patterns of correlation found among school performance measures. Correlations between reading and arithmetic grades and standardized tests were generally higher for boys than for girls: it was suggested that teachers tend to be more "fair" in grading boys' academic achievement than in grading girls' academic achievement. Correlations between conduct grades and other school measures showed a decline from the end of the first semester to the end of the second grade; this pattern was interpreted as reflecting a decreasing proportion of academic grades dependent upon conduct, or as reflecting the effects of accommodation of teacher to child and child to system.

The Influence of Maternal Behavior and Home Environment on School Performance

A number of maternal variables from the preschool study were found significantly related with the child's performance in school as measured by standardized tests and as evaluated by the teacher; thus it seemed justified to argue (with the usual reservations) both for their persistence as maternal behaviors and for their importance in the child's cognitive development. The mother's use of home resources was found significantly and in most cases highly associated with school performance for the total group, working-class group, boys, and girls. Maternal attitudes toward the nonfamily world--participation in out-of-home activities, feelings of effectiveness and optimism--were less strongly but still significantly related to school performance, although the correlations with conduct grades were lower than expected. Maternal control strategies, on the other hand, seemed at least as strongly associated with conduct as with academic grades and standardized test scores. The child who did well in school was likely to have a mother who stressed personal-subjective control strategies and avoided the use of either imperative or status-normative control strategies. Children who received high academic grades and objective test scores were also likely to have mothers who showed effective teaching styles in the preschool study: their mothers tended to be specific in giving directions and feed-back, to orient the child to his task, to elicit cooperation and to give praise--and to avoid demanding physical actions without accompanying the demands with rationales. The mother's use of facile and complex standard English was found to affect the child's success on school measures to approximately the same degree as the other variables from the maternal cognitive environment. And finally, measures of maternal affective behavior, especially maternal support, as rated by home interviewers, were associated with the children's grades and scores. Here again, however, as was the case with mother's attitudes toward the non-family world, correlation with conduct grades was lower than expected. One might predict that active, optimistic, warm mothers would tend to have self-confident children whose classroom behavior would be perceived as "good conduct" relatively independent of academic achievement; unfortunately the data permitted only limited claims for this sequence of maternal attitudes, children's behaviors, and teacher's perceptions. The child of the active, optimistic, and warm mother was as likely to receive good grades in reading and arithmetic as he was to receive good grades in conduct.

For the working-class group, correlations between preschool maternal variables and children's school performance measures tended to be similar in direction to, but lower in magnitude than, those for the total group. In a number of cases, lower correlations for the working-class resulted in eliminating variables found for the total group to be significantly related to children's school performance: for the working-class, crowding in the home, affective behavior, attitudes toward the non-family world, and most of the measures of teaching style, were unrelated to <u>conduct</u> grades; crowding in the home and feelings of <u>optimism</u> were also unrelated to <u>academic</u> grades and standardized test scores. On the <u>other hand</u>, <u>academic</u> grades and standardized test scores did show a <u>pattern</u> of significant relationship to variables measuring maternal control strategies, teaching styles, and affective behavior.

In general, girls' school performance seemed more affected by maternal environment than did boys' school performance, especially in the development of behaviors rated by the teacher as "good conduct." For boys, only imperative control strategies are consistently related to conduct grades, although use of home resources shows a significant correlation in the second semester and second grade; mothers who used imperative strategies had sons who tended to get low conduct grades, and mothers who availed themselves of a wide range of home resources had sons who tended to get good grades in conduct. On the other hand, almost all maternal measures--with the notable exception of affective behavior--were significantly and frequently strongly related to girls' conduct grades. Sex differences favoring girls on academic grades and objective tests were less consistent and marked, although it appeared that girls' academic grades and objective tests were more strongly affected by crowding in the home, use of home resources, maternal orientation toward the non-family world, the language factor, and maternal support (as rated by the interviewer). Although it can be claimed that maternal environment seemed to be generally more influential on girls than on boys, it should be noted that status-normative and personal-subjective control strategies, when related to academic grades, showed higher correlations for boys, and that the imperative control strategy was consistently more highly related to boys' school performance than to girls'. The mother's tendency to show warmth during the teaching tasks was also reflected more in boys' academic grades and objective test scores than in those for girls.

The pattern of strong and significant correlations between preschool maternal variables and school performance measures is impressive evidence of the importance of the child's cognitive environment to his educability. Maternal measures obtained when the child was 6 and 7 years old indicated that mothers' IQ, tendency to feel control over her destiny and not to feel anxious, and accurate matching of the Kagan familiar figures, also form part of this influential environment for the total group. Maternal locus of control and feelings of anxiety do not, however, seem to be meaningfully related to the working-class child's school performance, a somewhat surprising result in view of the significant correlations between the working-class child's locus of control and his school performance. Sex differences on these follow-up maternal measures were inconsistent, but it appeared that boys were more affected by their mothers' anxiety and intraception, and girls' performance more strongly associated with maternal IQ and perhaps also with locus of control.

The Relationship of the Child's Performance in Experimental Situations to Long-term Learning (School Performance)

Binet IQ (age 4 and age 7) and the absence of detrimental or ineffective behaviors in the preschool teaching situations were strongly related to the child's school performance. Detrimental behaviors in the teaching situations included resistance and non-meaningful responses; other measures of resistance (preschool study) and non-meaningful responses (follow-up study: systematic response sequences in the Kagan Design Recall test) were also found to be strong predictors of poor school performance. Errors on the Kagan test were related to poor school performance, and good first responses and response latencies were associated with good school performance. The child's ability to give scorable responses to the Sigel conceptual style sorting task tended to be significantly associated with school measures. All of the above measures showed the typical pattern for measures reported in this chapter: they were usually most powerful as predictors of standardized test scores and least powerful as predictors of conduct grades. The locus of control measure, another good predictor of school performance, showed an atypical pattern of correlations: it was at least as strong a predictor of conduct grades as of objective test scores. Neither absence from school nor months of preschool experience (excluding kindergarten and Head Start) were very useful as predictors of the child's performance. Little difference was found between the total group and working-class group in the patterns of correlation.

Sex differences in the predictive power of children's experimental variables were found most consistently in IQ. IQ at both age 4 and age 7 is a better predictor for boys than girls of objective test scores and arithmetic grades, and a better predictor for girls than boys of conduct grades; IQ at age 7 is also found to predict boys' reading grades more consistently than girls'. Scorable responses obtained from the Sigel sorting task during the preschool study and second follow-up session were much more strongly associated with girls' school performance than with boys'. Measures of self-management were likely to be more strongly correlated with boys' arithmetic grades and with girls' objective test scores. But, speaking very generally, it was often found that measures of optimal behavior in teaching and testing situations tended to be better predictors of boys' school performance, whereas measures of performance on experimental tasks tended to be more useful in predicting girls' performance.

CHAPTER IV

STYLISTIC ASPECTS OF CHILDREN'S BEHAVIOR AND THEIR SUSCEPTIBILITY TO VOLUNTARY CONTROL AND REGULATION

In the preceding discussion of the effects of environmental factors on cognitive development and educability, mention has been made of attributes such as the tendency to make discriminations and to reflect over alternatives, the tendency to recognize relationships between immediate behavior and long-range consequences or goals, and the ability to organize and to maintain adaptive goal-seeking behavior. If it is assumed that these variables are important factors affecting general intellectual functioning and educability, some conclusions about their development in children may be inferred from indirect evidence such as intelligence test and school performance data. Behavior management variables are of considerable theoretical and practical importance in their own right, however, and recently have received considerable attention from child development and educational researchers. Consequently, experimental measures bearing directly on them were included in the follow-up investigations. The present chapter will focus on these stylistic aspects of the children's behavior, relating them to one another, to intelligence and school performance data, and to relevant aspects of the home environment.

The experimental data to be discussed come from situations which require the child to postpone gratification in order to obtain a larger reward, to inhibit speech and motor movement on request, or to systematically inspect visual stimuli and reflect upon response alternatives. Studies of these and related abilities are often described as studies of impulsivity or impulse control. This designation is probably inappropriate, however, both because it applies a common label to diverse situations and because it implies for all contexts a struggle against a specific, crystallized undesirable impulse. It seems preferable, therefore, to describe the behavior in more positive terms emphasizing the goals sought by the individual and the behavior exhibited in attempting to implement them. "Impulsivity" may or may not be an appropriate designation for maladaptive behavior in these situations; the reader may judge this for himself.

Successful adaptation to the role of pupil requires, in addition to certain aptitudes and skills, the acquisition of self-disciplined habits of attention and activity.

That is, learning in the classroom is most successful when the child carefully attends to his teacher's verbal instructions and to the visual aids presented in connection with them. In order to sustain attention the child will frequently have to inhibit, or delay gratification of, competing desires, including such basic things as hunger, thirst, spontaneous speech, and gross motor locomotion. Children who are able to impose this executive control, establishing priorities on competing desires and organizing their behavior in order to pursue complex goals with maximum efficiency, should adapt more successfully to the requirements of the school situation than children who are not. Several experimental procedures used in the follow-up study were designed to elicit data on this self-regulatory behavior. Some of these involve play or problem-solving situations which allow measurement of stylistic aspects of the children's spontaneous reactions. Others are designed to approach the problem directly by requiring the child to delay gratification or to control his behavior in some other way.

Procedures

Draw-a-Circle-Slowly Test. The Draw-a-Circle-Slowly test, as its name implies, requires the subject to take as much time as possible in making a free-hand drawing of a circle. It was administered to both the mothers and the children during both the first and the second year of the follow-up testing. Once it was determined that the subject could draw a circle on request, the "slow condition" instructions were given in straightforward fashion. Without stopping or removing pencil from paper, the subject was to draw as slowly as he could and to delay completion of the circle for as long as possible. The number of seconds taken to complete the circle was recorded for each subject.

Tasks which have required subjects to "draw a line slowly" or "draw a circle slowly" have been used in several previous investigations. They are usually discussed in terms of the ability to inhibit the intensity and speed of motor response, although they may also be interpreted as delay of gratification measures if task completion or closure is regarded as reward. Both interpretations are probably relevant but incomplete, since in addition to its negative aspects (delay, inhibition), this type of task makes positive performance demands (initiation and maintenance of a specific type of motor response) in a goal-seeking context. This type of task provides a power score for a deliberate effort rather than a sample of spontaneously exhibited style or level. Thus the scores reflect the child's ability to draw slowly under instructions to do so, as opposed to his typical or characteristic rate of response when drawing spontaneously. The distinction is important because Maccoby, Dowley, Hagen, and Degerman (1965) found the former (power score) measure to be related to several indices of educability, while the latter score showed no such relationship. Previous research has found that the ability to draw slowly tends to correlate with tasks typically found on nonverbal intelligence scales (hidden figures, design recall, figure matching), although evidence regarding its relationship to verbal intelligence is unclear (Maccoby, Dowley, Hagen, and Degerman, 1965; Kagan, Rosman, Day, Albert, and Phillips, 1964).

Gross motor inhibition. A motor inhibition task adapted from the work of Singer (1955) was administered to the children at both the first and second follow-up testing. For this task, the child was seated facing a corner formed by two bare walls, chosen because it presented a minimum of sensory stimulation. The child was instructed to sit very still, without moving or speaking, for as long as he possibly could. The examiners observed the children closely during this time, recorded the presence of any physical movements or speech, and noted the time which had elapsed before the occurrence of each such instance. The task was discontinued for each child after three minutes.

In contrast to the previous task, this one is more clearly and specifically a test of the child's ability to inhibit. He was instructed to avoid moving or speaking but was not asked to carry out any positive action. The score for each child was simply the number of seconds, up to the maximum of 180, that he was able to avoid speaking or moving. Under the relatively crude conditions of observation employed, individual differences among examiners were likely to influence adversely the reliability of judgments concerning the presence or absence of motor movement. Therefore, gross criteria were used, with the child receiving credit for the full 180 seconds unless he vocalized audibly or got up out of the chair before the time limit had elapsed.

Delay of gratification. The ability (or willingness) to postpone immediate gratification in order to obtain a greater delayed gratification has been of interest both to behavioral scientists and to the general public. (See Miller et al.,1965.) The interest of the former is seen in empirical studies by behavioral theorists on the relative effects of immediate vs. delayed incentives, in the concern of clinicians with "impulse control" and "ego strength," and in the frequent mention of delayed gratification as a factor in achievement motivation and achievement behavior. Its importance to the general public is reflected in its frequent mention as part of the negative stereotypes applied by social groups against each other. Inability to delay gratification is often equated with "impulsivity" and even "irresponsibility," two traits commonly ascribed to members of negatively valued groups. Because of the general importance of this variable and especially because of its possible relationship to educability, a measure of delay of gratification was included in each of the follow-up test sessions.

In measuring delay of gratification we have followed the work of Mischel (Mischel, 1958; Mischel & Metzner, 1962), who defines delay of gratification as the ability to postpone immediate reward in order to obtain a greater future reward. One of the tests Mischel devised to measure this behavior has been adapted for use in our research. At the beginning of the testing session, each child was shown two quantities of candy: a small piece (two parts of a five-cent Tootsie Roll candy bar) and a larger piece (five parts of a five-cent Tootsie Roll candy bar). He was told that if he wanted the candy immediately, he would receive the smaller quantity, but if he was willing to wait about two hours until the end of the testing session, he would receive the larger quantity. This was explained to the child until it was clear that he could have one but not both quantities of candy. He was then asked to make a choice, and rewarded according to his choice. Each child was scored for the quantity chosen; choice of the larger delayed reward was interpreted as evidence of greater ability to delay gratification.

Design Recall Test. The Design Recall test was one of a battery developed by Kagan and his co-workers (Kagan, Rosman, Day, Albert, and Phillips, 1964; Kagan, 1965a, 1965b) in their studies of information processing in the problem-solving behavior of children. This task presents a series of twelve trials requiring the child to observe a single visual stimulus (line drawing) and then, with the stimulus figure out of sight, to point to its exact replica in an array of ten or twelve figures. All figures in the array are similar to the stimulus figure, but only one is an exact replica. On each trial the child is required to continue until he chooses the correct figure. Two scores are usually recorded: the average response latency (average time elapsing before first choice on each trial) and the total number of errors.

The Design Recall test is related to the Hidden Figures test and other performance tests of intelligence (Kagan et al. 1964; Kagan, 1965a, 1965b), and the "total errors" score can be considered a performance measure in this area. The reaction-time data from the Design Recall test are of greater theoretical importance than the totalled errors, however, because Kagan and his co-workers have shown that reaction times on this and similar tasks reflect important stylistic differences in the problem-solving behavior of children.

Children with longer reaction times have consistently been found to do better on this and other tasks involving choices from among several immediate response alternatives, and Kagan interprets this to mean that such children approach the tasks with a "reflective" attitude. That is, children with longer response times are assumed to be processing the different figures in the array before them and reflecting over alternative responses before settling on a specific figure as their first choice. In contrast, children with very short reaction times are believed to be responding without adequate reflection, tending to point to the first figure which appears correct without carefully considering each of the others.

The tendency to reflect over alternative responses is of particular interest to the present research because it has been shown to be a stylistic variable, relatively independent of IQ, which increases with chronological age yet shows individual consistency across situations (Kagan et al. 1964; Kagan, 1965a, 1965b). In addition to its immediate importance in problem-solving situations, it may be expected to have a long-range effect on the child's motivation and self-concept in school. Since children with a more reflective attitude tend more often to succeed on the first trial, and in general have fewer errors than children without this attitude, a greater proportion of their responses will be successful and, presumably, will elicit positive reinforcement from teachers. And since it is known that initial repeated success tends to engender continued and greater success, and that repeated initial failure tends to have the opposite effect, a stylistic variable (as opposed to a capacity variable) affecting the rate of success assumes considerable practical as well as theoretical interest.

To assess the tendency of the mothers in the study to adopt a reflective attitude in problem-solving, the Matching Familiar Figures test was administered to them at both follow-up testing sessions. This measure was developed by Kagan and his associates in the same research previously cited. The task is similar to the Design Recall test, except that the stimuli are drawings of persons or objects instead of abstract designs, and the subject has to choose from among only six rather than ten or twelve alternatives. However, despite the greater familiarity of the stimuli and the reduced number of response alternatives, the Matching Familiar Figures test is much more difficult than the Design Recall test. It is probably too difficult for children, because the alternative responses differ so little from each other and from the replica of the original stimulus that careful, sustained attention and discrimination of subtle differences are required. The scores recorded for this task, the average reaction time for first-choice responses and the total number of errors, are interpreted as in the Design Recall test.

Maintenance of visual attention. The final variable to be introduced in this chapter comes from the Preference for Visual Complexity task administered to the children at age four and also at both follow-up sessions. For this task, the children were asked to view a series of visual stimuli (simple and complex designs and objects, drawn on cardboard) in a specially-prepared viewing box modeled after an instrument developed by Lucco (1964). As the children looked through the viewing window, they pressed against a lever mechanism which turned on the light inside the viewing box and at the same time activated a timer. When the child removed his head after viewing each stimulus, the light automatically went off and the timer stopped. Consequently, a record of the time spent by the child in looking at each of the twelve stimuli was automatically recorded. The original purpose of the task was to measure the degree to which children would respond differentially to various stimuli, particularly the degree to which they would spend more time looking at complex rather than simple stimuli (preference for visual complexity). The children also differed, however, in the total time which they spent looking at the twelve stimulus pictures (complex and simple stimuli). Since the amount of time spent looking at the stimuli was controlled primarily by the children, the total time scores may be regarded as measures of interest-span for this activity. The relationship is not simple, of course, since factors such as general activity level, fatigue, and desire to please the examiner might also affect the children's viewing times. Most of these factors, however, could be expected to operate in the same direction in determining the children's visual attention in school. Consequently, the viewing time scores from the "preference for visual complexity" task may be considered as an estimate of the degree to which the children will sustain interest in observing visual stimuli. It should be remembered, of course, that the scores are not

TABLE IV-1

Age-Related Changes in Children's Performance on Stylistic Measures of Behavior Management

Measure	N	Observed Norms		Change with Age	Probability Statistics
Draw-a-Circle Slowly Task (seconds)					
Follow-up 1	153	Mean=19.4	SD=13.03	+4.7	$t=2.87$
Follow-up 2	154	Mean=24.1	SD=15.65		$p < .01$
Motor Inhibition (seconds)					
Follow-up 1	153	Mean=167.4	SD=40.20	+3.4	$t=0.84$
Follow-up 2	154	Mean=170.8	SD=30.32		p=NS
Delay of Gratification (choice of deferred reward)					
Follow-up 1	152	69 = 45.4%		+16.3%	$X^2=8.16$
Follow-up 2	154	95 = 61.7%			$p < .01$
Design Recall Test (avg. reaction time)					
Follow-up 1	153	Mean=5.1	SD=2.48	+1.1	$t=3.49$
Follow-up 2	154	Mean=6.2	SD=3.05		$p \leq .01$
Design Recall Test (errors)					
Follow-up 1	153	Mean=41.5	SD=18.46	-14.7	$t=7.32$
Follow-up 2	154	Mean=26.8	SD=16.38		$p < .01$
Preference for Visual Complexity (total seconds)					
Preschool	162	Mean=125.5	SD=127.32	+73.1	$t=4.21$
Follow-up 1	153	Mean=198.6	SD=179.40		$p < .01$
Follow-up 1	153	Mean=198.6	SD=179.40	+17.4	$t=0.90$
Follow-up 2	149	Mean=216.0	SD=154.80		p=NS
Preschool	162	Mean=125.5	SD=127.32	+90.5	$t=5.67$
Follow-up 2	149	Mean=216.0	SD=154.80		$p < .01$

power scores reflecting the children's ability to sustain attention when instructed to do so, but instead are measures of self-determined, spontaneous behavior.

Longitudinal Analysis: Effects of Age, Sex, and Social Status

Group data showing the effects of age, sex, and social class upon the children's performance on the tasks described above are presented in Tables IV-1, IV-2, and IV-3. Data taken at both the first and the second follow-up testing (mean ages 74 months and 86 months) are presented for each task. In addition, data obtained during the preschool study (mean age 49 months) are available for the measure of time spent observing the stimuli in the Preference for Visual Complexity task.

The effects of age upon the children's scores may be seen in Table IV-1. Changes with age were in the expected direction on each measure and were significant for each except the Motor Inhibition task. Inspection of the data for this task reveals that the great majority of the children received the maximum possible score (180 seconds) at both follow-up testings. The previously set three-minute time-limit was apparently so low that the distribution was seriously truncated and variability limited. Consequently, the measure as used does not discriminate properly among the majority of the children in the sample, and the data are not appropriate for the assessment of change with age, since the truncating effects of the time limit prevent discovery of any real changes that might have taken place. As subsequent discussion will show, the fact that the motor inhibition measure discriminates only at the lowest levels of the distribution also limits the degree to which the strength of its relationships to other measures may be assessed.

The other measures show consistent and relatively large age-related changes over the range of ages sampled. Between the first and the second follow-up testings, the children increased their ability to delay the completion of circles in the Draw-a-Circle-Slowly task, increased their average reaction time and decreased their average number of errors on the Design Recall test, and were more likely to delay gratification in order to obtain a larger reward. In addition, they showed a significant increase in the viewing time on the Preference for Visual Complexity task between the preschool testing and the first follow-up testing and showed an additional increase (this time not statistically significant) between the first and second follow-up testing. On all measures, the change with age was in the direction hypothesized to be favorable for educability. In general, the differences between age groups, both in consistency and in magnitude, tended to be more striking than those between social status and sex groups.

Group data by sex and social class are presented in Tables IV-2 and IV-3. Sex differences in the data tend to be inconsistent in direction and low in magnitude, except for a difference favoring girls (second follow-up) in the Draw-a-Circle-Slowly times. Social status differences tend to be consistent but insignificant, with means highest for middle-class children and lowest for lower-class, father-absent children. The only significant social status differences are found in the data from the Design Recall test. The notable and frequently significant differences between the children in the father-absent group and those of the other two working-class groups constitute an unexpected finding, and suggest the possibility that father absence may be particularly detrimental to the development of the self-management behavior assessed by these measures.

Interrelationships among the Measures

Intercorrelations among the child measures are shown in Table IV-4. The stability coefficients expressing the degree of correlation between separate administrations of the same measure appear along the diagonal in the table. Although these coefficients are statistically significant, they tend to be rather low for stability coefficients, ranging from $\underline{r} = .19$ through $\underline{r} = .28$, except for the two measures from the Design Recall test, where $\underline{r} = .49$. Except for average response time and average errors on the Design Recall test, then, there is relatively little stability in the children's performance on these tasks administered one year apart. The stability coefficient relating the time spent observing the stimuli of the Preference for Visual Complexity task at age four with the same measure taken at age seven was only $\underline{r} = .14$, not even statistically significant.

Cross-correlations show relatively little relationship among measures from different tasks, with the exception of the Draw-a-Circle-Slowly times and the two measures from the Design Recall test. Even here, however, only the Draw-a-Circle-Slowly times from Follow-up 1 correlate significantly with the Design Recall test measures; coefficients for Follow-up 2 are in the same direction but at non-significant levels. The children's behavior on the Delay of Gratification task shows occasional relationships with other measures, but these are sporadic and of relatively low intensity. Coefficients involving the Preference

TABLE

Children's Performance on Stylistic Measures

Measure	Social Status								
	Middle Class			Working Class					
				Skilled			Unskilled Father Present		
	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.
Draw-a-Circle-Slowly Task (seconds)									
Follow-up 1	39	22.7	15.61	37	17.8	10.81	37	19.4	12.74
Follow-up 2	38	26.7	13.18	41	23.2	13.72	36	25.3	19.54
Motor Inhibition (seconds)									
Follow-up 1	39	167.9	37.87	37	164.4	46.63	37	168.5	40.49
Follow-up 2	38	164.7	38.56	41	175.8	19.16	36	169.3	36.10
Delay of Gratification (choice of deferred reward)									
Follow-up 1	39	59.0%	--	37	43.2%	--	36	44.4%	--
Follow-up 2	38	78.9%	--	41	65.9%	--	36	58.3%	--
Design Recall Test (average reaction time)									
Follow-up 1	39	5.8	2.03	37	5.1	2.22	37	5.5	3.55
Follow-up 2	38	7.4	2.29	41	6.3	3.72	36	6.1	3.33
Design Recall Test (errors)									
Follow-up 1	39	33.5	17.35	37	39.0	18.79	37	42.4	15.88
Follow-up 2	38	19.0	11.38	41	30.9	17.15	36	26.0	16.05
Preference for Visual Complexity (total Seconds)									
Preschool	40	129.3	96.84	42	122.8	141.08	39	141.9	169.60
Follow-up 1	39	218.3	201.08	37	218.9	228.09	37	210.7	149.38
Follow-up 2	37	274.0	212.10	39	208.3	152.48	35	209.5	130.61

IV-2

of Behavior Management, by Social Status and Sex

Unskilled Father Absent			Sex of Child: Boys			Sex of Child: Girls		
N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.
40	17.7	12.27	75	18.9	12.32	78	19.9	13.75
39	21.3	15.81	75	21.9	14.17	79	26.2	16.77
40	168.6	36.99	75	167.5	40.96	78	167.3	39.72
39	173.1	24.42	75	171.1	30.37	79	170.6	30.47
40	35.0%	--	74	50.0%	--	78	41.0%	--
39	43.6%	--	75	58.7%	--	79	64.6%	--
40	4.1	1.44	75	5.3	2.58	78	4.8	2.37
39	5.2	2.23	75	6.3	2.93	79	6.2	3.17
40	50.8	17.80	75	42.3	18.69	78	40.7	18.31
39	31.1	17.57	75	28.1	15.84	79	25.7	16.89
41	108.9	88.35	81	119.8	125.08	81	131.2	130.04
40	149.4	118.38	75	187.8	159.57	78	209.0	197.07
38	173.3	84.76	71	224.1	144.02	78	208.6	164.57

TABLE IV-3

Social Status and Sex Differences in Children's Performance on Stylistic Measures of Behavior Management[a]

Measures	Contrasts						
	Middle Class vs. Working Class			Working Class Skilled vs. Unskilled		Unskilled Working Class: Father Present vs. Father Absent	Male vs. Female
	Skilled	Unskilled Father Present	Unskilled Father Absent	Father Present	Father Absent		
Draw-a-Circle-Slowly Task (seconds)							
Follow-up 1	ns	ns	ns	ns[b]	ns	ns	ns[b]
Follow-up 2	ns	ns	.05	ns[b]	ns	ns	.05[b]
Motor Inhibition (seconds)							
Follow-up 1	ns	ns	ns	ns	ns	ns	ns
Follow-up 2	ns[b]	ns[b]	ns[b]	ns	ns	ns[b]	ns
Delay of Gratification (choice of deferred reward)							
Follow-up 1	ns	ns	.05	ns[b]	ns	ns	ns
Follow-up 2	ns	ns	.001	ns	.05	ns	ns[b]
Design Recall Test (average reaction time)							
Follow-up 1	ns	ns	.001	ns[b]	.01	.05	ns
Follow-up 2	ns	.05	.001	ns	ns	ns	ns
Design Recall Test (total errors)							
Follow-up 1	ns[b]	.05[b]	.001[b]	ns[b]	.01[b]	.05[b]	ns
Follow-up 2	.001[b]	.05[b]	.001[b]	ns	ns[b]	ns[b]	ns
Preference for Visual Complexity (total seconds)							
Preschool	ns	ns[b]	ns	ns[b]	ns	ns	ns[b]
Follow-up 1	ns[b]	ns	.05	ns	.05	.05	ns[b]
Follow-up 2	ns	ns	.01	ns[b]	ns	ns	ns

[a] All probabilities are from _t_-tests (one-tailed), except for the Delay of Gratification probabilities which were obtained through chi-square.

[b] The mean for the second group exceeded that for the first group.

for Visual Complexity times are perhaps the most puzzling, since they seem to reflect a shift in the meaning of the scores with time. The direction of correlation of earlier scores with other measures is inconsistent, and most significant associations tend to be for boys; in the later data, the cross-correlations are consistent in direction, and tend to be much higher for girls. Much of the explanation for this probably lies in the sex difference in stability coefficients for the Preference for Visual Complexity time scores, which decreased for boys and increased for girls with age. The source of this latter fact is itself unknown, however, so that the shifts in correlational pattern in the sex-related differences remain unexplained. In view of the lack of any other consistent pattern, perhaps the best that can be said for the measure of time spent on the Preference for Visual Complexity task is that it forms a reasonably good stylistic measure for girls by age seven, correlating with the Draw-a-Circle-Slowly times ($\underline{r}$ = .44) and with the Design Recall task reaction times ($\underline{r}$ = .54). For boys of age seven the measure appears to be unreliable and to lack any consistent pattern of correlations with other measures.

Sex-related differences also appear in other aspects of the data. The most obvious one in Table IV-4 lies in the stability coefficients for the Motor Inhibition task ($\underline{r}$ = .03 for boys and $\underline{r}$ = .51 for girls). The reliability of these coefficients is, however, highly suspect; because the distribution was seriously truncated, the coefficients were produced by the deviant scores of a small sub-group of the children. Another difference occurred in the Delay of Gratification task, where boys proved to be more stable than girls in their tendencies to choose the delayed larger reward. These coefficients reflect the differences seen in Table IV-2, which show a slight rise between Follow-up 1 and Follow-up 2 in the boys' percentage but a large gain in the girls'. A considerable percentage of the girls who had chosen the smaller candy at age six opted for the larger one at age seven.

In summary, the cross-correlations are in the expected directions but tend to be low, except for intercorrelations among measures from the Design Recall task. The data show low stability coefficients and important task differences (low cross-correlations), and do not provide evidence for the existence of a common factor affecting the scores on two or more tasks. Correlations tend to be higher for girls than for boys, although many exceptions are present and there is no unambiguously consistent pattern of differences.

TABLE

Intercorrelations among Measures of

Measure	2	3	4	5	6
Draw-a-Circle Slowly Task (seconds)					
1 Follow-up 1	.28** .24** .31**	-.10 -.09 -.11	.01 -.14 .13	.09 .01 .16	.22** .21* .22*
2 Follow-up 2	--	.06 .13 .00	.13 .03 .21*	.08 .18 .02	.09 .13 .05
Motor Inhibition (seconds)					
3 Follow-up 1		--	.27** .03 .51**	.06 .11 .00	.07 .06 .09
4 Follow-up 2			--	.02 -.02 .06	.15 .16 .14
Delay of Gratification (choice of deferred reward)					
5 Follow-up 1				--	.19* .29** .10
6 Follow-up 2					--
Design Recall Test (average reaction time)					
7 Follow-up 1					
8 Follow-up 2					
Design Recall Test (errors)					
9 Follow-up 1					
10 Follow-up 2					
Preference for Visual Complexity (total seconds)					
11 Preschool					
12 Follow-up 1					
13 Follow-up 2					

* = $p < .05$; ** = $p < .01$

a The first (top) coefficient in each group
and girls (bottom).

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Children's Behavior Management[a]

7	8	9	10	11	12	13
.26** .32* .22*	.39** .23* .52**	-.29** -.23* -.35**	-.29** -.32** -.27*	-.02 .07 -.10	.12 .05 .17	.21* -.11 .44**
.08 .15 .04	.15 .15 .14	-.14 -.15 -.13	-.17 -.12 -.19	-.05 -.02 -.09	.11 .11 .09	.07 .13 .05
.04 .09 -.01	.00 -.03 .03	.05 .03 .07	.01 -.01 .03	.15 .15 .15	.12 .09 .15	.12 .07 .17
.10 .14 .07	.07 .05 .09	-.02 .00 -.04	.05 .07 .02	.01 -.06 .07	.09 .12 .07	-.06 -.25* .10
.14 .11 .16	.17 .18 .16	-.08 -.09 -.08	-.22* -.28** -.18	-.19* -.13 -.23*	.02 -.06 .09	.16 .14 .17
.15 .19 .11	.14 .13 .14	-.23** -.19 -.26*	-.20* -.28** -.11	-.04 -.16 .08	.08 .00 .14	-.01 -.09 .06
--	.49** .52** .46**	-.34** -.32** -.36**	-.29** -.32** -.28**	.15 .30* .02	.20* .31** .13	.24** .15 .31**
	--	-.28** -.18 -.37**	-.45** -.49** -.42**	-.03 -.04 -.02	.05 -.07 .14	.33** .04 .54**
		--	.49** .41** .55**	.03 -.10 .14	-.19* -.24* -.16	-.14 -.19 -.12
			--	.17 .09 .25*	-.05 .11 -.16	-.13 .04 -.18
				--	.20* .41** .04	.14 .31** .03
					--	.29** .20 .37**
						--

is for the total sample; the two coefficients below are for boys (middle)

Relations with Measures of School Readiness and School Performance

Correlations reflecting the relationships between measures of child behavior management and measures of school readiness and school performance are shown in Table IV-5. The organization of Table IV-5 departs somewhat from those previously presented, in that measures from two tasks (Motor Impulsivity and Preference for Visual Complexity) are missing and a third (Non-meaningful Responses on the Design Recall test) has been added. The measures omitted from the table were dropped because they did not correlate significantly with the school readiness and school performance measures. Most of the coefficients, in fact, were very close to zero. This was true for both measures of motoric inhibition and for all three measures of time spent viewing the stimuli in the Preference for Visual Complexity task.

The Non-meaningful Responses measure from the Design Recall task is a new measure similar in many ways to the Non-meaningful Placement measure taken on the children's performance on the Block Sorting task. Both are addressed to similar behavior and involve a similar measurement approach, even though the tasks are somewhat different. Their relationship is underscored by the significant correlations obtained between the measure of Non-meaningful Placement taken at age four and the measure of Non-meaningful Responses on the Design Recall test at ages six and seven ($\underline{r}$ = .41, p <.001, for both relationships). The Non-Meaningful Response scores on the Design Recall test were obtained by summing the number of trials in which non-meaningful responses were found. Non-meaningful responses were coded as present when the child appeared to make his selections on the basis of spatial contiguity of the alternative responses rather than on the basis of their resemblance to the stimulus figure. On each trial, the child was presented with ten or twelve alternatives arranged in two equal rows. The most obvious (and most frequent) type of non-meaningful response occurred when the child simply began at the end of one row and continued along it and then along the other row until he reached the "correct" choice. A few children did this for every one of the twelve trials on the test, obviously making no attempt to determine which choice was correct. Other forms of non-meaningful responses, such as beginning in the middle of a row or proceeding through the choices by columns, were less obvious but nevertheless easily detectable. The criterion for presence of non-meaningful responses on a given trial was set at three consecutive choices forming a spatial progression. This criterion seemed most useful for avoiding

TABLE

Intercorrelations Between Measures of
and Measures of School

School Readiness and Performance Measures	Behavior Management: Draw-a-Circle Slowly Task (total seconds) 1	2	Delay of Gratification (delays reward) 1	2
Binet IQ (age 4)	.20* .11 .29**	.28* .28* .25*	.20* .17 .26*	.19* .23 .13
Binet IQ (age 7)	.32** .27* .37**	.32** .38** .28*	.17* .06 .28*	.26** .31** .22*
Lee-Clark Reading Readiness Test: Total	.22* .12 .30**	.23** .32** .13	.21* .37** .09	.30** .36** .22*
Metropolitan Readiness Test	.27** .23* .32**	.26** .38** .17	.25** .20 .31**	.27** .32** .21*
Lee-Clark Reading Test: Primer	.27** .24* .29**	.27** .30** .21*	.12 .18 .09	.28** .28* .26*
Reading Level (at end of second school year)	.23** .17 .30**	.22* .14 .26*	.05 .08 .05	.23** .19 .27*
Arithmetic Level (at end of second school year)	.18* .19 .18	.23** .25* .17	.16 .20 .12	.23** .25* .19
Reading Grades (sum for first two years)	.33** .28* .35**	.30** .31** .26*	.14 .22* .11	.22* .31** .11
Arithmetic Grades (sum for first two years)	.28** .20 .32**	.21* .24* .15	.21* .31** .14	.17* .27* .06
Conduct Grades (sum for first two years)	.21* .21* .19	.19* .21* .11	.05 .11 .04	.17* .21* .10

a The first (top) coefficient of each group is for the total sample; 1 = Follow-up #1; 2 = Follow-up #2
* $p < .05$; ** $p < .01$

Children's Behavior Management
Readiness and Performance [a]

Measures					
		Design Recall Test			
Average Response Latency (seconds)		Total Errors		Non-meaningful Responses	
1	2	1	2	1	2
.24**	.25**	-.28**	-.29**	-.33**	-.28**
.18	.09	-.16	-.22*	-.23*	-.27*
.36**	.43**	-.40**	-.36**	-.45**	-.28*
.33**	.32**	-.40**	-.48**	-.45**	-.42**
.32**	.17	-.38**	-.43**	-.43**	-.42**
.36**	.46**	-.43**	-.53**	-.47**	-.42**
.28**	.23**	-.44**	-.50**	-.51**	-.40**
.24*	.05	-.28**	-.35**	-.37**	-.34**
.38**	.42**	-.61**	-.64**	-.67**	-.47**
.23**	.34**	-.51**	-.54**	-.57**	-.52**
.21*	.28*	-.48**	-.55**	-.58**	-.55**
.29**	.42**	-.55**	-.53**	-.57**	-.49**
.31**	.34**	-.48**	-.50**	-.43**	-.36**
.32**	.27**	-.44**	-.52**	-.43**	-.43**
.33**	.41**	-.51**	-.48**	-.41**	-.34**
.23**	.27**	-.39**	-.36**	-.39**	-.29**
.24*	.24*	-.30**	-.44**	-.39**	-.35**
.28*	.39**	-.47**	-.28*	-.41**	-.22*
.30**	.29**	-.35**	-.28**	-.45**	-.32**
.34**	.31**	-.38**	-.42**	-.43**	-.49**
.26*	.29**	-.33**	-.13	-.46**	-.09
.29**	.25**	-.42**	-.40**	-.46**	-.33**
.26*	.20	-.36**	-.43**	-.45**	-.30**
.38**	.31**	-.47**	-.37**	-.48**	-.34**
.26**	.26**	-.34**	-.44**	-.41**	-.41**
.31**	.30**	-.32**	-.55**	-.44**	-.51**
.24*	.23*	-.35**	-.34**	-.36**	-.30**
.18*	.24**	-.27**	-.25**	-.32**	-.13
.32**	.28*	-.25*	-.26*	-.40**	-.22*
.10	.22*	-.27*	-.13	-.22*	-.02

the two below it are for males (middle) and females (bottom).

false positives (scoring "present" where there was in fact no non-meaningful response) and false negatives (failure to score "present" when there was non-meaningful response). Exceptions to the criterion were made in a few cases in which there were fewer than three responses. In these cases the child had clearly established a non-meaningful response pattern, such as beginning each series of choices with the left-most alternative in the top row.

The correlations in Table IV-5 fall into a consistent pattern: Draw-a-Circle-Slowly times, choice of delayed large reward, and average response latency of the Design Recall task are positively related to school readiness and performance measures, while the scores for errors and non-meaningful responses on the Design Recall test are negatively related to school measures. All of these trends are, of course, in the expected direction. Associations tend to be strongest with the IQ and reading data, next strongest with the arithmetic data, and least strong with the conduct grades. This again underscores the need to avoid thinking about these variables as measures of "impulsivity," since they seem to relate more meaningfully to the relatively restricted sphere of cognitive and problem-solving behavior than to more gross or generalized behavior patterns.

Each correlation from Follow-up 1 tends to be similar in magnitude to its counterpart in Follow-up 2, except that the coefficients involving non-meaningful responses on the Design Recall task tend to drop between the first and the second follow-up. Lower coefficients for non-meaningful responses are apparently related to a decrease in the frequency of this behavior between the first and second follow-up (non-meaningful responses were coded on 33.6% of the trials in Follow-up 1, but on only 12.2% of the trials in Follow-up 2). A much larger percentage of the children were scored zero on this measure in Follow-up 2, limiting the discrimination of the measure and consequently its potential correlation with other measures. The change in percentages apparently represents a genuine drop in the frequency of non-meaningful responses between Follow-up 1 and Follow-up 2 (as opposed to an introduction of more sophisticated non-meaningful response methods which would be too subtle for the criterion to identify), and it is consistent with the increase in decision times and the considerable decrease in total errors reported in Table IV-1.

The measure of non-meaningful responses on the Design Recall test is of interest as a complement to the measure of average response latency on the same test. Both measures tap the child's attitude in approaching the task, but one detects desirable behavior and the other, detrimental behavior. As expected, the measures are negatively associated (intercorrelations range from $\underline{r}$ =-.26 to $\underline{r}$ = -.42). The degree of association is not high enough to negate their separate usefulness, however, and both contribute important information. At the age levels involved in the present research, the measure of non-meaningful responses tends to correlate with school data more strongly than the measure of response latency, although this situation would be expected to change if the frequency of non-meaningful responses continues to decrease as the children get older.

In summary, we find that measures of the children's behavior on the Draw-a-Circle-Slowly task, the Delay of Gratification task, and the Design Recall test show consistent significant correlations with intelligence data, readiness test scores, school achievement data, and school grades. Scores from the Motor Inhibition task and from the Preference for Visual Complexity task are unrelated to the school data. Correlations with IQ and reading scores tend to be higher than those with arithmetic and conduct scores, although even most of the last remain statistically significant. When the correlations are analyzed separately for boys and girls, the direction of association is always the same, and the magnitudes of the coefficients are usually comparable. In general, the behavior management measures tend to correlate more highly with IQ, readiness, and reading achievement data for the girls, while correlations with arithmetic and conduct grades tend to be higher for the boys. It is also noteworthy that behavior management measures correlate most strongly with scores from objective tests, next strongly with grades and achievement in academic subjects, and most weakly with conduct grades. In other words, correlations of measures of behavior management are highest with scores produced by the child himself and affected directly by his test-taking behavior, next highest with grades presumably highly influenced by test scores, and least highest with the grades presumably based on things other than test scores. This pattern suggests that these behavior management variables can be more meaningfully discussed in relation to cognitive behavior than in relation to a generalized trait of "impulsivity."

If the correlations of behavior management scores with school data represent causal relationships, it seems probable that behavior management is the antecedent. Other things being equal, the more effective the child's styles of behavior control, the more likely he is to receive higher scores on objective tests and higher grades in school. Styles of behavior management are presumably learned, however, and therefore may also be viewed as consequent rather than antecedent variables. This perspective is taken in subsequent sections in which environmental factors are investigated for their possible relationship to the development of children's behavior management styles.

Maternal Performance on the Draw-a-Circle-Slowly and Matching Familiar Figures Tasks and Its Relationship to Child Measures

Maternal performance on the Matching Familiar Figures and the Draw-a-Circle-Slowly tasks is presented in Table IV-6. On the Matching Familiar Figures task, both mean response latencies and mean number of errors were reduced between the first and the second administration. Neither trend is statistically significant, but both appear in all group differences and probably should be regarded as slight practice or familiarity effects. Changes between the first and the second administration of the Draw-a-Circle-Slowly task are more irregular, as evidenced by conflicting direction of changes in group means and by a large increase in variance. Inspection of the data revealed that both trends were caused primarily by a few subjects with extremely long Draw-a-Circle-Slowly times on the second administration. Because these few scores produced skewed distributions and tended to distort the group means, the distribution has been cut near the median and recorded as a two-point high/low scale.

Data concerning the differences between social status groups are presented in Table IV-7. On both administrations of the Matching Familiar Figures test, the middle-class mothers had the longest average response latency and the lowest error total, with the skilled-working-class mothers next and the unskilled-working-class mothers farthest removed from the middle-class norms. Many of the group differences are statistically significant, and all of these are in the expected direction, showing longer response latencies and lower error totals with higher social status. In general, the pattern of group differences shown in Table IV-7 is typical of that found for maternal performance measures obtained in the preschool phase of the research.

Group differences in the Draw-a-Circle-Slowly task presented in Table IV-7 are inconsistent due to the great increase in variance for the second set of data. There is some evidence of an increase in time scores with higher social status, although the fluctuation in means makes this interpretation cautionary at best. Generally, the test-retest differences within groups tend to exceed the between-group differences within each administration.

Interrelationships among the maternal measures are shown in Table IV-8. Here the unreliability of the Draw-a-Circle-Slowly scores shows up clearly: the correlation between the means for the first and second administration (the stability coefficient) is only .05, not even reaching statistical significance. When the high/low scores are substituted for the distribution of times on the second

TABLE

Maternal Performance on the Matching Familiar

	Total Sample			Middle Class		
	N	Mean	S.D.	N	Mean	S.D.
Matching Familiar Figures Average Reaction Time (Response Latency) (seconds)						
Follow-up 1	155	12.9	5.88	39	14.9	6.48
Follow-up 2	144	11.8	4.93	36	14.1	5.84
Total Errors						
Follow-up 1	155	12.3	6.31	39	9.6	5.58
Follow-up 2	144	11.2	5.84	36	8.5	4.77
Draw-a-Circle Slowly Total Seconds						
Follow-up 1	155	40.7	41.08	39	41.5	56.98
Follow-up 2	145	49.4	115.32	36	47.9	52.21
Above high-low cutting score						
Follow-up 2		44.8%			63.9%	

IV-6

Figures and Draw-a-Circle-Slowly Tasks

Social Status								
Working Class								
Skilled			Unskilled					
			Father Present			Father Absent		
N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.
41	12.9	6.27	36	12.7	5.26	39	11.1	4.86
40	11.9	4.50	32	10.8	4.44	36	10.3	4.09
41	11.4	4.91	36	14.4	6.80	39	14.1	6.80
40	10.3	3.97	32	14.0	7.67	36	12.3	5.47
41	42.8	32.65	36	48.6	44.21	39	30.5	22.38
40	68.6	179.56	32	27.4	21.32	37	49.1	119.95
	55.0%			21.9%			35.1%	

TABLE IV-7

Social Status Differences in Maternal Performance on the Matching Familiar Figures and Draw-A-Circle-Slowly Tasks[a]

Measures	Contrasts: Middle Class vs. Working Class: Skilled	Middle Class vs. Working Class: Unskilled: Father Present	Middle Class vs. Working Class: Unskilled: Father Absent	Working Class: Skilled vs. Unskilled: Father Present	Working Class: Skilled vs. Unskilled: Father Absent	Unskilled Working Class: Father Present vs. Father Absent
Draw-a-Circle-Slowly Task (seconds)						
Follow-up 1	ns[b]	ns[b]	ns	ns[b]	.05	.05
Follow-up 2	ns[b]	.05	ns[b]	ns	ns	ns[b]
Matching Familiar Figures Task						
Average Reaction Time (seconds)						
Follow-up 1	ns	ns	.01	ns	ns	ns
Follow-up 2	.05	.01	.001	ns	.05	ns
Total Errors						
Follow-up 1	ns[b]	.001[b]	.01[b]	.05[b]	.05[b]	ns
Follow-up 2	.05[b]	.001[b]	.01[b]	.01[b]	.05[b]	ns

[a] All probabilities are from one-tailed t-tests.
[b] The mean for the second group exceeded that for the first group.

TABLE IV-8

Interrelationships among Measures of Maternal Performance on the Draw-a-Circle-Slowly and Matching Familiar Figures Tasks[1]

Measure	Matching Familiar Figures				Draw-a-Circle-Slowly		
	Average Response Latency		Total Errors		Total Seconds		High/Low Score
	1	2	1	2	1	2	2
Matching Familiar Figures							
Average Response Latency							
Follow-up 1	--	.38**	-.25**	-.11	.13	-.07	.04
Follow-up 2		--	-.08	-.24**	.17*	.03	.20*
Total Errors							
Follow up 1			--	.66**	-.06	-.13	-.06
Follow-up 2				--	-.01	-.08	-.16
Draw-a-Circle-Slowly							
Total Seconds							
Follow-up 1					--	.05	.28**
Follow-up 2						--	.32**
High/Low Score							
Follow-up 2							--

[1] All coefficients are Pearson r's except those involving the "High/Low" Score (last column), which are biserial r's.

* $p < .05$; ** $p < .01$

TABLE IV-9

Relationships between Maternal Performance on the Matching Familiar Figures and Draw-a-Circle-Slowly Tasks and Measures of Stylistic Aspects of the Children's Behavior[a]

Children's Measures	Maternal Measures: Matching Familiar Figures, Ave. Response Latency 1	Ave. Response Latency 2	Total Errors 1	Total Errors 2	Draw-a-Circle-Slowly, Total Seconds 1	Total Seconds 2	High/Low Score 2
Draw-a-Circle-Slowly, Total Seconds							
Follow-up 1	.10	.14	-.03	-.12	.06	.05	.04
	.05	.09	-.12	-.22*	.00	.07	.00
	.15	.20	.05	-.01	-.10	.04	.08
Follow-up 2	.22*	.10	-.15	-.07	-.06	.00	.05
	.24*	.14	-.15	-.16	-.02	-.03	.01
	.20	.06	-.16	.02	-.10	.06	.07
Inhibition of Speech and Movement, Total Seconds							
Follow-up 1	.03	-.19*	-.12	-.04	.10	.04	-.01
	.05	-.27*	-.16	.02	.05	.04	-.13
	.02	-.08	-.08	-.10	.16	.04	.11
Follow-up 2	-.06	-.06	.01	-.04	.10	.05	.01
	-.10	-.09	.06	.02	.11	.04	-.11
	-.02	-.02	-.03	-.10	.09	.07	.13
Delay of Gratification, Choice of Delayed Large Reward							
Follow-up 1	.22*	.11	.00	-.03	.06	.05	.06
	.17	.02	.01	.01	.01	.13	.12
	.28*	.24*	-.01	-.10	.11	-.11	-.02
Follow-up 2	.22*	.17	-.12	-.08	.09	.12	.02
	.27*	.16	-.05	.02	.11	.14	.08
	.17	.18	-.19	-.21*	.07	.09	-.05

	Ave. Response Latency 1	Ave. Response Latency 2	Total Errors 1	Total Errors 2	Total Seconds 1	Total Seconds 2	High/Low Score 2
Design Recall Test, Average Response Latency (seconds)							
Follow-up 1	.14	.23*	-.12	-.18*	.17*	.19*	.13
	.19	.16	-.19	-.22*	.20	.21*	.24*
	.08	.33**	-.05	-.14	.13	.15	.01
Follow-up 2	.09	.14	-.14	-.20*	.14	.03	.04
	.10	.05	-.16	-.18	.12	.06	.16
	.08	.24*	-.12	-.23*	.17	-.03	-.08
Design Recall Test, Errors							
Follow-up 1	.03	-.14	.11	.19*	.07	-.15	-.06
	.17	-.10	.15	.20	.08	-.27*	-.29**
	-.10	-.18	.08	.17	.06	.01	.16
Follow-up 2	-.22*	-.14	.18	.18	-.12	-.11	.00
	-.17	-.19	.20	.23*	-.18	-.24*	-.20
	-.26*	-.08	.17	.11	-.05	.07	.19
Preference for Visual Complexity, Total Seconds							
Age 4	-.13	-.12	.06	.01	.01	-.06	.02
	-.03	-.10	-.06	-.10	.11	-.07	.17
	-.23*	-.15	.18	.13	.09	-.03	-.11
Follow-up 1	.05	-.02	-.09	-.12	-.07	-.02	.02
	-.05	.01	-.02	-.09	-.08	-.02	.09
	.13	-.04	-.15	-.14	-.06	-.02	-.03
Follow-up 2	.13	.08	-.05	-.08	-.01	-.06	.15
	.21*	-.09	.03	.05	-.15	-.08	.27*
	.05	.27*	-.12	-.23*	.13	-.05	.05

[a] The first (top) coefficient of each group is for the total sample; the second and third are for males and females, respectively.

* $p < .05$; ** $p < .01$

administration, a statistically significant but nevertheless low stability coefficient is obtained (biserial r = .28, $p<.01$). Stability coefficients for the Matching Familiar Figures data are r = .38 for the response latencies and r = .66 for the total errors. A few significant relationships among the variables appear in the cross-correlations, showing that response latency on the Matching Familiar Figures task tends to correlate negatively with the error totals on the same task and positively with the Draw-a-Circle-Slowly times. Although all significant correlations are in the expected direction, they tend to be quite low and are not replicated across administrations.

Correlations between maternal and children's measures are presented in Table IV-9. Not surprisingly, in view of the instability and the lack of interrelationship among the maternal measures, the coefficients in Table IV-9 tend to be low in magnitude and inconsistent in direction. Thus, despite some consistent and expected group differences and patterns of correlation with other variables, there are no consistent relationships between the mothers and the children on measures of self-management and problem solving style, even though the measures were taken from identical or very similar tasks. The performance of the children on these variables must be regarded as independent of maternal standing on the same variables. The possibility that the child data may show relationships to other maternal behavior remains, however, and will be discussed in the following section.

Relationships between Maternal and Home Environment Measures and Measures of Behavior Management and Control in the Children

Correlations relating maternal and home environment measures to the measures of behavior management and control in the children are presented in Table IV-10. As the table shows, many measures of maternal and home environment are consistently and significantly correlated with the child measures, even though measures of maternal performance in similar tasks were not. Significant correlations were obtained regularly with measures from the Design Recall test, and frequently from the Delay of Gratification task and the Draw-a-Circle-Slowly task. Because correlations with the Motor Inhibition scores and with the time scores from the Preference for Visual Complexity task were for the most part not significant, these coefficients were omitted from Table IV-10. The absence of a consistent correlational pattern involving the measures from these two tasks presumably results from the design and reliability difficulties described previously. Effects of relatively low

TABLE

Intercorrelations between
and Measures of Child-

Maternal and Home Environment Measures			Child	
	Draw-a-Circle-Slowly Slowly (seconds)		Delay of Gratification	
	1	2	1	2
General Environment				
(Corrected) Social Status	.14	.09	.16	.24**
	.07	.13	.16	.26*
	.19	.07	.16	.21*
Availability and use of	.16	.13	.09	.25**
home resources	.17	.18	.05	.39**
(Home Resources Factor)	.15	.08	.13	.11
Maternal support toward	.14	.18*	.07	.31**
child (interviewer	.16	.25*	.03	.42**
rating)	.13	.12	.12	.19
Maternal Performance				
WAIS Full Scale IQ	.21*	.07	.19*	.24**
	.16	.07	.15	.21*
	.26*	.06	.24*	.27*
Language Factor Score	.18*	.07	.01	.21*
	.05	.07	.02	.12
	.39**	.08	-.01	.31**
Maternal Control Strategies				
First Day:	-.13	.00	.03	-.17*
% Imperative	-.17	-.05	.00	-.20
	-.09	.05	.06	-.13
School-Peer:	-.10	-.12	-.11	-.22*
% Status-Normative	-.02	-.21*	-.18	-.27*
	-.15	-.06	-.05	-.18
Mastery:	-.11	-.09	-.04	-.08
% Status-Normative	-.03	.01	.04	-.08
	-.26*	-.21*	-.12	-.09
Maternal Teaching Behavior in Observed Interaction				
Number of models mother	.17*	.11	.08	.19*
shows child (Etch-a-Sketch)	.15	.16	.00	.13
	.19	.07	.17	.24*

IV-10

Measures of Home Environment
ren's Behavior Management[a]

Measures					
Design Recall Test					
Ave. Latency (First Resp.)		Total Errors		Non-meaningful Resp.	
1	2	1	2	1	2
.17*	.24**	-.30**	-.24**	-.33**	-.18*
.11	.12	-.25*	-.12	-.21*	-.11
.24*	.34**	-.34**	-.35**	-.45**	-.26*
.22*	.23**	-.36**	-.29**	-.35**	-.23**
.16	.16	-.41**	-.23*	-.36**	-.13
.28*	.30**	-.30**	-.34**	-.35**	-.33**
.25**	.22*	-.24**	-.32**	-.22*	-.29**
.28*	.23*	-.27*	-.30**	-.26*	-.28*
.22*	.22*	-.20	-.33**	-.18	-.31**
.28**	.35**	-.29**	-.31**	-.38**	-.36**
.22*	.29**	-.19	-.25*	-.27*	-.39**
.36**	.41**	-.38**	-.37**	-.48**	-.32**
.17*	.31**	-.36**	-.22*	-.39**	-.18*
.14	.27*	-.33**	-.19	-.31**	-.13
.19	.34**	-.39**	-.24*	-.46**	-.23*
-.23**	-.27**	.13	.30**	.16	.24**
-.24*	-.29**	.05	.31 **	.15	.22*
-.23*	-.25*	.21*	.27*	.18	.26*
-.30**	-.26**	.32**	.25**	.31**	.20*
-.32**	-.24*	.27*	.25*	.25*	.19
-.31**	-.28*	.36**	.25*	.37**	.21*
-.15	-.31**	.08	.18*	.13	.14
-.07	-.26*	.01	.18	.08	.12
-.23*	-.35**	.15	.17	.19	.16
.13	.27**	-.27**	-.31**	-.30**	-.23**
.14	.13	-.25*	-.14	-.19	-.17
.14	.39**	-.28*	-.44**	-.40**	-.?8*

IV- 10 -(continued) TABLE

Maternal and Home Environment Measures	Child			
	Draw-a-Circle-Slowly Slowly (seconds)		Delay of Gratification	
	1	2	1	2
Number of specific turning directions (Etch-a-Sketch)	.10	-.04	.06	.26**
	.14	-.02	.09	.38**
	.07	-.09	.06	.16
Requests for block Placement (Block Sorting task)	-.13	-.23**	-.22*	-.08
	-.02	-.30**	-.38**	-.25*
	-.23*	-.16	-.09	-.08
Praise and engagement (factor score)	.14	.07	.14	.21*
	.12	.14	.09	.32**
	.17	.01	.20	.08
<u>Maternal Locus of Control</u>				
Locus of control scale (James), externality score	-.10	-.08	-.18*	-.20*
	-.14	-.09	-.11	-.26*
	-.07	-.07	-.23*	-.15
Internality-externality (Rotter), externality score	-.08	.04	-.12	-.09
	-.16	.01	-.01	-.12
	-.29*	.07	-.26*	-.07

[a] All coefficients are adjusted to reflect the actual direction of associa- in each group is for the total sample; the others are for boys (middle) scales were administered to the mothers during the follow-up. All

1 = Follow-up 1; 2 = Follow-up 2

* p< .05; ** p< .01

IV-10 (continued)

Measures					
Design Recall Test					
Ave. Latency (First Resp.)		Total Errors		Non-meaningful Resp.	
1	2	1	2	1	2
.01	.09	-.14	-.19*	-.16	-.19*
.13	.16	-.18	-.25*	-.29**	-.27*
-.07	.04	-.10	-.13	-.05	-.11
-.14	-.14	.26**	.36**	.32**	.38**
.00	-.03	.23*	.34**	.22*	.45**
-.32**	-.24*	.28*	.38**	.43**	.30**
.17*	.22*	-.10	-.28**	-.21*	-.31**
.19	.22*	-.11	-.36**	-.26*	-.42**
.13	.23*	-.09	-.22*	-.15	-.17
-.19*	-.20*	.17*	.16	.21*	.15
-.17	-.26*	.19	.14	.15	.13
-.19	-.14	.16	.19	.28*	.18
-.27**	-.19*	.34**	.24*	.25*	.25*
-.14	-.10	.35*	.21	.24	.23
-.43**	-.31*	.33*	.28*	.25*	.29**

tion between the variables as labeled. The first (top) coefficient
and girls (bottom). Part of the WAIS and both of the Locus of Control
other maternal and home data were collected in the preschool study.

stability coefficients among children's measures are found in Table IV-10 as considerable changes in magnitude of correlations between the first and second follow-up or between the first and second follow-up or between the boys and the girls; the direction of association remains the same, however, and the general pattern is clear.

The data of Table IV-10 clearly show that high scores on the children's measures of behavior management, like high scores on other child data in this research, tend to be associated with social status and the resources of the family, maternal intelligence and verbal facility, maternal control strategies and teaching styles. An additional maternal factor investigated in the follow-up study also appears: the mother's sense of control over her life and its rewards. There is some tendency for the measures of maternal IQ and language to be more closely related to the girls' scores, and for other maternal measures and social status to relate more closely to the boys' scores, but these differences are in magnitude and not in direction of association. The overall pattern clearly indicates that children who are more able to delay gratification in the interest of obtaining a larger reward, to control motor movement on request, to reflect over alternative choices before making a response, and to approach tasks in a way minimizing errors and non-meaningful responses tend to come from relatively more advantaged homes and to have mothers who are relatively superior on a wide range of performance measures.

The data of Table IV-10 should not be surprising, since they indicate that measures of behavior management in the children are associated with those maternal and home environment measures regularly showing strong relationships with the children's IQ, school achievement, school grades, and other important performance measures. In direction and consistency they bear out expectations of the probable effects of home resources, maternal control strategies, maternal teaching behavior, and maternal feelings of powerlessness. Correlations are generally lower with the stylistic child measures than with the more clearly cognitive aspects of educability. Nevertheless, a clear trend is present which suggests that behavior management styles in children are developed in reaction to the kinds of attitudes and interactions that the environment provides, and that general parental behavior, rather than specific parental traits in the same area, predicts the styles developed by the children. The data of Table IV-10 also suggest that coefficients tend to increase with age and that they are higher and more consistent where the child data are more stable. Both of these suggest that coefficients will increase and the pattern become more uniform as the children get older.

Summary Discussion

Because design and reliability difficulties were found in the measures of Motor Inhibition and Preference for Visual Complexity, no interpretation could be made of their relationship to other variables. The data obtained from the other measures of behavior management, however, generally conformed to expectations based on previous research and theory. Measures of the children's intelligence, school readiness, and school performance showed positive and significant correlations with Draw-a-Circle-Slowly times, choice of delayed large reward, and average response latency of the Design Recall task; they were negatively related to the scores for errors and non-meaningful responses on the Design Recall test. Associations tended to be strongest with scores on standardized tests and least strong with conduct grades. Even though measures of maternal performance in self-management and problem-solving tasks were not correlated with the children's similar behavior management measures, many other measures of maternal and home environment were. The data indicated that children more able to delay gratification, to control motor movement, to reflect before responding, and to minimize errors and non-meaningful responses tended to have mothers of higher IQ and language facility who provided a rich variety of home resources, avoided imperative and status-normative control strategies, and taught more effectively.

The group data by age and sex closely parallel previous findings. Within the age range sampled, the children receive higher scores as they get older, while sex differences tend to be small and inconsistent in direction. These findings parallel those reportsd by Mischel (1961a, 1962) for the delay of gratification measure and by Kagan (1965a) for the design recall test. There is some evidence that with increasing age, girls' performance scores will tend to be higher than boys; but data from at least one more point in time would be required to establish this firmly.

The differences among the social status groups also confirmed expectations, since there was a general trend for higher status children to perform more effectively on the various measures. The differences are smaller than might have been expected, especially at the first follow-up, but they appear to be increasing as the children get older; this trend is more noticeable and consistent for social status differences than for sex differences. Perhaps the most notable group difference is the weak performance of the lower-lower-class, father-absent group relative to the other children. Differences between this group and the others are more consistent and larger on the behavior management measures than in the other child data.

The greater effect of father-absence on behavior management measures was not specifically hypothesized, although in general it was expected that father-absence would be negatively associated with child performance measures.

Mischel (1958, 1961c) has reported an association between preference for immediate gratification on the delayed gratification task and father-absence for children aged seven to nine, in two West Indian cultural groups. This finding was replicated by Mischel in groups of children aged eight to nine, but no difference between father-present and father-absent groups was found in children aged eleven through fourteen. The present findings provide another instance of association between preference for immediate reinforcement and father-absence in young children, and, like Mischel's reported group differences, can be interpreted as reflecting general environmental disadvantage--if father-absence is postulated to be *prima facie* evidence of disadvantage in otherwise comparable families. This interpretation fails to indicate any of the mechanisms that may be involved, however, and it cannot explain Mischel's failure to find the expected group difference among the older children studied. In addition to father-absence, Mischel has found that the preference for immediate over delayed reinforcement is associated with juvenile delinquency (1961a), low *n* achievement (1961b), acquiescence set (1961b), and various differences in values and culture patterns (1961c). Although these findings may be helpful in understanding the meaning of the behavior involved in delay of gratification, they do not seem to suggest any explanations for the findings regarding father-absence.

Recent discussions suggest that delayed gratification itself is too little understood to permit adequate explanation of its relationship to father-absence. Attempts to treat delay of gratification as equivalent to impulse control, a personality trait which, once established, is essentially unaffected by situational factors, have been strongly challenged; individuals' willingness to delay gratification has been shown, for example, to vary in some instances according to the probability of achieving gratification at the end of the deferment period (Miller *et al.* 1965). This suggests that the explanation for the relationship of father-absence to delay of gratification might be found in the effects of father-absence on the child's trust in promises or in the future, an hypothesis presented by Mischel in more limited form (Mischel, 1958). Father-absence may also be found to relate to relative values placed on the deferred reward, and to the degree of unpleasantness resulting from deferment. At the present time the relative influences of situation, social class, and "impulsivity" on delay of gratification are imperfectly understood. Data from the Delayed Reward Task in this study are not taken to support any one explanatory hypothesis; they do, however, support the notion that social status differences will be found in some deferred gratification situations.

Kagan has been severely criticized (Fisher, 1966) for referring to children with short response latencies on his tasks as "impulsive." The term is unfortunate because of its inappropriate connotations; Fisher (1966), moreover, has shown that Kagan's measures do not discriminate between normal children and children who are extremely impulsive, in the usual sense of the word. In his writings, Kagan is usually careful to point out where the stylistic dimension he described is expected to operate and where it is not; however, he continues to describe the dimension as "reflection-impulsivity." Low performance scores on the other measures reported in this chapter have also sometimes been referred to as "impulsivity," although use of the term in those contexts is not appropriate either. Examination of the intercorrelations among the measures reaffirms the necessity for these cautions.

If the intercorrelations among the measures (see Table IV-4) are viewed as a multitrait-multimethod matrix (Campbell and Fiske, 1959), it is clear that they provide no evidence for the existence of an underlying factor of "impulsivity." Even if we exclude the data from the motor inhibition task because it fails to discriminate sufficiently, and even if we allow for the attenuating effects of the low stability coefficients on some of the other tasks, it remains clear that most of the variance is related to method (task) and various unknown factors. A similar conclusion--that there is no evidence for "impulsivity"--can be drawn from the correlations with other child data. Correlations of the child behavior management measures are highest with IQ and readiness tests, next highest with achievement tests, third highest with academic grades (presumably based in part on test scores), and lowest with school conduct grades. Cross-correlations are highest, then, when they relate measures of response process in performance tasks to scores from other performance tasks. As the stylistic measures move away from response process in a problem-solving context (toward simple inhibition or naturalistic behavior in unstructured situations), and as performance criterion measures move away from direct test scores, strength of association is diluted.

For the most part, the data from the Design Recall test bear out Kagan's findings and are consistent with his comments concerning tasks and conditions under which his dimension is relevant. In addition, however, they provide further evidence that short reaction time should not be identified as "impulsivity." In his various publications on the subject (Kagan *et al*. 1964; Kagan, 1965a, 1966b), Kagan has attempted to account for reaction times in terms of anxiety connected with fear of failure. He has been inconsistent in this regard, however, proposing two separate explanations which seem to conflict with each other. In an early article (Kagan, et al. 1964) three possible sources of low reaction times are considered: constitutional predisposition to restlessness, as in some types of brain-injured children; ego-involvement, in which low reaction times would be associated with low performance standards; and anxiety connected with fear of failure, in which low reaction times would appear in children unable to tolerate pre-response silence and thus likely to blurt out a tension-breaking response. The last hypothesis was stresses as the most likely explanation, although no particular evidence in support of it was offered.

In more recent publications (Kagan, 1965a, 1966b), Kagan has discussed the problem in terms of the relative values placed on avoiding failure and achieving immediate success. He suggests that low reaction times occur in children who value quick success more than they fear failure. This hypothesis was based in part on data showing that children with short reaction times tended to choose easier rather than more difficult tasks for themselves, to be uninhibited in initiating peer group interaction in a new situation, and to be likely to attempt physically dangerous activities (Kagan, 1965a). These data are consistent with Kagan's interpretation, although they cannot be said to consititute any direct evidence for it. A later study attempted to provide more specific evidence by testing the hypothesis that reflective children would show greater fear of failure (Kagan, 1966b). Results, however, were mixed and mostly negative. On the whole, reflective children did not seem to have a greater fear of failure than children with short reaction times. Kagan's hypotheses, then, appear contradictory, for they predict that anxiety or fear of failure will be related to both low and high reaction times. Neither hypothesis is supported by Kagan's data, however, since no clearcut relationship between fear of failure and reaction time has been established. A recent study by Ward (1968) also failed to find an interpretable relationship between fear of failure in children and their reaction times on these tasks.

The present research is not consistent with either of Kagan's attempts to use anxiety to explain reaction times. However, it does provide somewhat direct evidence favoring one of the hypotheses which Kagan considered but did not adopt: the idea that reaction times are associated with the degree of ego-involvement of the subject and the performance standards that he sets for himself (or more loosely, his achievement motivation). Evidence for the latter interpretation is provided by the correlates of

-.42 (Follow-up 1) and -.34 (Follow-up 2) of the "non-meaningful responses" measure with the reaction time measure on the Design Recall test. Furthermore, because of the high correlations between non-meaningful response sequences and total errors (.80 and .76 in the first and second follow-ups), it appears that a considerable part of the correlation between the errors totals and the reaction time scores, (-.34 and -.45 in the first and second follow-ups) is explained by the data from those children who made non-meaningful responses. In view of these data, a new interpretation is offered for the meaning of the short response times. The child who produces non-meaningful responses (in the sense defined) may be assumed to have neither a strong value on immediate success nor a fear of the consequences of failure. Success and failure are actually irrelevant for this child, since his responses are not genuine attempts to fulfill the task instructions, but instead are merely attempts to get the task over with as quickly as possible without openly refusing to cooperate. His responses suggest a lack of achievement motivation and ego-involvement in the task. The child's short reaction times are not surprising, since he is not making any real decision; he is merely pointing to the figures in some spatial order rather than in an order determined by their perceived similarity to the stimulus figure.

Kagan (1966b) discussed alienation from the task as a possibility but dismissed it as a major cause of short reaction times, apparently because he did not think it would be an important factor in the response processes of young children (he seemed to think it would apply only, or at least primarily, to the high school dropout who had slowly developed such an attitude over a longer period of years). The present research shows that refusal to learn can and does occur even in the preschool years, especially among children from disadvantaged backgrounds. Children who become alienated in this manner tend not to openly resist the task as the merely bored or restless child might do, nor do they show concentration of effort, signs of anxiety or agitation, or other indicators of a strong need to achieve or a strong fear of failure. Instead, they maintain outward appearances of continued task involvement and cooperation, behind which they have switched from attempts to follow the instructions to attempts to get through with the task as quickly as possible.

Kagan has not gone into the question of the possible environmental antecedents of a reflective attitude in the problem-solving situation, although recent studies (Kagan, Pearson, and Welch, 1966; Yando and Kagan, 1968) have shown the possibility of changing children's behavior on this dimension through modifying the classroom situation.

These changes have usually been attributed to the effects of modeling and direct reinforcement. Data from the present research support the hypothesis of direct reinforcement but not the hypothesis of modeling. The modeling hypothesis would predict a degree of correlation between the reaction time scores of the mothers and those of their children, but such correlations in this research tended to be low (usually not even statistically significant). The reflective attitude in the children was correlated, however, with maternal use of control strategies which favor the development of tendencies to consider alternatives in thought and action. This suggests that a reflective attitude is developed in response to socialization practices reinforcing this behavior.

The finding that reflective attitudes in the children tend to be independent of maternal behavior on similar measures but nevertheless tend to correlate with maternal control strategies is consistent with the general body of data coming out of this research. It is another example of the general finding that the attributes of children on factors relevant to cognition and educability are understandable as behavior learned in reaction to parental socialization practices. Differences in important aspects of parental behavior are correlated with social status and presumably underlie the social status differences observed in children and the phenomenon of the "culturally disadvantaged" child. Since maladaptive attitudes and behavior in children develop as learned responses to the environment, they should be modifiable through remedial education or other intervention procedures. Once maladaptive behavior becomes established, however, spiraling effects of repeated action-reaction chains can result in its becoming deeply ingrained in the child, solidified to the point of "functional fixity." It is because of this phenomenon that the problem of eliminating maladaptive attitudes and behavior in young children is described as a re-socialization problem rather than merely a socialization problem.

CHAPTER V

THE CHILD'S COGNITIVE DEVELOPMENT

Although it is now generally accepted that concepts are acquired through highly complex learning processes, it has not yet been established whether cognitive development always follows the same general pattern, proceeding in a sequential, invariant order (Sigel, 1964). Evidence is slowly gathering, however, that cognitive development is stage-dependent, that is, that certain types of knowledge and concepts cannot be attained until necessary and specifiable stages of development have been mastered and passed through. If this is true, and if these stages of development are influenced by various environmental and mediating factors (for example, socioeconomic status-related experiences), then critical conclusions can be drawn about children's educability and school curricula. Suppose, for example, that the disadvantaged first-grader can be shown to be behind the middle-class first-grader in his attainment of the ability to classify; assume further that first-grade curricula at present presuppose this ability. The disadvantaged child would then experience unnecessary but frustrating school failures stemming from inadequate school materials or teaching techniques.

Thus it was decided to identify if possible the stages of cognitive development in which the children in our research population could be found during their first two years of school, and to look for relationships between these aspects of development and other measures of the children's behavior and performance, especially school performance. Since Piaget and his followers have developed the most comprehensive and detailed stage-dependent theory of cognitive development (Flavell, 1963), it was decided to administer some experimental tasks based on Piagetian ideas of conservation behavior in 6 and 7 year olds (the end of the period of "intuitive thought" and the beginning of the period of "concrete operations"). "Conservation" refers to the ability to conceive that some attributes of an object remain invariant as other attributes are perceived to change, to know for example that the size of an object does not change when it is moved from one place to another, or that a quantity of liquid does not change when it is poured from a short, fat glass into a tall, thin glass. The very young child is likely to think that if the liquid is higher in the tall glass, there is more of it, or that if the object moved away from him appears smaller, then it is actually smaller. Size and quantity are only two concepts involved in the ability to conserve; other concepts include those of length, number, mass, and weight. The ability to conserve, or the ability to maintain a conceived invariance against perceptual variances, appears at different ages for different concepts; number, for example, is believed to be conserved quite some time before weight. On the whole, however, conservation behavior appears at about the age of 7 and once obtained is apparently permanent. It is clear that the person who cannot conserve cannot use the kind of thinking and logic that is prerequisite to many school subjects (and to "adult" thought); he lacks the necessary notion of the "real," or of an external world independent of his thought and perception. Thus, when investigating educability, it is of value to understand children's ability to conserve, and possible environmental influences upon it. Children's notions of reality are also believed to go through stages of development which are reflected in part by their responses to questions about dreams; accordingly, a dream interview was administered to the youngsters.

The present chapter will focus on these aspects of cognitive development (children's ability to conserve and notions of the reality of dreams), relating them to one another, to intelligence and school performance data, and to relevant aspects of the home environment. The longitudinal data will, in addition, provide some information on the hypothesized invariance of stages in cognitive development (as defined by Piaget); most previous studies using Piagetian tasks have been cross-sectional instead of longitudinal and thus the data from this study will provide a much-needed contribution to knowledge about "Piagetian" cognitive development.

Procedures

The six Piagetian tasks briefly described below were administered to the children during each follow-up summer session (see Appendices B-G for further details of administration and scoring).*

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*The Piaget-type tasks discussed in this chapter were devised and developed by L. Kohlberg and R. DeVries in order to provide more standardized, less verbally dependent task procedures than those hitherto available. (Kohlberg, 1966; Kohlberg, in preparation; DeVries, in preparation). Their use in this study is gratefully acknowledged.

A more detailed analysis of the data reported in this chapter and of further follow-up data is being made by N. Kohn for her doctoral dissertation, focusing (see next page)

<u>Number Conservation</u>. To test whether the child could conserve number, that is, to test whether the child's <u>logical</u> structure of number was more powerful than his <u>perception</u>, the child was shown two different arrangements of plates with M & M candies and asked to select from each one the plate of M & M's that contained more candy. Eleven candies of the same color were used in the first of these arrangements; six were equally spaced on a cardboard pizza plate in a 12" line parallel to the child's line of sight, and five were equally spaced on another pizza plate in an 8" line parallel to the first line. The two lines of candies were approximately a foot apart. The second arrangement was much like the first, except that the six candies were spaced in a 4" line instead of a 12" line, and were on the right-hand plate instead of the left-hand plate.

To begin the task, the child was shown the first arrangement (the one with six candies in a longer line). After receiving the correct answer to which plate had more candy, the examiner rearranged (constricted) the six candies in the 12" line into a shorter 4-1/2" line, and told the child that if he could pick which plate then "had more candy to eat," he could eat the candy. The child was allowed to take the candy he chose, whether he was correct or not. The child was then shown the second arrangement, asked to choose the plate with more candy, and allowed to take his choice. If (for the first arrangement) the child did not choose correctly after constriction, or if (for the second arrangement) he did not show ability to discriminate an array from an amount, the examiner would spread out the six candies in the second arrangement into a 12" line, count both plates for the child, say the plate with six had more candy, and then quickly rearrange the six candies back into the shorter line. If the child could then respond that the plate with six M & M's had more candies, he was credited with having "conserved with help."

Dichotomous pass-fail scores were given, "passing" requiring consistent conservation response. A total score was also given for the task, indicating how many of seven number conservation items were passed by the child. Five of these items were questions designed to establish whether the child possessed concepts underlying the ability to conserve; the other two items indicated the presence or absence of conservation behavior and are also reported separately as the dichotomous pass-fail score.

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*(continued) more on the longitudinal evidence for sequentiality of stage progression in the different socioeconomic status groups and on task interrelationships (Kohn, in preparation). Data reported in this chapter from the Dream Interview and Ring Segment Illusion task (age 6) must be considered tentative and preliminary. Age 7 data for these same measures was not available at the time this report was prepared.

Length Conservation. For Piaget, one of the important developments in the child's acquisition of conceptual thought is the gradual appearance of the effects of previous knowledge upon his thinking. Piaget and Taponier (1955-6), for example, argued that the conservation of length against illusion shows the ability to integrate two temporally separate experiences into a single judgment and thus suggests the presence of conceptual thinking rather than dependence on perception. The task used in this study differed from Piaget's in that sticks of unequal length were used instead of sticks of equal length. A further complication was introduced in forcing the child to distinguish an irrelevant variance in color from the relevant difference in length, but the principle remained the same: if, after a series of changes in position, color, and form, the child persisted in correctly identifying the longer stick, then he possessed the concept of length conservation.

Pink, orange, and purple sticks of gum were used, some 4" long, some 4-1/2" long. For each of three trials, the child was shown two aligned but unequal and differently colored gum sticks. One stick was advanced away from (or toward) the child, and he was told that if he could pick the one with more gum to chew, he could have it. (Whether his response was correct or not, he was allowed to keep the gum.) If the child failed on any of these "advance" trials, he was given a series of other "advance" trials designed to help him recognize length invariance. After the "advance" trials, all children were shown another pair of gum sticks, the longer of which was bent before the child's eyes to appear shorter than the other stick. He was then asked to pick the one with more gum to chew, and allowed to keep his choice. Differences in the color of the longer stick, the position of the aligned ends, the direction of advance, and the form of the longer stick were included to distinguish temporal integrations of the perception of lengths from the conception of length conservation: it was thought that the numerous variations would make highly unlikely a score of "pass" on length conservation for children whose "conservation" was spurious, based on position, color response tendencies, or chance.

Responses were scored on the following items: ability to discriminate length differences correctly, attempts to compare lengths, conservation on "advance" trials, and conservation on the "bending" trial. The measure length conservation, total score recorded how many of these four subscores were reported as "pass." In addition to the total score, a dichotomous pass-fail score was given, based on consistent conservation throughout the task.

Liquid (quantity) Conservation. Piaget has often discussed the usefulness of measures of liquid conservation to the study of various forms of conservation of nonconservation, and has recently begun to include records of the child's ability to anticipate conservation and predict the results of transferring liquids from one container to another (Piaget, 1952b; Piaget & Inhelder, 1963).

In the present study, Coca-Cola was used to test the children's notions about the constancy of liquid volume across transformations in shape occurring when the liquid was poured into containers of different dimensions. About twice as much coke was poured into one 10 ml. beaker as was poured into a second 10 ml. beaker, and the child was asked if he could see that one had more to drink. Following an affirmative reply, the greater quantity was poured into a 100 ml. beaker, as the child watched the height of the greater quantity become lower than that of the lesser quantity. The child was told that if he could point to the one with more to drink, he could have it to drink (but he was allowed to drink whichever he chose). Then the two 10 ml. beakers were again filled unequally, and the lesser quantity poured into a 5 ml. graduated cylinder as the child watched the lesser quantity become a taller but narrower column of liquid than the greater quantity. If the child selected the taller cylinder, a limits-testing/training procedure was followed in which the child was corrected and shown the effect of pouring the coke back into the original beaker. The limits-testing/training procedure was also used with children who selected the incorrect beaker on the first question.

Dichotomous pass-fail scores were given, a "pass" score requiring consistent conservation response.

Class Inclusion. The ability to categorize on the basis of more than one characteristic is found in rudimentary form in the period of intuitive thought: the child can, for example, group together all the blue objects that are also squares. But the ability to treat blue squares as a subclass of the class of all squares, to see the relationships between subclasses and classes or between members of a class as individuals and as members of the class, is usually not found until about the age of seven and is a basic indicator that the child has entered upon the stage of concrete operations (Piaget, 1952a).

As is well known, Piaget tested for the presence of "class inclusion" by showing children a box of brown and white wooden beads and asking if there were more wooden or brown beads (Piaget, 1952a). The task developed for this study, a close variation of Piaget's bead task, used brown and white candy (4 brown M & M's, 1 white mint). After agreeing that the chocolates were candy and the mint was candy, the child was told that if he could pick what had more to eat, he could have it. He was then asked to choose either "all the chocolate or all the candy." Whether or not he chose correctly, he was allowed to take the candy he chose. He was then asked to explain his choice, in order to see if he could verbalize the class inclusion principle. Children who responded incorrectly were then asked a series of help questions, before being again urged to pick "all the candy or all the chocolate, whichever is more." The child was allowed to take the candy and his answer was recorded. Children who responded correctly to the first class inclusion choice were also asked the help questions as a means of checking the stability of their original responses.

Responses were scored on the following items: ability to verbalize the class inclusion principle, correct responses to specified parts of the help questions, correct choice of more candies at the beginning of the task, correct choice of more candies at the end of the task. The measure class inclusion, total score was based on the total number of items answered correctly. A dichotomous pass-fail score was given, based on "pass" scores recorded for any three of the four items.

Ring Segment Illusion. In this task, four cookies in the shape of ring segments were used; three segments, one green, one red, and one blue, were the same length but the fourth segment (white) was 1/8" shorter than the other three. The child was first shown two segments, the green and the white, arranged so that the larger green was closer to the child. Thus the green segment both was, and appeared to be, larger than the white segment. The child was asked to pick the "bigger one with more to eat" after watching the examiner move the white cookie below the green one. Thus, if the illusion occurred as expected, the white cookie appeared bigger than it had at first. If nevertheless the child chose the green cookie as the larger segment, there was some evidence that he could "conserve" his original judgment of size in the face of perceptual changes. The children then went on to the second trial in which the red and blue segments of equal size were used. Again the child was asked to pick the larger cookie and again, before the child answered, the examiner changed the segments' positions. If the child maintained his choice of the cookie "with more to eat" despite the position change, it was assumed he understood that moving an object from one place to another does not change its size. The child could distinguish between what he perceived about size constancy, and what he thought about size constancy.

Children who failed the first trial were asked a series of questions designed to help them distinguish between perceptual variances and objective size invariance. They then proceeded to the second trial with the equal red and blue segments.

A dichotomous pass-fail score was given for the ring segment illusion task, based on responses showing consistent conservation of size.

Dream Interview. The conceptions of invariances and relationships between classes are only two--very important, but still only two--aspects of cognitive development critical to the acquisition of logical thinking and thus to success in school. A third type of stage-dependent development discussed by Piaget is the development of the notion of realism, in particular of the relationship between the internal and the external, thought and matter (Piaget, 1967). According to Piaget, the growth of ideas about realism occurs in three stages: in the first stage, the child learns to distinguish between the sign and the thing signified, or between the mental object and the thing it represents; in the second stage, the child learns to separate internal reality from external reality; and in the third stage, the child eventually realizes that thought is something other than a material substance. Children's ideas on thoughts, words, and dreams all show these three stages of development, although the stages may appear at different ages for thoughts than for words or for dreams. Piaget believes, for example, that confusion between image and corresponding object disappears earlier for dreams (about 5-6 years of age) than for words (about 7-8 years of age).

It was decided, therefore, to use a dream interview developed along the lines suggested by Piaget (Kohlberg, 1966), with two purposes in mind: first, to see if the conclusions drawn by Piaget about his research populations would hold for the children in this study, and second, to see if any suggestive relationship could be found between children's dream interview responses and other measures of educability and school performance. The complete Dream Interview questionnaire can be found in Appendix F. The dream interview total score, the sum of items scored "pass," is reported in this chapter. The scoring was designed so that a total score of at least five indicates that the child has passed into, or is close to, stage 2; he is fairly sure dreams are not objectively real and do not originate in the external world, but he may not yet correctly conceptualize dreams as internal realities ("take place inside"). A total score of eight suggests strongly that the child has reached stage 3, and distinguishes thought from matter.

Analysis of the Relationships of Age, Sex, and Social Status to Performance on Piagetian Measures

Group data showing the relationships of age and social status to the children's performance on the tasks described above are presented in Table V-1 through V-5. Data reported for children "age 6" was obtained when the children's mean age was 6 years and 2 months; data reported for children "age 7" was obtained when the children's mean age was 7 years and 2 months.

Table V-1 reports longitudinal data on the mean performance of children in the four social status groups. It can be seen that age made the expected difference for the performance of children at all social status levels: mean scores for 7-year-olds were consistently higher than for 6-year-olds, with but one exception. That exception was the performance of the unskilled working-class children (groups 3 and 4) on the class inclusion task; their mean scores decreased from age 6 to age 7. Further consideration of the class inclusion scores suggests, however, that it would be improper to draw any conclusions based upon them, for the means are extremely low in all cases (about one point out of a possible four points). Table V-2, which reports the percentage of children receiving a "pass" score for each of the Piagetian tasks, further underlines the impossibility of deriving useful generalizations from the class inclusion data, because only about 2% of the total group were able to "pass" this task at either age. It would appear then, that the only useful conclusion to draw is that the children in our research population were still too young for the task, a conclusion consistent with Piagetian theory (children are not expected to master class inclusion until at least the age of 7). Therefore this chapter will contain no further discussion of the class inclusion task.

Looking at mean scores for the other tasks reported in Table V-1 (Length Conservation, Number Conservation, and Dream Interview) it can be seen that there is no consistent pattern of social status differences. There is, however, some indication that middle-class children are likely to do better than lower-class children, and that this difference favoring the middle-class may be found to increase with age. Table V-2, in which the percentage of children passing each task is reported, seems to support this tentative statement about social status differences. The table indicates that with increased age, and increased ability to pass the tasks, are found increased social status differences tending to favor the middle-class.

Longitudinal Data on Mean Scores for
Piagetian Tasks, by Social Status

Piagetian Task	Social Status												Significant Differences[a]
	Middle Class 1			Working Class									
				Skilled 2			Unskilled						
							Father Present 3			Father Absent 4			
	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	
Class Inclusion, Total Score Age 6	39	.97	.74	37	.92	.68	36	1.06	.63	39	.92	.48	
Class Inclusion, Total Score Age 7	38	1.18	.95	39	1.10	1.10	34	.73	.73	39	.77	.77	1x3* 2x3** 1x4* 2x4**
Length Conservation, Total Score Age 6	39	3.18	1.05	37	2.84	1.12	37	3.19	1.05	40	2.70	1.09	1x4* 3x4*
Length Conservation, Total Score Age 7	38	3.39	.92	39	3.26	.78	35	3.29	.82	39	3.05	.92	
Dream Interview, Total Score Age 6	38	5.45	1.7	37	4.73	1.71	36	4.03	1.5	40	4.32	1.80	1x3** 1x4**
Number Conservation, Total Score Age 6	36	4.58	1.96	34	3.73	1.6	37	4.30	1.63	40	3.85	1.64	
Number Conservation, Total Score Age 7	38	6.21	1.19	39	5.18	1.6	35	5.11	1.7	39	4.85	1.66	1x2** 1x3** 1x4**

[a] 1x2 = Differences between means for these groups are significant

* = $p < .05$
** = $p < .01$

TABLE V-2

Social Status and Age[a] Differences in
Percent of Children Passing Conservation and Class Inclusion Tasks

Piagetian Task	Percent of Children Scored "Pass"					Significant Differences (Yates Chi Square)[b]	
	Total Sample	Middle Class	Working Class				
			Skilled	Unskilled			
				Father Present	Father Absent		
		1	2	3	4		
	N = 152	N = 39	N = 37	N = 37	N = 40		
Length							
Age 6	47.1	56.4	37.8	59.5	35.0	1x4*	3x4*
Age 7	52.3	68.4	46.2	54.3	41.0		
Liquid (Quantity)							
Age 6	18.3	20.5	13.4	18.9	20.0		
Age 7 (Conserves with help)	34.4	55.3	28.2	25.7	28.2	1x2* 1x3* 1x4*	3x4*
Age 7 (Conserves consistently)	64.9	81.6	64.1	42.9	69.2	1x3*	
Number							
Age 6	17.7	33.3	14.7	13.5	10.0	1x4*	
Age 7	49.0	73.7	43.6	45.7	33.3	1x2* 1x3* 1x4**	
Class Inclusion,							
Total Score Age 6	2.7	5.1	2.7	2.9	0.0		
Age 7	2.0	7.9	0.0	0.0	0.0		
Ring Segment Illusion							
Age 6	12.9	2.9	13.5	16.2	17.9		

* = $p < .05$
** = $p < .01$

a Differences between performances at Age 6 and Age 7 were significant for Liquid (Quantity) and Number tasks. ($p < .05$, using X^2)

b 1x2 = Differences between means for these groups are significant.

It will be noted that neither Table V-1 nor Table V-2 contains separate information about boys' and girls' performances on the Piagetian tasks. When the data were analyzed, it was found that there were no significant sex differences on mean total scores, pass/fail scores, or individual item scores for the Piagetian tasks. Boys' scores tended on the whole to be higher than girls' scores, but since the differences were not large or significant, the scores are not reported here in tabular form.

TABLE V-3

Longitudinal Data on the Length Conservation Task: Percent of Children Passing Individual Items (Total Group)

Length Conservation Item	Percent of Children Scored "Pass"
Conserves on Advance	
Age 6	60.13
Age 7	66.89
Conserves on Bending	
Age 6	56.21
Age 7	60.26
Conserves Consistently (both on advance and bending)	
Age 6	47.06
Age 7	52.32

When discussing Piagetian tasks, it is always important to get some idea of whether or not the child failing the task was close to passing it, if he was, for example, nearly ready to conserve, or close to distinguishing between internal and external reality. Therefore Tables V-3, V-4 and V-5 have been included to present information on children's

TABLE V-4

Longitudinal Data on the Number Conservation Task:
Percent of Children Passing Individual Items
(Total Group; Social Status Groups)

Number Conservation Item	Percent of Children scored "Pass					Significant Differences (Yates Chi Square)[a]
	Total Group	Middle Class	Working Class			
			Skilled	Unskilled		
				Father Present	Father Absent	
		1	2	3	4	
	N = 152	N = 39	N = 37	N = 37	N = 40	
Conserves with help						
Age 6	67.3	69.4	58.8	78.4	62.5	
Age 7	68.2	97.4	66.7	60.0	48.7	1x2** 1x3**
Chooses correctly before expansion (Discriminates array from amount)						
Age 6	21.8	38.9	14.7	16.2	17.5	1x2* 1x3*
Age 7	49.7	73.7	41.0	45.7	38.5	1x2** 1x3** 1x4**
Conserves (chooses correctly after constriction) Age 6	29.9	36.1	23.5	35.1	25.0	
Age 7	49.7	76.3	43.6	42.9	35.9	1x2** 1x3** 1x4**
Conserves Number (Passes both "conserves chooses correctly" and "conserves with help")						
Age 6	17.7	33.3	14.7	13.5	10.0	1x4*
Age 7	49.0	73.7	43.6	45.7	33.3	1x2* 1x3* 1x4*

* = $p < .05$
** = $p < .01$

a 1x2 = Differences between means for these groups are significant performance on critical individual items from the Dream Interview, Number Conservation and Length Conservation tasks. Table V-3 presents information on the percent of children passing individual items from the Length Conservation task. Data are reported for the total group only, since there were no significant social status or sex differences found for conserves on advance or conserves on bending, and since conserves consistently (length conservation, pass/fail) is fully reported in Table V-2. Two items from the length conservation task, discriminates length differences correctly and attempts to compare length, are not reported in Table V-3, since both were passed by over 85% of the children at age 6 and over 90% of the children at age 7. Thus it was clear that filure to conserve could not be simply explained by failure to understand the concept of "more" or the concept of measurement. Table V-3 indicates that more children were able to demonstrate partial conservation behavior than were able to conserve consistently (as defined by our experimental task) and that the illusion of bending (change in form) is somewhat more difficult to overcome than the illusion of advance (change in position). The table also reveals that some children unable to pass the conserves on advance measures given at the first of the task were able, by the end of the length conservation session, to pass the conserves on bending item. It could thus be hypothesized that these children were close to conservation, close enough to be nudged over the edge, so to speak, by the end of the testing session. Although the percent of children passing each item increased with age, these changes were not great enough to reach significance ($p > .05$).

Table V-4 presents longitudinal data on the percentage of children passing selected items from the Number Conservation task. Items testing fundamental concepts prerequisite to conservation of number, such as the concept of "more," of correct counting, of comparative counting, and of the use of comparative counting to determine inequalities, are not reported; analysis of the data revealed that almost all the children possessed these abilities after the first year in school. One conclusion to be drawn from the data in Table V-4 is that the present research population shows a pattern of attainment of number conservation that is similar to that found in other samples of 6 and 7 year old children: the great increase in the children's ability to conserve without help that is found between 6 and 7 supports the belief that these ages do indeed mark the transition from the period of intuitive thought to the period of

TABLE V-5

Longitudinal Data on Dream Interview Items:
Percent of Children Passing Each Item
(Total Group; Social Status Groups)

Dream Interview Item	Percent of Children Scored "Pass"				
	Total Group	Middle Class	Working Class		
			Skilled	Unskilled	
				Father Present	Father Absent
		1	2	3	4
	N = 151	N = 38	N = 37	N = 36	N = 40
Knows what a dream is	94.7	100.0	97.3	86.1	95.0
Picture of dog is not real	87.4	94.7	86.5	88.9	80.0
Partly aware of unreality of dream	80.0	86.8	89.2	80.6	65.0
Fully aware of unreality of dream	37.7	47.4	24.3	33.3	45.0
Dreams do not originate in external world	76.8	76.3	78.4	69.4	82.5
Dreams *may* take place inside	53.6	63.2	64.5	38.9	47.5
Dreams *do* take place inside	19.9	34.2	27.0	5.6	12.5
Dreams are not material things	9.9	31.6	5.4	0.0	2.5
Dreams are caused by the dreamer	3.3	10.5	0.0	0.0	2.5

* = $p < .05$
** = $p < .01$

concrete operations. It will also be noticed that more significant social status differences, favoring the middle-class, are found at age 7 than at age 6, supporting the notion that some factor associated with middle-class status is conducive to more rapid cognitive development.

To know that the mean score on the Dream Interview was approximately 5 (out of a possible 9) is relatively meaningless unless one also knows what apparent understanding of dreams is represented by this mean score. Thus Table V-5 has been prepared to show the percent of children passing individual items from the dream interview. Inspection of the table reveals that at age 6 over 85% of the children in all social status groups knew what a dream was and could distinguish between representations of real objects and the objects themselves. And over 80%, except for the children in the father-absent group (65%), showed some recognition that dream objects are not real but are "pretend objects" that "just seem to be there." Roughly 3/4 of the children were convinced that dreams do not originate in the external real world, and about half felt that dreams are probably internal, "seeming to be in the room (or somewhere else) but not really there." Thus if we see these five most frequently passed items as typically clustered together in forming the mean score for the several groups (obviously not all children with a score of 5 will have passed these 5 items and no others), then we can say that our "average" 6-year-old child: 1) can distinguish between image and object, 2) is struggling to cast off the ideas that images are real in the same sense as objects are real and that dreams take place somewhere outside the dreamer, and 3) no longer believes that dreams emanate from external sources. According to Piagetian theory, this places the child somewhere between the first and second stages found in the formation of notions of reality, a transition period that ought to be found in the 6-year-old child (Piaget, 1967). To this extent then, the present data can be interpreted as supporting the theory.

Interrelationships among Measures of the Children's Performance on Piagetian Tasks and Interview

Intercorrelations among children's total scores and pass/fail scores for the Piagetian measures are shown in Table V-6. Because of the differences between the middle-class and working-class groups that were reported in the last section, correlation coefficients are reported for the combined

TABLE

INTERCORRELATIONS AMONG
COGNITIVE BEHAVIOR (WORKING

Measure	1	2	3	4	5	6	7	8
Child's Binet IQ								
1 Age 4	--	.63** .74** .72**	.18 .11 .10	.10 .08 -.10	.04 .08 .11	.09 .12 .23*	.11 -.03 .34**	.01 -.05 .07
2 Age 7		--	.12 .24* -.09	.04 .15 -.12	.13 .06 .25*	.27** .13 .33**	.11 -.09 .38**	-.02 -.14 .08
Child's Sigel Responses								
Descriptive Part-whole								
3 Follow-up 1			--	.28** .50** .12	-.23* -.05 -.27*	.11 .18 -.10	-.45** -.50** -.36**	-.25** -.36** -.02
4 Follow-up 2				--	.06 .12 .01	-.05 .00 -.13	-.28** -.22 -.26*	-.58** -.41** -.66**
Descriptive Global								
5 Follow-up 1					--	.33** .22 .43**	-.13 -.29* -.14	-.06 -.05 -.15
6 Follow-up 2						--	-.14 -.36** .07	-.22* -.27* -.25*
Relational-Contextual								
7 Follow-up 1							--	.40** .55** .18
8 Follow-up 2								--
Categorical-Inferential								
9 Follow-up 1								
10 Follow-up 2								
Non-scorable Verbal								
11 Follow-up 1								
12 Follow-up 2								
Nonverbal								
13 Preschool								
14 Follow-up 1								
15 Follow-up 2								
Scorable								
16 Preschool								
17 Follow-up 1								
18 Follow-up 2								
Category Shifts								
19 Follow-up 1								
20 Follow-up 2								

* = p < .05
** = p < .01

a The first (top) coefficient in each group is for the working-class (groups 2 - 4

V I - 6

M E A S U R E S   O F   C H I L D R E N ' S
- C L A S S ;   B O Y S   A N D   G I R L S)[a]

	9	10	11	12	13	14	15	16	17	18	19	20
	.15 .21 .38**	.01 -.01 .34**	-.36** -.36** -.49**	-.22* -.21 -.39**	-.38** -.37** -.49**	-.22* -.11 -.33**	-.06 -.07 -.07	.38** .49** .47**	.41** .34** .56**	.22* .16 .39**	.18 .22 .30**	.11 .11 .20
	.36** .30* .55**	.13 .11 .43**	-.46** -.51** -.52**	-.39** -.34** -.50**	-.41** -.34** -.56**	-.21* -.23 -.27*	-.08 -.14 .01	.35** .44** .55**	.49** .51** .56**	.39** .30** .51**	.18 .17 .35**	.20* .13 .26*
	-.45** -.48** -.46**	-.11 -.24* -.05	-.35** -.37** -.31**	-.10 -.18 -.04	-.03 .07 .05	-.22* -.18 -.30**	-.12 -.12 -.12	-.06 -.14 .03	.41** .38** .41**	.10 .14 .03	-.37** -.32** -.33**	-.10 -.18 -.04
	-.26** -.32** -.20	-.44** -.42** -.42**	-.10 -.23 .02	-.33** -.32** -.29**	-.05 -.18 .20	.19* -.12 .25*	-.10 -.16 .02	.06 .09 -.11	-.01 .23 -.14	.33** .31** .28*	-.13 -.02 -.13	-.44** -.28* -.49**
	-.01 -.17 .20	-.17 -.25* -.04	-.22* -.18 -.25*	-.13 -.06 -.15	-.04 -.06 -.15	-.01 .08 -.04	.08 .07 .11	.08 .14 .23*	.19* .14 .22	.12 .01 .15	.34** .19 .46**	.12 -.08 .19
	.05 .02 .22	-.17 -.35** .01	-.19 -.09 -.20	-.36** -.28* -.32**	-.21* -.03 -.39**	-.16 .07 -.21	.00 -.01 .00	.12 .01 .33**	.23* .07 .27*	.37** .25* .32**	.02 -.08 .23*	.32** .17 .40**
	.31** .14 .40**	.08 .03 .26*	-.28** -.18 -.37**	.02 .02 -.09	-.05 .05 -.25*	-.22* -.27* -.25*	.00 .00 -.03	.16 .08 .13	.34** .22 .44**	-.02 .00 .10	.39** .29* .38**	.20 .27* .09
	.13 .10 -.02	.00 -.16 .13	.01 -.05 .03	-.01 -.06 -.03	.05 .14 -.08	-.12 -.19 -.10	-.05 -.04 -.11	-.01 -.03 -.02	.05 .09 .02	.02 .10 .05	.09 .18 -.09	.30** .31** .26*
	--	.28** .30* .37**	-.26** -.27* -.32**	-.10 -.05 -.18	-.16 -.26* -.27*	-.17 -.11 -.21	-.01 -.08 .08	.17 .30** .25*	.30** .27* .38**	.11 .09 .17	.41** .35** .52**	.24** .28* .20
		--	.02 .16 -.27*	-.22 -.12 -.37**	-.11 -.05 -.40**	-.03 .06 -.12	-.01 -.05 .04	.07 .06 .37**	.00 -.16 .28*	.23* .18 .37**	.02 -.12 .18	.19* -.11 .41**
			--	.26** .28* .32**	.15 .12 .29*	.06 .34** .07	.04 .10 .02	-.19* -.24* -.33**	-.88** -.98** -.84**	-.26** -.24* -.32**	-.20 -.28* -.26*	-.14 -.16 -.11
				--	.31** .21 .45**	.00 .16 .01	.02 .09 -.03	-.25** -.20 -.37**	-.23* -.29* -.26*	-.98** -.93** -.99**	.03 .03 -.05	-.17 -.02 -.24*
					--	.14 .08 .18	.05 .11 -.07	-.52** -.65** -.51**	-.19* -.13 -.31**	-.30** -.17 -.43**	-.07 -.08 -.15	-.18 .08 -.41**
						--	.13 .39** .07	-.08 -.11 -.17	-.52** -.53** -.59**	-.02 -.22 -.02	.15 -.10 -.33**	-.25** -.24* -.24*
							--	-.02 -.04 -.07	-.10 -.18 -.05	-.20* -.33** -.06	.15 .15 .10	.09 .09 .08
								--	.20* .24* .35**	.24** .17 .38**	.01 .18 .11	.14 .00 .26*
									--	.23* .27* .26*	.30** .27* .40**	.23* .20 .20
										--	-.05 -.06 .04	.15 .01 .23*
											--	.23* .32** .14

combined); the two coefficients below are for boys (middle) and girls (bottom).

working-class groups and not for the total group. Coefficients for the total group were in the same direction as those for the working-class group and typically higher.

The stability coefficients expressing the degree of correlation between separate administrations of the same measure appear along the diagonal in the table. The extremely low coefficients for the Class Inclusion measures can be explained as a result of the children's inability to perform this task, as was discussed in the previous section. For the working-class group, stability coefficients for the various conservation tasks are statistically significant but rather low, ranging from $r = .20$ to $r = .43$. To a certain extent, these results are surprising and puzzling for the ability to conserve is believed to be stable for the same child performing the same task under the same (similar) conditions; it is expected that the child conserving length, say, at age 6 will also conserve length at age 7. The magnitude of the stability coefficients can of course be partly explained by the greater number of 7-year-old children able to pass some tasks and by the accompanying increase in mean scores. This is clearly the case for the Number Conservation and Liquid (Quantity) Conservation measures. (See Tables V-1 and V-2 for data on the increase in mean scores and percent of children passing each task.) The difference in the children's performance at ages 6 and 7 for these two measures is large enough to account for the most of the level of the stability coefficients for the tasks without any necessary implication that the reliability or validity of the tasks (or Piagetian theory) should be questioned. Children's performance on the Length Conservation task, however, raises more puzzling questions. The change from age 6 to age 7 in mean scores and percent passing was small and not significant, yet the stability coefficients are only .31 (total scores) and .21 (pass/fail). This means that many of the children passing Length Conservation at age 6 failed it at age 7, a result in contradiction to the Piagetian theory of the invariant order, and permanence when established, of stages in cognitive development. It is necessary then to question the reliability of the task, and perhaps even its validity. When the task was described in the "Procedures" portion of this chapter, its unusual complications both in design and in scoring were mentioned. It seems more likely that some factor related to these complications is responsible for the low stability coefficients than that Piaget's theory should be challenged by these data.*

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*The Kohn dissertation will contain a more elaborate analysis of these stability coefficients in order to determine whether regression was in fact present, or if the magnitude of the coefficients is artifactual (Kohn, in preparation).

Coefficients of intercorrelation are also reported for boys and girls in Table V-6. Inspection of the table reveals that girls' performance on the Length Conservation and Liquid (Quantity) Conservation tasks is consistently less stable than is that of the boys; boys' stability coefficients range from .38 to .39, whereas girls' stability coefficients are lower, ranging from .14 to .27, and in 3 out of 4 cases are not significant. Girls are also less stable on the number conservation, pass/fail measure; curiously enough, however, girls' stability coefficient is unusually high for the number conservation total score measure (r = .50 vs. r = .32 for the boys). Although, as reported earlier, girls' mean scores and pass/fail scores tended to be lower than those for boys, the differences were not significant. Thus it appears reasonable to say that girls indeed tended to be more erratic than boys in their performance on the conservation tasks. This suggests that a fruitful area for further research would be an investigation into sex differences in the performance of Piagetian tasks.*

Examination of cross-correlations (relationships among measures from different tasks) reveals that coefficients are consistently in the expected positive direction and significant in the vast majority of cases. It was hypothesized that cross-correlations among measures of tasks given at age 7 would be high, reflecting the increase from age 6 to age 7 in the children's ability to pass the tasks, and the presence of an "ability to conserve" common to all the tasks. As can be seen, the coefficients were indeed relatively high, the highest reported on Table V-6, and ranged from r = .42 to r = .54. Cross-correlation coefficients for boys and girls at age 7 show an inconsistent pattern of differences. Girls' coefficients are higher than boys' coefficients for the relationships between Length Conservation and Liquid Conservation measures but are more often lower than boys' coefficients for the relationship between Length Conservation and Number Conservation measures. The girls' coefficient is higher than the boys for one of the relationships between Liquid and Number Conservation, but lower for the other. Thus although the girls appeared to be consistently less stable than boys in their performance at different ages, no such statement can be made for their performance on different conservation tasks at the same age (7). At age 6, however, a more consistent difference between boys and girls, favoring the boys, was found in the relationships among measures from different conservation tasks.

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*The Kohn dissertation will contain a more elaborate analysis of these stability coefficients in order to determine whether regression was in fact present, or if the magnitude of the coefficients is artifactual (Kohn, in preparation).

The Relationship of Maternal Behavior and Environment to Children's Performance on Piagetian Measures

The effect of external influences, such as instruction and home environment, on the stages of children's cognitive development is not yet wholly understood (Sigel, 1964). Some investigators feel that conservation, for example, cannot be taught either directly or indirectly; others feel that external influences can affect the onset of a given stage, although not the order of stages, and use such things as social class differences in performance of conservation tasks to support their belief; still others feel that at the present stage of knowledge the entire question must be considered moot. In order to see whether data from the present study throw any light on the question, correlations of children's Piagetian measures with maternal measures (representing possible "external influence") were obtained. Relatively few significant relationships were found between the maternal measures and the children's performance, and even fewer were found when the middle-class group was excluded from analysis. Thus the first general conclusion was drawn that, except for some factor(s) related to social class, data from the research measures used in this study seem to support the notion that external (maternal) influences have relatively little to do with the children's performance on Piagetian tasks.

There were, however, some maternal variables showing enough significant relationships with the children's measures to warrant tabular presentation and discussion. Table V-7 presents these variables and their relationships for the total group and working-class group; the table includes all the conservation tasks except the Ring Segment Illusion and Class Inclusion measures. As could be predicted from the very low mean scores for these two tasks, there was no relationship between them and the maternal variables. The reader will note that the maternal variables included in Table V-7 have often been discussed in this study as showing significant relationships with children's performance and that the correlation coefficients are in the directions believed favorable for development.

Looking first at the total group's coefficients for the Number Conservation task, it can be seen that the coefficients increase from age 6 to age 7 and that most of them are significant at age 7; this increase in magnitude and significance probably reflects the children's increasing scores and stability of performance. On the basis of these correlations, it might be suggested that children who do well on the number conservation task at age 7 are likely to have mothers who: 1) put pressure on their children for

TABLE V-7

The Relationship of Maternal Behavior and Environment to Children's Performance on Piagetian Conservation Tasks (Total group; Working-class Group)[a]

Maternal Measures	Conservation									
	Length				Number				Liquid Quantity	
	Total Score		Pass-Fail		Total Score		Pass-Fail		Pass-Fail	
	Age 6	Age 7	Age 6	Age 7	Age 6	Age 7	Age 6	Age 7	Age 6	Age 7
Preschool Measures										
Maternal Attitudes:										
Global Achievement Pressure	.17* .17	.08 .03	.20* .23*	.05 .00	.21* .24*	.21** .17	.17* .11	.21* .15	b	.24** .21*
"Powerlessness"	-.02 -.01	-.09 -.08	.04 .05	-.11 -.06	-.07 -.08	-.29** -.24*	.00 .00	-.26** -.21*	.02 .01	-.26** -.27**
Personal Optimism	.14 .10	.19* .15	.15 .12	.21 -.13	.19* .16	.32** .21*	.08 -.05	.25** .14	-.07 -.10	.15 .02
Control Strategies:										
First Day: % Imperative	-.16 -.11	-.10 -.11	-.15 -.08	-.11 -.03	-.07 -.06	-.21* -.10	-.04 .10	-.23** -.15	.05 .06	-.26** -.22*
Mastery: % Personal Subjective	.09 .01	.07 .06	.19* .12	.10 .04	.05 -.02	.23** .13	.03 -.07	.16* .07	-.01 .05	.22** .25**
Teaching Techniques:										
Number of specific turning Directions (Etch-a-sketch)	.18* .21*	.08 -.01	.17* .20*	.07 -.04	.13 .13	.26** .18	.12 .11	.19* .09	.07 .13	.21** .17
Praise and Engagement	.14 -.13	.25** .20	.13 .09	.28** .22*	.10 .13	.26** .19*	.13 -.10	.23** .14	-.04 .03	.20* .16
Specificity of feedback in block sorting task	.13 .13	.21** .13	.16* .06	.20* .14	.25** .16	.20* .17	.19* .09	.18* .13	.08 .04	.15 .10

TABLE V-7 (Continued)

Maternal Measures	Conservation									
	Length				Number				Liquid Quantity	
	Total Score		Pass-Fail		Total Score		Pass-Fail		Pass-Fail	
	Age 6	Age 7	Age 6	Age 7	Age 6	Age 7	Age 6	Age 7	Age 6	Age 7
Other Measures:										
Language Factor Score	.08	.12	.09	.16	.08	.31**	-.01	.24**	-.05	.22**
	.06	.18	.08	.14	.10	.29**	-.13	.25**	-.01	.25**
Sigel Ave. Reaction Time per Sort	.02	-.14	-.07	-.20	-.10	-.28**	-.09	-.17*	-.08	-.22**
	.10	-.12	-.02	-.14	-.05	-.23*	-.03	-.10	-.06	-.19*
Support toward Child	.20*	.19*	.15	.14	.20*	.25**	.09	.20*	.11	.26**
	.22*	.20*	.17	.09	.30**	.18	.05	.16	.12	.23*
Follow-up Measures										
WAIS - Performance IQ	.20*	.14	.13	.21*	.16	.32**	.11	.26**	-.01	.30**
	.16	.09	.07	.11	.12	.18	.01	.10	-.02	.20*
- Full IQ	.20*	.20*	.16	.23**	.19*	.40**	.13	.34**	-.02	.36**
	.16	.14	.11	.11	.17	.26**	.00	.18	-.05	.27**
Locus of Control (high score = external)	-.17*	-.16	-.09	-.15	-.13	-.23**	-.06	-.15	.07	-.21*
	-.10	-.07	-.02	.04	-.06	-.06	.09	.05	.15	-.08
Externality Score (high score = externality)	-.19	-.15	-.12	-.18	-.32**	-.26*	-.26*	-.20	.01	-.25*
	-.12	-.05	-.07	-.06	-.17	-.16	-.05	-.09	.14	-.19

* = p < .05
** = p < .01

a The top coefficient in each group is for the total group; the coefficient below is for the working class group (groups 2-4 combined).

b Data not available.

achievement and feel personal optimism and a sense of efficacy with respect to the school; 2) avoid imperative control strategies and employ personal-subjective control strategies; 3) use specificity and praise as part of their teaching techniques (it will be remembered that these same aspects of technique were found to distinguish mothers who were effective teachers from mothers who were ineffective teachers); 4) were able to use relatively facile and complex standard English; 5) showed short response latencies on the Adult Sigel Sorting task; and 6) showed support of their children (as rated by the interviewer). In addition, these mothers were likely to have a higher IQ, to feel less anxiety, and to possess an internal locus of control (accept responsibility for their own destiny). Coefficients for the working-class showed a similar pattern of increase from age 6 to age 7 but did not, however, show the same pattern of significant associations. For the working-class, 7-year-old children's performance on the Number Conservation measures was consistently related only to the mother's feeling of "powerlessness" and her ability to use standard English; some significant relationship were found between Number Conservation and the mother's pressure for achievement, feelings of optimism, use of praise as a teaching technique, response latency, support shown toward the child, and IQ. These Number Conservation data suggest that excluding the middle-class from analysis (and thus also excluding the effects of social class differences) results in eliminating a number of hypothetical "external influences" (independent from social class) on working-class children's conservation behavior. It is not justified to urge strongly on the basis of these correlations that further research be done in the relationship of, say, control strategies to working-class children's performance on Number Conservation tasks. It is possible, of course, that such research would be highly fruitful, but the present data do not permit making a strong recommendation for the research.

Similar conclusions can be made, and patterns of relationship found, for the correlations of maternal variables with Liquid (Quantity) Conservation measures. For both total group and working-class group, the magnitude of correlation coefficients increases from age 6 to age 7; coefficients for the total group are usually higher, and more are significant. But again, it must be pointed out that the increasing coefficients can be at least partly if not wholly explained by the children's higher mean scores at age 7. That the apparent relationship of some maternal measures to children's conservation measures may be an artifact--or best explained by social class differences--is underlined by the coefficients obtained for the Length Conservation measures. As reported earlier, children's performance on these measures appeared to be unstable, and the pattern of correlations with maternal measures can be seen on Table V-7 to be correspondingly irregular. There is no consistent increase from age 6 to age 7 in the magnitude of the coefficients, and the total group's coefficients are not consistently higher than those for the working-class group. Thus it is concluded that although there may be some meaningful relationship between maternal behavior (independent from social class) and children's ability to conserve, any such relationships found in the present data must be suspected of being spurious.

Even though these data about relationships between maternal behavior and conservation ability must be interpreted cautiously, there is one suggestion that can be made for further research. This suggestion is that sex differences may play a far greater role in children's performance on Piagetian tasks than has yet been realized. Table V-8 reports correlation coefficients separately for boys and girls. Inspection of the table reveals that a highly consistent (and thus perhaps meaningful) pattern of sex differences is found in the coefficients for the Number Conservation task. In general, girls' coefficients are higher than those for boys, and several more are significant; in addition, girls' coefficients (age 7) were found to be significantly higher ($p < .05$) for the home resources factor score, mother's out-of-home activities and the language factor score. Only two boys' coefficients were found to be significant when the girls' corresponding coefficients were not, and those were the correlations between the two measures of maternal specificity and the children's performance on the Number Conservation task. Correlation coefficients for the Liquid Conservation task (age 7) show a similar (although not identical) pattern of differences favoring girls, and again some of the girls' coefficients are significantly higher than those for boys, namely the coefficients for the measure of crowding in the home, mother's out-of-home activities, and the Rotter measure of externality. No consistent or meaningful pattern of sex differences can be found in the Length Conservation data. In summary then, the present data suggest that if there is a maternal influence on children's ability to conserve, it is more likely to be reflected in girls' performance than in boys' performance. It can be speculated

TABLE V-8

The Relationship of Maternal Behavior and Environment to Children's Performance on Piagetian Conservation Tasks, by Sex

Maternal Measures	Conservation Tasks									
	Length				Number				Liquid Quantity	
	Total		Pass/Fail		Total		Pass/Fail		Pass/Fail	
	Age 6	Age 7	Age 6	Age 7	Age 6	Age 7	Age 6	Age 7	Age 6	Age 7
Preschool Measures										
Home Environment										
Rooms per person	-.03	-.07	-.01	-.08	.07	-.08	.07	-.02	-.05	-.01
	.04	.16	-.02	.24*	.10	.33**	.13	.30**	.09	.32**
Home Resources factor Score	.23*	.13	.21	.11	.19	.18	.24*	.13	.10	.24*
	.14	.21	.07	.24*	.19	.44**	.01	.39**	-.06	.35**
Use of reading material by child with adult	.11	-.03	.03	-.07	.16	.12	.11	.07	-.03	.27*
	.19	.10	.22	.15	.06	.25*	-.12	.24*	-.11	.18
Maternal Attitudes										
Mother's out-of-home activities	.09	.19	.10	.21	-.02	.05	-.01	.05	.16	-.06
	.10	.19	.12	.21	.20	.42**	.07	.41**	-.11	.32**
Global Achievement pressure	.36**	.09	.41**	.08	.22	.23	.21	.23	.03	.35**
	-.03	.04	.02	.00	.19	.19	.11	.18	-.10	.10
"Powerlessness"	-.12	-.15	-.05	-.13	-.06	-.29*	-.01	-.30*	.00	-.33**
	.13	-.06	.17	-.12	-.06	-.30**	.01	-.24*	.00	-.20
Personal Optimism	.17	.25	.19	.23	.14	.33**	.14	.24*	.07	.23
	.08	.14	.07	.20	.23*	.31**	-.01	.27*	-.24*	.06

TABLE V-8 (Continued)

Maternal Measures	Conservation Tasks									
	Length				Number				Liquid Quantity	
	Total		Pass/Fail		Total		Pass/Fail		Pass/Fail	
	Age 6	Age 7	Age 6	Age 7	Age 6	Age 7	Age 6	Age 7	Age 6	Age 7
Control Strategies										
1st day: % Imperative	-.18 -.11	-.16 -.07	-.13 -.15	-.11 -.13	-.06 -.06	-.18 -.25*	-.04 -.03	-.14 -.34**	-.04 .15	-.20 -.34**
School-Peer: % Status-normative	-.10 -.27*	-.05 .03	-.11 -.30**	-.07 -.06	-.09 -.19	-.21 -.21	-.23 -.29*	-.16 -.14	-.07 .00	-.13 -.25*
Mastery: % Personal-subjective	-.02 .25*	-.06 .19	.21 .19	-.05 .28*	-.06 .22	.16 .31*	-.07 .20	.13 .22	-.05 .03	.21 .25*
Teaching Techniques										
No. of Specific Turning Directions (Etch-a-Sketch)	.28* .11	.23 .02	.32** .07	.17 .01	.18 .15	.37** .20	.26* .05	.30* .13	.05 .14	.26* .20
Praise and Engagement	.13 .14	.19 .32**	.18 .09	.18 .38**	.10 .11	.24* .28*	.11 .16	.12 .35**	-.01 -.11	.15 .25*
Specificity of Maternal Feedback in Block Sorting Task	.14 .12	.21 .20	.19 .14	.27* .12	.27* .23*	.29* .12	.29* .06	.26* .09	.11 .01	.16 .14
Other Measures										
Language Factor Score	-.04 .19	.04 .17	-.01 .18	.08 .23*	.03 .13	.14 .46**	-.05 .05	.03 .42**	-.02 -.08	.12 .33**
Mother's Sigel Ave. Reaction Time per Sort	.08 -.05	-.17 -.15	-.13 .00	-.21 -.22	-.12 -.09	-.26* -.32**	-.14 -.05	-.12 -.27*	-.22 .13	-.26* -.21
Maternal Support Toward Child	.24* .14	.10 .28*	.21 .07	.06 .23*	.12 .27*	.17 .34**	.16 .01	.11 .30**	.11 .14	.30* .22

TABLE V-8 (Continued)

Maternal Measures	Conservation Tasks									
	Length				Number				Liquid Quantity	
	Total		Pass/Fail		Total		Pass/Fail		Pass/Fail	
	Age 6	Age 7	Age 6	Age 7	Age 6	Age 7	Age 6	Age 7	Age 6	Age 7
Follow-up Measures										
WAIS - Performance IQ	.17	.08	.09	.19	.09	.26*	.10	.25*	-.02	.30*
	.24*	.19	.17	.24*	.23*	.39**	.15	.29*	.02	.31**
- Full IQ	.18	.13	.12	.20	.09	.34**	.11	.33**	-.04	.33**
	.23*	.27*	.19	.28*	.31**	.47**	.18	.37**	.03	.40**
Mother's Kagan Ave. Reaction Time	-.31**	.17	.36**	.19	.18	.18	.36**	.17	.00	.06
	.06	.11	.04	.18	.07	-.11	.07	-.24*	-.09	-.27*
Edward's Personal Preference Schedule-Abasement	-.36**	-.05	-.43**	-.12	-.15	-.16	-.37**	-.05	-.15	-.21
	.14	-.11	.04	-.12	-.01	-.11	-.14	-.24*	.08	-.27*
Locus of Control (high score = external)	-.27*	-.11	-.22	-.07	-.10	-.30*	-.05	-.17	.13	-.14
	-.07	-.18	.02	-.20	-.16	-.22	-.04	-.11	.03	-.26*
Externality Score (high score = externality)	-.18	-.01	-.08	-.04	-.28	-.12	-.27	-.12	-.13	-.09
	-.16	-.26	-.12	-.30	-.35*	-.39*	-.25	-.28	.14	-.39*

* = p < .05
** = p < .01

a The top coefficient in each group is for boys; the coefficient below is for girls.

that mothers may have more influence on the onset of conservation in girls than in boys.

Table V-9 reports data on the relationship of maternal behavior and environment to children's Dream Interview scores for the working-class boys and girls. For the working-class, Dream Interview scores are significantly related to the richness and variety of utilized home resources and to the amount of reading material used by the mother together with her child. Dream Interview scores are also associated with the mother's feelings of powerlessness and the type of control strategies she uses. Children tending to receive high scores on the Dream Interview were relatively likely to have mothers who avoided imperative and status-normative control strategies, used personal-subjective control strategies, and felt effective vis-a-vis the school. Their mothers were also likely to have higher IQ's and to show support toward their children (as rated by the interviewer). The sex differences that were found corresponded to a certain degree to those found in the coefficients for the conservation tasks: girls' coefficients were higher than boys' coefficients for the use of home resources and reading material, use of personal-subjective control strategies, short response time on the Sigel task, and the Rotter externality score. Except for this incomplete correspondence with the pattern of sex differences found in the coefficients for the conservation tasks, there seemed to be no meaningful trend in the sex differences observed in the coefficients for the Dream Interview scores.

Children's Performance on Piagetian Tasks Related to Their School Performance and Other Behaviors

Table V-10 reports for the working-class the relationship between children's performance on the Conservation Tasks and the Dream Interview and other measures of their performance and abilities. These other measures were selected for reporting from among the entire group of children's measures either because it was hypothesized that they would be significantly related to the Piagetian measures, or because they showed significant relationships with more than one or two of the Piagetian measures. When Table V-10 is examined, it can be seen that the correlation coefficients for Length Conservation show no meaningful longitudinal pattern of relationships with the other child measures; as previously discussed this is most probably due to a lack of stability and possible lack of

TABLE V-9

The Relationship of Maternal Behavior and
Environment to Children's Dream Interview Total Scores
(Working Class; Boys and Girls)

Maternal Measures	Dream Interview Total Scores		
	Working Class	Boys	Girls
Preschool Measures			
Home Environment:			
Home Resources Factor Score	.27**	.24*	.42**
Use of Reading Material by Child with Adult	.23*	.22	.26*
Maternal Attitudes:			
Out-of-Home Activities	.16	.24*	.23*
Global Achievement Pressure	.07	.17	.02
"Powerlessness"	-.19*	-.15	-.34**
Personal Optimism	.13	.25*	.18
Control Strategies:			
1st Day: % Imperative	-.29**	-.34**	-.29*
School-Peer: % Status-normative	-.19*	-.29*	-.18
Mastery: % Personal-subjective	.29**	.23	.34**

TABLE V-9 (Continued)

Maternal Measures	Dream Interview Total Scores		
	Working Class	Boys	Girls
Teaching Techniques:			
No. of Specific Turning Directions (Etch-a-Sketch)	.11	.34**	.14
Praise and Engagement	.16	.24	.23
Specificity of Maternal Feedback in Block Sorting Task	.18	.17	.35**
Other Measures:			
Language Factor Score	.09	.19	.20
Sigel, Ave. Reaction Time per Sort	-.17	-.15	-.34**
Maternal Support Toward Child	.35**	.35**	.36**
Follow-up Measures:			
WAIS - Performance IQ	.08	.27*	.17
- Full IQ	.22*	.35**	.30**
Kagan, Ave. Reaction Time	.10	.10	.13
Anxiety and Depression Test - Anxiety Score	-.18	-.44**	-.11
Locus of Control (high score = external)	-.19	-.41**	-.20
Externality Score (Rotter) (high score = externality)	-.19	-.24	-.38*

* = p < .05
** = p < .01

validity of the task. In general, however, the coefficients show the expected directions and the increase in magnitude from age 6 to age 7 that could be predicted from the increase in Piagetian scores found between ages 6 and 7.

Working-class children's school performance shows consistent significant relationships with the Dream Interview (age 6) and the Number and Liquid Conservation tasks (age 7), except for the correlation of the Lee-Clark Reading Readiness Test with Liquid Conservation. Not surprisingly, Number Conservation (age 7) shows greater association with arithmetic grades than with reading grades. Number Conservation (age 7) also shows greater association with the reading readiness test than with the reading achievement test, a result to be expected if readiness tests measure a more general cognitive ability and achievement tests measure a more specific cognitive skill.

When the coefficients for the other child measures are examined it can be seen that high scores or "passes" for Piagetian tasks show the greatest relationship with IQ scores at age 7, and the next strongest relationship with good performance (giving correct or scorable answers and avoiding errors and non-meaningful responses) on the Kagan Design Recall test and Sigel Conceptual Style Sorting task. Performance and behavior measures from the preschool tests and tasks were found similarly associated with the conservation tasks; detrimental behaviors during testing, errors in block sorting, and non-meaningful responses are negatively related to conservation measures, whereas high scores on the block sorting task are positively associated with the conservation measures. It was also found that the child's locus of control, or tendency to see himself as responsible for his successes and failures, was positively associated with the ability to conserve. It would appear then that the ability to conserve is closely associated with intelligence and with those aspects of cognitive development affecting test behaviors and performance; it is not clear, however, whether any of these relationship should be seen as causal relationships, or whether it is more appropriate to interpret the correlations as resulting from parallel development of the several abilities. It seems likely that there may be a cause-effect relationship between attitudes toward tests (as reflected, for example, in the locus of control measure) and performance on Piagetian tasks, although this cause-effect relationship if it exists may be circular or two-directional, rather than one-way.

Table V-11 reports correlation coefficients separately for boys and girls for relationships between Piagetian tasks and other child measures. No wholly consistent patterns of sex differences can be found, but potential

TABLE V-10

Children's Performance on Piagetian Tasks Related to Their School Performance and Other Selected Measures (Working-class Group)

Other Children's Measures	Conservation Measures										Dream Interview
	Length				Number				Liquid		
	Total		Pass/Fail		Total		Pass/Fail		Pass/Fail		
	Age 6	Age 7	Age 6	Age 7	Age 6	Age 7	Age 6	Age 7	Age 6	Age 7	Age 6
School Measures											
Lee-Clark Reading Readiness Test, Total Score	.26**	.28**	.21*	.24*	.35**	.40**	.07	.33**	-.04	.17	.39**
Metropolitan Readiness Test	.37**	.27**	.34**	.21*	.40**	.37**	.18	.28**	.13	.26*	.46**
Lee-Clark Reading Primer, Total Score	.25**	.29**	.17	.24*	.33**	.36**	.10	.24*	.04	.29**	.36**
Reading, Twc Year Total	.20*	.23*	.17	.22*	.25*	.36**	.00	.25**	.00	.22*	.32**
Arithmetic, Two Year Total	.28**	.27**	.25*	.24*	.22*	.43**	-.07	.32**	.03	.25**	.32**
Preschool Performance Measures											
Block sorting Task Score	.17	.23*	.19*	.26**	.00	.32**	-.06	.25**	-.07	.33*	.19*
Non-meaningful Block Placement	-.27**	-.20*	-.22*	-.15	-.17	-.29**	-.05	-.22*	.08	-.04	-.27**
Teaching Period Combination Score (high score = detrimental behaviors)	-.15	-.20*	-.16	-.14	-.31**	-.34**	-.06	-.23*	.00	-.12	-.32**
Child's Errors, Block Sorting	-.19*	-.07	-.15	-.06	-.12	-.22*	.07	-.16	.16	.03	-.15

TABLE V-10 (Continued)

Other Children's Measures	Conservation Measures										Dream Interview
	Length				Number				Liquid		
	Total		Pass/Fail		Total		Pass/Fail		Pass/Fail		
	Age 6	Age 7	Age 6	Age 7	Age 6	Age 7	Age 6	Age 7	Age 6	Age 7	Age 6
Binet IQ											
Age 4	.15	.22*	.12	.20*	.16	.30**	-.12	.21*	-.09	.22*	.44**
Age 7	.37**	.32**	.29**	.26**	.32**	.42**	.12	.29**	.02	.40**	.50**
General Factor, age 7 (optimum behavior during testing)	.16	-.03	.11	-.04	.13	.05	-.04	.10	.09	.14	.25**
Kagan Design Recall Test											
Average Reaction Time Follow-up 1	.15	.10	.24*	.01	.22*	.23*	.08	.19*	-.08	.09	.24**
Follow-up 2	.16	.25**	.26**	.22*	.09	.21*	-.02	.17	.00	.21*	.29**
Total Errors Follow-up 1	-.32**	-.18	-.29**	-.19	-.24*	-.34**	-.16	-.28**	-.05	-.13	-.16
Follow-up 2	-.34**	-.23*	-.36**	-.19	-.29**	-.22*	-.14	-.20*	.06	-.11	-.23*
Good First Response Follow-up 1	.21*	.16	.29**	.20*	.21*	.39**	.09	.36**	-.01	.14	.16
Follow-up 2	.24*	.20*	.27**	.17	.37**	.23*	.09	.20*	.06	.13	.30**
Non-meaningful Response Sequences Follow-up 1	-.29**	-.29**	-.28**	-.27**	-.29**	-.36**	-.17	-.30**	-.02	-.19*	-.14
Follow-up 2	-.27**	-.20*	-.26**	-.14	-.19*	-.21*	-.15	-.19*	.16	-.11	-.33**

TABLE V-10 (Continued)

Other Children's Measures	Conservation Measures										Dream Interview
	Length				Number				Liquid		
	Total		Pass/Fail		Total		Pass/Fail		Pass/Fail		
	Age 6	Age 7	Age 6	Age 7	Age 6	Age 7	Age 6	Age 7	Age 6	Age 7	Age 6
Sigel Conceptual Style Sorting Task											
Nonscorable Verbal Follow-up 1	-.17	-.10	-.21*	-.07	-.16	-.27**	.05	-.18	-.03	-.27**	-.32**
Follow-up 2	-.23*	-.35**	-.13	-.29**	-.31**	-.30**	-.09	-.28**	-.06	-.18	-.12
Scorables Follow-up 1	.11	.15	.14	.13	.17	.24**	-.01	.17	.06	.29**	.35**
Follow-up 2	.24*	.34**	.16	.29**	.28**	.31**	.07	.30**	.07	.20*	.10
Locus of Control											
Total Internalized Choices	.10	.19*	.01	.22*	.12	.31**	-.09	.23*	-.07	.14	.23*

* = p < .05
** = p < .01

trends toward meaningful sex differences can be seen in the correlations of conservation tasks with school performance, IQ, Kagan average reaction time ("reflectivity"), and locus of control. Boys' school grades, IQ measures, and locus of control (when correlated with conservation performance at age 6) tend to show higher relationships with the conservation tasks than do those for girls. On the other hand, girls' scores on standardized tests, "reflectivity," and locus of control (when correlated with conservation performance at age 7) tend to show higher associations with conservation tasks than do corresponding measures for boys.

Summary

Responses to a Dream Interview questionnaire and measures of number conservation, length conservation, liquid conservation, size conservation, and class inclusion were obtained from the children. Age made the expected difference for the performance of children at all social status levels: mean scores for 7-year-olds were consistently higher than for 6-year-olds, with the exception of the Class Inclusion task. Only 2% of the children were able to pass the Class Inclusion task at either age. Limited evidence was obtained for the proposition that middle-class children are likely to do better than lower-class children, and that this difference favoring the middle-class is likely to increase with age. Breakdown of scored items from the Number Conservation task indicated that the children in this study showed a pattern of attainment of number conservation that is similar to that found in other samples of 6 and 7 year old children: a large increase in mean scores indicating the children's ability to conserve without help supported the belief that these ages do indeed mark the transition from the period of intuitive thought to the period of concrete operations. The mean score on the Dream Interview questionnaire also confirmed that the children were in the transition period between the first and second stages of the formation of notions of reality.

Evidence was found for a relationship between maternal behavior and environmental variables and children's performance on Piagetian tasks, but great caution was urged about interpreting these relationships as signs of maternal and environmental <u>influence</u> on children's conservation behavior or notions of reality. Nevertheless,

TABLE V- II

CHILDREN'S PERFORMANCE ON PIAGETIAN TASKS RELATED TO THEIR SCHOOL PERFORMANCE AND OTHER SELECTED MEASURES, BY SEX

Other Children's Measures	Conservation Measures																				Dream Interview	
	Length								Number								Liquid					
	Total				Pass/Fail				Total				Pass/Fail				Pass/Fail					
	Age 6		Age 7		Age 6		Age 7		Age 6		Age 7		Age 6		Age 7		Age 6		Age 7		Age 6	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
School Measures																						
Lee-Clark Reading Readiness Test, Total Score	.26*	.29**	.21	.37**	.20	.24*	.22	.36**	.31**	.41**	.42**	.55**	.19	.19	.38**	.48**	.10	.00	.24	.28*	.51**	.35**
Metropolitan Readiness Test	.39**	.39**	.31	.31*	.37**	.31*	.30**	.31**	.52**	.41**	.43**	.56**	.36**	.20	.34*	.53**	.23	.16	.34**	.38**	.50**	.51**
Lee-Clark Reading Primer, Total Score	.25*	.26*	.18	.38**	.24*	.13	.16	.37**	.33**	.29*	.40**	.46**	.21	.14	.34**	.35**	.21	.01	.26*	.39**	.32**	.45**
Reading, Two Year Total	.23	.18	.24	.22	.21	.10	.23	.20	.38**	.23	.44**	.43**	.17	.02	.39**	.33**	.21	.01	.29*	.22	.35**	.34**
Arithmetic, Two Year Total	.25*	.27*	.33**	.30**	.25*	.14	.29*	.22	.25	.23	.50**	.45**	.07	.01	.45**	.35**	.23	.05	.34**	.26*	.44**	.26*
Preschool Performance Measures																						
Block sorting Task Score	.22	.22*	.39**	.28*	.30*	.16	.43**	.30**	.15	.13	.52**	.37**	.25*	-.02	.41**	.37**	.08	.09	.26*	.53**	.22	.38**
Non-meaningful Block Placement	-.19	-.29**	-.15	-.24*	-.15	-.24*	-.18	-.22	-.27*	-.12	-.30*	-.35**	-.13	-.01	-.24*	-.27*	-.01	.13	-.10	-.06	-.29*	-.29*
Teaching Period Combination Score. (high score = detrimental behaviors)	-.08	-.18	-.21	-.18	-.17	-.09	-.21	-.15	-.23	-.39**	-.40**	-.41**	-.08	-.16	-.28*	-.35**	.01	-.07	-.15	-.23*	-.27*	-.33**
Child's Resistance During Interaction	.03	-.24*	-.11	-.21	.00	-.25*	-.14	-.13	-.07	-.14	.11	-.16	.16	-.01	.03	-.08	.11	-.05	.00	-.21	-.08	-.15
Child's Errors, Block Sorting	-.12	-.15	-.07	-.19	-.04	-.14	-.14	-.15	-.24*	-.05	-.30**	-.23*	-.07	.15	-.23	-.19	.07	.17	.01	-.10	-.16	-.20
Binet IQ																						
Age 4	.31**	.14	.41**	.19	.28*	.12	.31**	.30**	.34**	.26*	.47**	.37**	.32**	.01	.43**	.33**	.20	-.09	.30**	.35**	.53**	.45**
Age 7	.39**	.37**	.31**	.34**	.39**	.21	.26*	.37**	.41**	.38**	.54**	.50**	.37**	.27*	.45**	.43**	.29*	.08	.47**	.44**	.53**	.62**
General Factor, Age 7 (optimum behavior during testing)	.09	.23*	.01	.01	.07	.21	-.07	.01	.30*	-.01	.20	-.02	.20	-.14	.19	.07	.08	.10	.13	.09	.20	.30*

Behavior Management Measures																				
Kagan Design Recall Test																				
Average Reaction Time																				
Follow-up 1	.08	.22	-.05	.05	.12	.31**	-.09	.06	.03	.27*	.14	.30**	.15	.08	.05	.29*	.13	-.14	.07	.17	.26	.23*
Follow-up 2	.11	.24*	.02	.37**	.20	.30**	.01	.42**	.08	.32**	.07	.38**	.02	.33**	-.06	.40**	.09	-.04	.08	.34**	.25*	.34**
Total Errors																				
Follow-up 1	-.19	-.30**	-.05	-.16	-.15	-.28*	-.15	-.20	-.23	-.19	-.20	-.43**	-.35	-.06	-.15	-.34**	-.25	-.02	-.05	-.23*	-.10	-.27**
Follow-up 2	-.28	-.36**	-.17	-.25*	-.34**	-.33**	-.20	-.23*	-.26*	-.35**	-.32**	-.27*	-.21	-.29*	-.24*	-.27*	-.09	.03	-.18	-.11	-.29*	-.30**
Good First Response																				
Follow-up 1	.16	.20	.06	.14	.23*	.20	.14	.26*	.28*	.14	.35**	.40**	.30*	-.04	.28*	.38**	.13	.06	.17	.26*	.18	.26*
Follow-up 2	.14	.26*	.18	.15	.20	.22	.20	.18	.27*	.39**	.29*	.29**	.09	.30*	.21	.28*	.13	.03	.19	.08	.24	.33**
Non-meaningful Response Sequences																				
Follow-up 1	-.28*	-.25*	-.14	-.30**	-.26*	-.23*	-.18	-.33**	-.33**	-.20	-.32**	-.48**	-.34**	-.06	-.25*	-.44**	-.17	.05	-.16	-.27*	-.19	-.21
Follow-up 2	-.19	-.34**	-.10	-.33**	-.19	-.29*	-.11	-.27*	-.20	-.17	-.34**	-.24*	-.18	-.18	-.27*	-.25*	-.03	.17	-.21	-.10	-.42**	-.27*
Sigel Conceptual Style Sorting Task																				
Nonscorable Verbal																				
Follow-up 1	-.24*	-.28*	-.29*	-.02	-.26*	-.27**	-.12	-.15	-.26*	-.17	-.41**	-.34**	-.21	-.07	-.32**	-.24*	-.10	.00	-.35**	-.28*	-.36**	-.38**
Follow-up 2	-.11	-.33**	-.20	-.34**	-.02	-.23	-.21	-.31**	-.26*	-.29*	-.32**	-.37**	-.12	-.12	-.33**	-.30*	-.17	.02	-.19	-.23*	-.16	-.18
Scorables																				
Follow-up 1	.24*	.23	.27*	.11	.26*	.19	.10	.23	.23	.22	.43**	.30	.20	.00	.34**	.23	.10	.05	.34**	.31	.36**	.42
Follow-up 2	.08	.34**	.17	.34**	.00	.24	.21	.30**	.12	.31**	.28*	.39**	.03	.13	.30*	.32**	.20	-.01	.16	.24*	.11	.18
Locus of Control																				
Total Internalized Choices	.15	.26*	.17	.32**	.12	.20	.16	.39**	.37**	.10	.21	.47**	.33**	-.10	.20	.41**	.10	-.07	.05	.39**	.29*	.28*

* = p < .05
** = p < .01

maternal variables that have repeatedly been discussed in this study as showing significant relationship with children's performance were again found related to the Piagetian measures of children's cognitive development. For the total group, these measures were: mother's feeling of efficacy and optimism; pressure for achievement; control strategies; specificity and praise as part of teaching techniques; use of standard English; support of children; low anxiety; internal locus of control; and IQ. For the working-class group only, these measures were: feeling of efficacy, use of standard English, and--to a more limited degree--achievement pressure, optimism, praise, support of child, and IQ.

Children's school performance was related to their scores on the Dream Interview, Number Conservation, and Liquid Conservation tasks. Number Conservation was more highly associated with arithmetic grades than with reading grades. The ability to conserve also appeared to be closely related to children's intelligence and to those aspects of cognitive development affecting test behaviors and performance. The child's locus of control was positively associated with the ability to conserve.

Girls as a group tended to receive lower (but not significantly lower) scores than did boys on the Piagetian measures; their performance also appeared to be somewhat less stable. Maternal variables were typically more highly associated with girls' Piagetian scores than with boys' scores on the same tasks. Boys' school grades and IQ's were likely to show higher relationships with the Piagetian measures than were the girls', whereas some experimental measures (reaction time, problem behaviors) were more highly related to girls' scores.

CHAPTER VI

COGNITIVE BEHAVIOR OF MOTHER AND CHILD

This chapter, a sequel to Chapter VI of the preschool phase report, is concerned with the general intellectual functioning of the mothers and their children, and with the development of the child's classificatory behavior as measured by the Sigel Conceptual Style Sorting Task. Group differences and longitudinal data on the child's Binet IQ and patterns of categorizing ability will be reported, as will the interrelationships among maternal and child variables. A central concern of this chapter is the relationship of IQ and sorting behaviors to children's school performance. What links can be established among intelligence, cognitive style, and school achievement? In an attempt to answer this question for our research population, correlations between children's cognitive behavior (IQ and Sigel scores) and school performance will be discussed; in addition, the apparent impact of maternal environment on children's IQ scores, cognitive style preferences and school performance will be presented.

Procedures

General intellectual functioning. In order to provide longitudinal data about the stability of intellectual functioning in both mothers and children, IQ tests were administered during the follow-up testing session. Stanford-Binet IQ scores were obtained from the children during the second follow-up sessions, to be used in comparison with the Binet IQ scores obtained from the children at age 4. During the first follow-up session, the mothers were administered four of the five performance subtests of the WAIS: digit symbol, picture completion, picture arrangement, and block design. The vocabulary subtest of the WAIS was also readministered to the mothers at this time. By prorating from the nine scales used (five WAIS verbal subscales had been administered to the mother during the preschool phase), estimates could be made for each mother of her WAIS Verbal, Performance, and Full IQ.

Cognitive style. The Sigel Conceptual Style Sorting Task described in the preschool report (Chapter VI) was readministered to the children at both follow-up testing sessions. Thus longitudinal data can be presented for the development of the children's classificatory behavior over a three-year interval. Data obtained during the preschool phase of the mothers' performance on the Adult Sigel Sorting Task (MAPS) will also be included in this chapter.

For the reader's convenience, a brief description of the children's Conceptual Style Sorting task follows (See Appendix H for detailed administration and scoring procedures). On each of twenty trials the child was asked to pick one of three pictures to go with the test picture. For five of the trials, ambiguous drawings of human figures were used; the remainder were black and white photographs depicting familiar characters, animals, or objects. After pointing to one of the pictures, the child was asked to explain his choice, and the experimenter recorded the answer verbatim. Rationales or scorable responses were classified as descriptive (descriptive part-whole or descriptive - global), relational-contextual, and categorical-inferential. In addition, nonscorable responses were classified as nonscorable verbal (e.g., "looks like it" or disjunctive responses, such as "this is a truck and this is a horse"); nonverbal (child points, edges cards, or only says "don't know"); or nonsort (where no choice is made).

Cognitive style, according to Kagan, Moss, and Sigel (1963) is a "term that refers to stable individual preferences in mode of perceptual organization and conceptual categorization of the external environment." Kagan and his group have described three basic categories of cognitive style (those listed above as types of scorable responses). A descriptive response is one having direct reference to manifest stimulus attributes; a descriptive part-whole response uses part of the stimulus--e.g., "have guns," "have shoes"--and a descriptive-global response uses all of the stimulus--e.g., "men," "horses." The individual who prefers descriptive (analytic) responses is one who prefers to split his environmental stimuli into parts and to attend to these stimuli as discrete units; his groupings tend to be based on an objective attribute shared by all of the stimuli. A relational-contextual response is given when the stimuli are perceived as having functional or thematic interdependence, e.g., "mother and baby," "the men are fighting." The individual who prefers relational responses is one who characterizes objects in his environment by a temporal or spatial functional relationship; he may also tend to see the world in terms of thematic interdependences. Since perception of function and theme are often highly dependent on idiosyncratic experiences, relational-contextual responses tend to be subjective and concrete rather than detached and abstract. The categorical-inferential response is one in which stimuli are treated as independent representatives of a class based on inferred or non-observable characteristics, e.g., "we eat them," "they go to the water." This category is typified in individuals who classify on the basis of inferences made about stimuli. No one objective attribute is singled out as the basis of classification. Thus categorical-inferential responses often represent thought processes which are highly orderly and complex in organizing stimuli, and which suggest more efficient strategies of information processing.

Longitudinal Analysis: Effects of Age, Sex and Social Status

Group data showing the effects of age, sex and social status upon the children's performance on the tasks described above are presented in Tables VI-1 through VI-5. Data taken at both the first and the second follow-up testing (mean ages 74 months and 86 months) are presented for each task. In addition, means and correlations obtained during the preschool study (mean age 49 months) are available and reported.

The effects of social class and age upon IQ scores may be seen in Table VI-1. Inspection of the table reveals that maternal IQ scores did not change significantly over the two-year period between tests; the slight observable differences can most readily be explained as a function of obtaining a Full IQ score that is a composite of Performance and Verbal IQ. Further confirmation of the mother's stability of intellectual functioning (as measured by IQ) is found in the high correlation (r = .90) of the WAIS vocabulary subtest administered during the preschool phase with the same test administered during the first follow-up. Thus the pattern of social class differences in maternal IQ scores that was found in the preschool study is also found in the follow-up study: middle-class mothers score significantly higher than mothers

TABLE VI-1

Social Status and Age Differences in Mean IQ's of Mothers and Children [a]

IQ Measure	Social Status															Significant Differences in Group Means
	Total Group			Middle Class			Working Class									
							Skilled			Unskilled						
										Father Present			Father Absent			
				1			2			3			4			
	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	
Mother's WAIS																
Verbal IQ (Preschool)	163	91.5	17.0	40	109.4	11.2	42	91.8	13.85	40	82.5	13.58	41	82.4	13.6	1 x 2** 1 x 3** 2 x 3** 1 x 4** 2 x 4**
Performance IQ (Follow-up 1)	155	92.6	16.15	39	107.2	9.9	41	92.3	13.79	36	83.6	14.0	39	86.7	15.67	1 x 2** 1 x 3** 2 x 3** 1 x 4**
Full IQ (composite score)	155	91.9	16.73	39	109.3	9.79	41	91.8	13.59	36	82.1	13.67	39	83.8	14.18	1 x 2** 1 x 3** 2 x 3** 1 x 4** 2 x 4*
Child's Binet IQ																
Age 4	163	99.6	13.79	40	109.4	14.98	42	98.6	14.52	40	96.3	10.42	41	94.4	9.72	1 x 2** 1 x 3** 1 x 4**
Age 7	153	100.2	16.14	38	113.2	14.82	41	98.0	13.95	35	95.9	13.88	39	93.7	14.7	1 x 2** 1 x 3** 1 x 4**
Change	153	.6	11.38	38	3.8	10.55	41	- .6	11.15	35	- .4	10.7	39	- .7	12.65	

* = $p < .05$
** = $p < .01$

[a] $p > .05$ for all differences between maternal preschool and follow-up measures, and between children's IQ at age 4 and age 7.

in all three working-class groups. Furthermore, mothers in the skilled working-class group received significantly higher IQ scores (Verbal IQ, Full IQ) than did those in the unskilled working class groups. There were no significant differences between mothers in the father-present and father-absent unskilled working-class groups.

Children's IQ scores showed fewer significant social status differences than did mothers' IQ Scores. The middle-class group showed significant differences from each of the three working-class groups, but the working-class groups showed no between-group differences. As reported in the preschool study, the mean preschool Binet IQ's for the children's groups were fairly close and all were within average range; this remained true for the Binet scores taken at age 7. The mean score increased somewhat with age for the middle-class group, and decreased slightly for the working-class groups; these changes were not significant ($p > .05$) but the trend, however, was in accord with previous research (Bloom, 1964; Cooper, 1964; Deutsch and Brown, 1964; Kennedy et al, 1963; Osborne, 1960). If this trend continues, with gains in the middle class and losses in the working class, significant age-related differences could be expected to appear.[1]

Sigel scorable and nonverbal responses showed age-related changes in the expected direction: the mean number of scorable responses increased and variance decreased with age, whereas the mean number of nonverbal responses (as well as the variance) decreased with age (see Table VI-2). Changes between preschool and follow-up measures were significant ($p < .01$) for all social status groups; in addition changes between the first and second follow-up mean scores were significant for scorable responses in the skilled working-class and father-present groups ($p < .01$) and for nonverbal responses in the father-present group ($p < .05$). Accompanying these age-related changes were changes in significant differences between social status groups. Although middle-class children gave significantly fewer nonverbal responses in the preschool study, there was no significant difference between middle-class and working-class performance on this measure

[1]Because of these social status differences affecting IQ scores, tables in this chapter containing maternal and child IQ data will usually report correlations for groups 2 - 4 and not for the total sample. Correlations for the combined working-class group are typically lower than those for the total group; the text will mention where exceptions exist, or where the magnitude of the difference is unusual.

TABLE VI-2

Longitudinal Data on Mean Scores for Children's Scorable and Nonverbal Responses (Sigel Conceptual Style Sorting Task), by Social Status

Child's Sigel (Conceptual Style Sorting Task) Measures	Social Status												Significant Differences in Group Means
	Middle Class 1			Working-class									
				Skilled 2			Unskilled						
							Father Present 3			Father Absent 4			
	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	
Scorable Responses													
Preschool	40	10 25	6.02	42	6.67	5.74	39	4.08	4.31	41	2.95	4.18	1 x 2** 1 x 3** 2 x 3* 1 x 4** 2 x 4**
Follow-up 1	39	18.49	3.66	37	16.73	4.31	37	15.86	4.89	40	16.72	3.82	1 x 3** 1 x 4*
Follow-up 2	38	19.26	1.55	41	18.44	1.88	36	18.28	1.81	39	17.38	4.04	1 x 2* 1 x 3* 1 x 4**
Nonverbal Responses													
Preschool	40	3.00	5.12	42	6.40	6.98	39	7.08	6.38	41	8.76	6.88	1 x 2* 1 x 3** 1 x 4**
Follow-up 1	39	.41	1.35	37	.27	.93	37	1.11	3.38	40	.20	.61	
Follow-up 2	38	.00	.00	41	.05	.22	36	.00	.00	39	.18	.85	

* p = < .05
** p = < .01

in the follow-up study: as can be seen, the means for the nonverbal responses dropped to zero or nearly zero. Thus the measure of nonverbal responses lost its usefulness as a research measure differentiating among social status groups; working-class children seemed to have "caught up" to the middle-class in their ability (or willingness) to give verbal responses. Scorable responses, however, continued to show social status differences, with the middle-class performing significantly higher.

Table VI-3 presents data on the categories ("cognitive style dimensions") which when combined form the scorable responses. These categories show relatively large age-related increases between the preschool and follow-up phases of the study; the magnitude of the increases, however, varies between groups and between measures. Mean scores for the father-absent group show unexpectedly large increases relative to the other groups. Changes in mean scores between follow-up 1 and follow-up 2 show an inconsistent pattern of increases; in 40% of the cases mean scores actually decreased from follow-up 1 to follow-up 2.

Certain hypotheses about these age-related changes, both between preschool and follow-up phases and between follow-up 1 and follow-up 2, can be more usefully discussed when the sorting categories are also presented as percentages of the scorable responses (See Figure 1). Inspection of Figure VI-1 makes clear that regardless of amount of verbal production, the relational-contextual and descriptive-global categories were preferred cognitive style dimensions for 4-year-old children in all social status groups. Descriptive part-whole responses were used less by the middle-class 4-year-olds and almost not at all by the working-class 4-year-olds. These sorting responses were noticeably different for the 6 and 7 year olds; they gave decreased percentages of global and relational responses and used part-whole responses most frequently. These changes support the hypothesis that global and relational responses are the most immature and occur most frequently in preschool children. In addition, the further hypothesis that descriptive part-whole ("analytic") responses increase with age is supported by these data. However, there is one hypothesis tentatively set forward in the report of the preschool phase that cannot be sustained by these longitudinal data. The preschool data indicated that middle-class children used significantly more descriptive part-whole responses than did working-class children, and it was therefore suggested that

TABLE VI-3

Longitudinal Data on Mean Scores for Children's Cognitive Style Dimensions, by Social Status

Child's Sigel (Conceptual Style Sorting Task) Measures	Social Status												Significant Differences in Group Means
	Middle Class			Working-class									
				Skilled			Unskilled						
							Father Present			Father Absent			
	1			2			3			4			
	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	
Part-Whole[b]													
Preschool	40	2.20		40	.60		39	.20		41	.30		(a)
Follow-up 1	39	5.97	4.18	37	4.95	4.04	37	8.11	5.63	40	6.15	4.63	2 x 3**
Follow-up 2	38	5.37	2.61	41	6.83	3.49	36	6.22	3.94	39	5.77	4.14	1 x 2*
Global													
Preschool	40	2.80		40	2.30		39	.50		41	1.00		(a)
Follow-up 1	39	3.38	1.97	37	3.43	2.25	37	2.78	2.30	40	3.42	2.51	
Follow-up 2	38	3.63	2.07	41	3.17	1.97	36	3.56	2.47	39	3.38	2.53	

TABLE VI-3 (Continued)

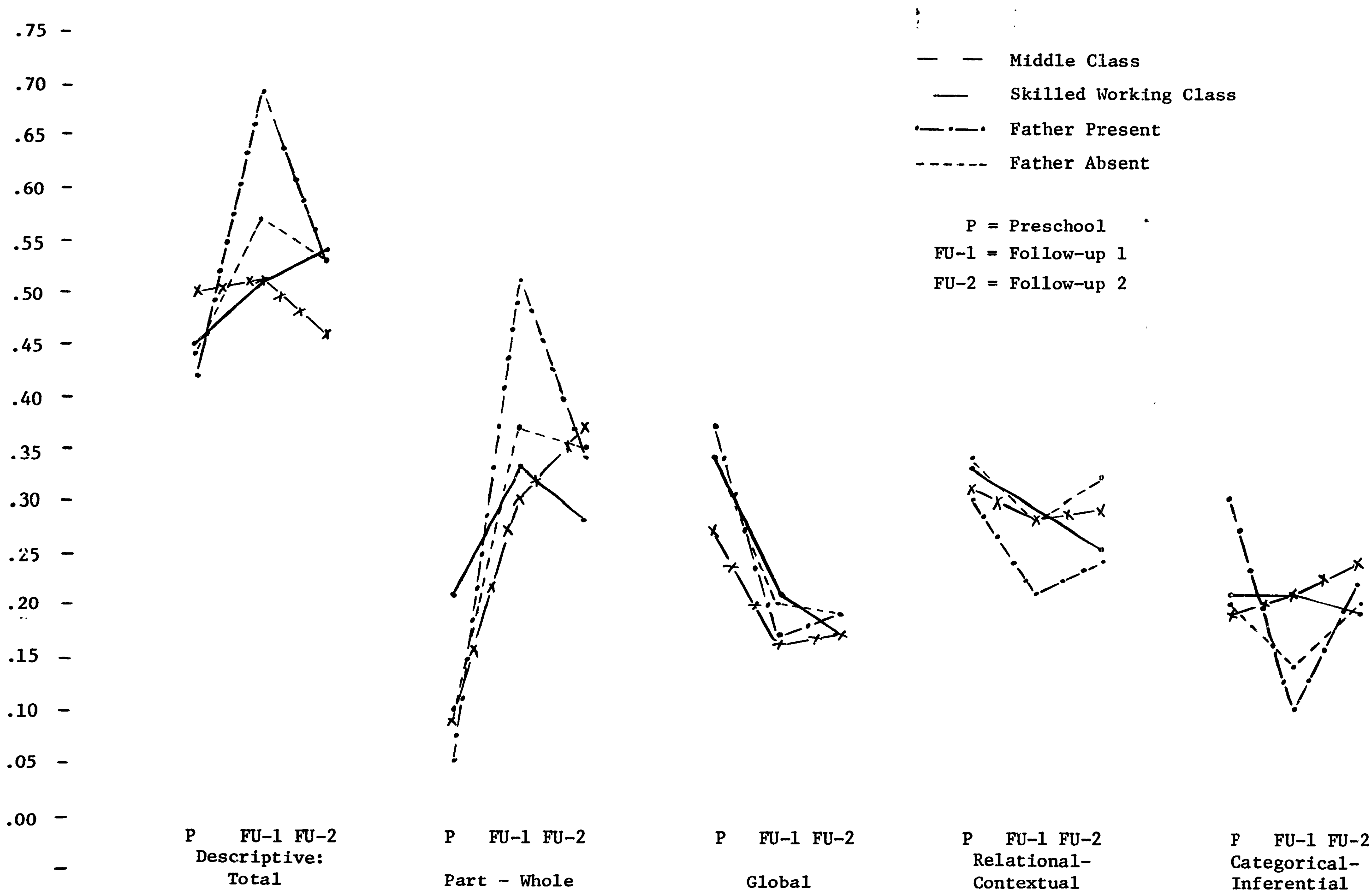
Child's Sigel (Conceptual Style Sorting Task) Measures	Social Status												Significant Differences in Group Means
	Middle Class			Working-class									
				Skilled			Unskilled						
							Father Present			Father Absent			
	1			2			3			4			
	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.	
Relational-Contextual Responses													
Preschool	40	3.20		40	2.20		39	1.20		41	1.00		(a)
Follow-up 1	39	5.15	3.40	37	4.81	3.10	37	3.35	3.30	40	4.75	3.14	1 x 3*
Follow-up 2	38	5.53	2.90	41	4.88	2.43	36	4.47	2.76	39	4.74	3.17	
Categorical-Inferential Responses[c]													
Preschool	40	2.00		40	1.40		39	1.20		41	.60		(a)
Follow-up 1	39	3.97	2.76	37	3.54	2.79	37	1.62	1.83	40	2.40	2.62	1 x 3* 2 x 3* 1 x 4*
Follow-up 2	38	4.74	2.30	41	3.56	2.26	36	4.03	3.46	39	3.49	2.50	1 x 2* 1 x 4*

* = p <.05
** = p < .01

a Data on significant differences not available for preschool groups.
b For the skilled working-class groups, difference between means for Follow-up 1 and Follow-up 2 is significant (p <.05).
c For the father-present unskilled working-class groups, difference between means for Follow-up 1 and Follow-up 2 is significant (p < .01).

FIGURE VI-1

Longitudinal Data on Sorting Categories as % of Scorable Responses, by Social Status



culturally disadvantaged children's impaired educability might arise in part from differences in opportunities for developing the reflective attitudes leading to descriptive part-whole responses. This suggestion was based on Kagan's report that descriptive part-whole responses correlate with favorable prognostic signs for educability such as attentiveness, control, learning ability, and prediction of first-grade reading ability (Kagan, 1965b). Figure VI-1 makes clear, however, that middle-class 6-year-olds did not use significantly more descriptive part-whole responses than did the working-class 6-year-olds. Thus, although the rate of developing part-whole responses seemed to be different for middle-class and working-class children, the amount and percentage of these responses were substantially the same for all groups of children at age 6, and use of part-whole responses could no longer be seen as an indicator of impaired educability resulting from cultural disadvantage.

Mean scores for boys and girls on IQ and Sigel Conceptual Style Sorting task measures are presented in Tables VI-4 and VI-5. Table VI-4 reports no significant sex differences for Sigel scorable and nonverbal responses, and only one significant sex difference for IQ scores. Mean IQ increased for boys (+2.34) and decreased for girls (-1.74) between ages 4 and 7; this relative change was significant ($p = .015$), even though girls' IQ remained slightly greater in magnitude than did boys' IQ. Although no significant or wholly consistent sex differences were found in scorable and nonverbal responses, it should be noted that on the preschool measures, boys gave fewer scorable responses than did girls, and on the follow-up measures, boys gave more scorable responses than did girls. Thus our tentative hypothesis set forward in the preschool report, that boys (especially from lower-class Negro homes) may be impaired relative to girls in their ability to offer verbal rationales for sorting, cannot be supported at ages 6 and 7.

Table VI-5 reports means for boys and girls on the sorting categories or cognitive style dimensions of the Sigel Sorting Task. Although others have reported sex differences in the utilization of these categories (Kagan, Moss and Sigel, 1963; Sigel, 1963, 1965), our data show only one significant sex difference. Boys used consistently more categorical-inferential responses at age 7 than did 7-year-old girls. It can be seen that the mean scores in all but two categories show an increase in magni-

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TABLE VI-4

Longitudinal Data on Mean Scores for Children's
IQ and Sigel Scorable and Nonverbal Responses, by Sex

Measure	Sex of Child					
	Boys			Girls		
	N	Mean	S.D.	N	Mean	S.D.
Child's Binet IQ						
Age 4	79	97.43	14.61	82	101.56	12.79
Age 7	73	99.49	16.64	78	100.31	15.50
Change	73	2.06*	11.48	78	-1.25*	10.86
Child's Sigel (Conceptual Style Sorting Task)						
Scorable Responses						
Preschool	79	5.82	5.84	81	6.21	5.84
Follow-up 1	73	17.57	3.53	78	16.36	4.82
Follow-up 2	75	18.55	2.33	79	18.10	2.84
Nonverbal Responses						
Preschool	79	7.35	7.05	81	5.46	6.20
Follow-up 1	73	.26	.80	78	.72	2.53
Follow-up 2	73	.08	.59	79	.04	.25

* = Difference between means for boys and girls is significant. ($p < .05$)

TABLE VI-5

Longitudinal Data on Mean Scores for Children's Cognitive Style Dimensions, by Sex

Sorting Category (Cognitive Style Dimension)	Sex of Child						Significant Differences in Group Means[a]
	Boys			Girls			
	N	Mean	S.D.	N	Mean	S.D.	
Descriptive Responses							
Part-Whole							
Preschool	80	.70		80	1.03		
Follow-up 1	73	6.33	4.53	78	6.19	4.86	
Follow-up 2	73	5.55	3.04	79	6.53	4.05	
Global							
Preschool	80	1.77		80	2.03		
Follow-up 1	73	3.22	2.16	78	3.32	2.38	
Follow-up 2	73	3.51	2.35	79	3.30	2.17	
Relational-Contextual Responses							
Preschool	80	2.00		80	1.81		
Follow-up 1	73	4.73	3.25	78	4.36	3.29	
Follow-up 2	73	5.01	2.58	79	4.85	3.05	
Categorical-Inferential Responses							
Preschool	80	1.3		80	1.17		
Follow-up 1	73	3.30	3.03	78	2.49	2.25	
Follow-up 2	73	4.48	2.95	79	3.42	2.33	1 x 2*

* $p < .05$

a Data on significant differences not available for preschool groups.

tude from preschool to follow-up 1 to follow-up 2. (The two exceptions are both in the second follow-up. Boys showed fewer part-whole responses than in the first follow-up; girls showed slightly fewer global responses in the second follow-up than in the first). It appears that with an increase in age goes an increase in ability to give all types of sorting responses. But it should be noted that although the number of responses increased in almost all cases, the percent of scorable responses for each category showed a different pattern (See Figure VI-2). As discussed in connection with Figure VI-1, it has been hypothesized that descriptive part-whole responses increase with age; Figure VI-2 shows that our data support this hypothesis for both boys and girls, although a slight decline is found between follow-up 1 and follow-up 2. In addition, boys consistently show a somewhat smaller percent of descriptive part-whole responses than do girls, even though the magnitude of boys' means was greater in the first follow-up. These data give some support, but not dramatic support, to other studies in which urban Negro girls were found to give more descriptive part-whole responses than urban Negro boys (e.g., Sigel, 1967). It is expected that descriptive global responses and relational-contextual responses will decline with age; Figure VI-2 shows a clear decline in descriptive global responses and a less definite decline in relational-contextual responses. Roughly similar patterns are found for boys and girls.

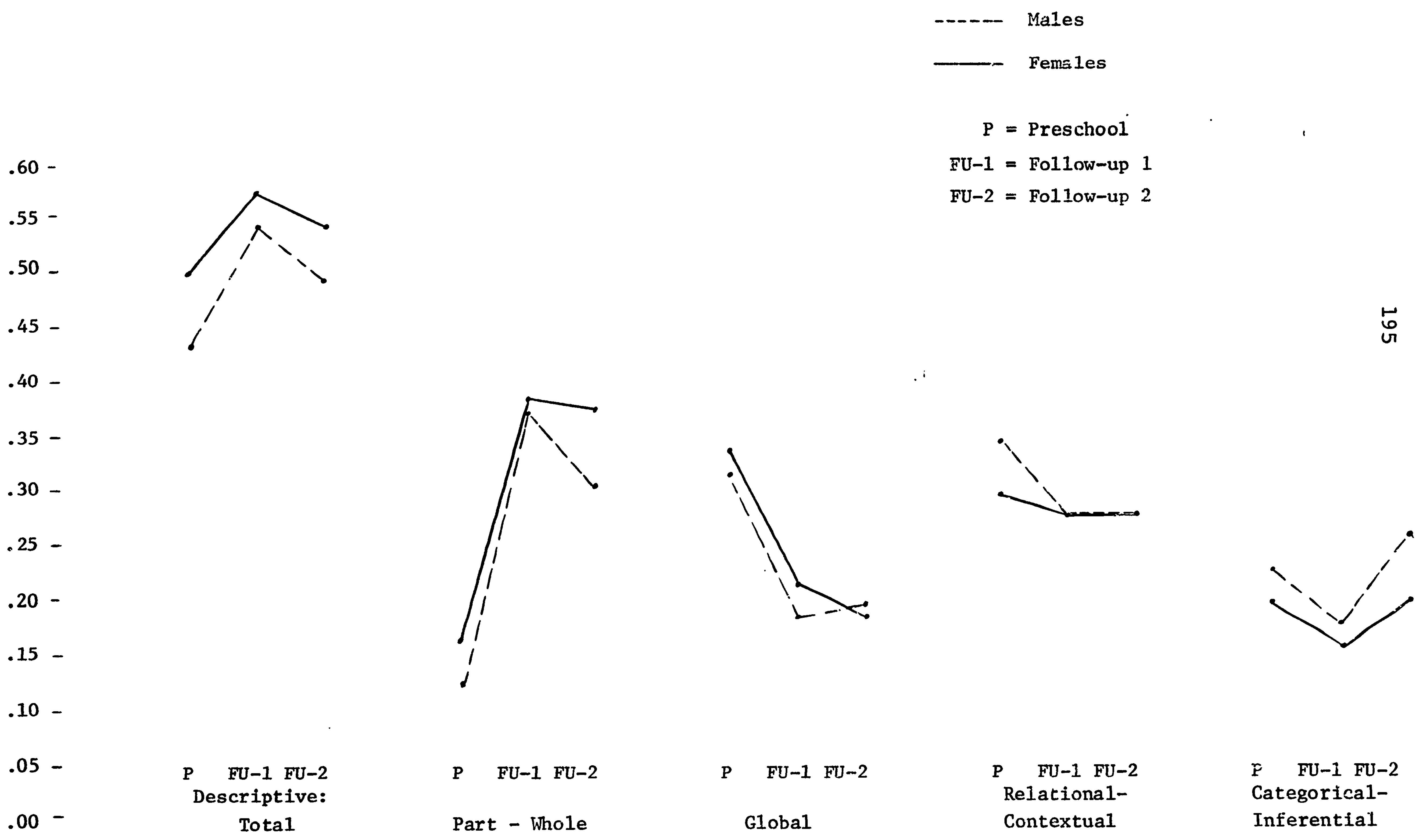
Interrelationships among Measures of the Children's Cognitive Behavior

Intercorrelations among children's IQ and Sigel Conceptual Style Sorting task measures are shown in Table VI-6. Correlation coefficients are reported for the working-class, boys, and girls. Correlation coefficients for the total group showed a fairly irregular pattern of difference from those for the working-class group: for the descriptive part-whole, descriptive global, and relational-contextual measures, r's for the total group tended to be .00 to .05 less than r's for the working class; for the other measures, r's for the total group tended to be .00 to .05 greater than for the working-class group.

The stability coefficients expressing the degree of correlation between separate administrations of the same measure appear along the diagonal in the table. Although

FIGURE VI-2

Longitudinal Data on Sorting Categories as % of Scorable Responses, by Sex



for the working-class group these coefficients (with the exception of those for nonverbal responses) are statistically significant, they are frequently rather low for stability coefficients, most probably as a consequence of the age-related changes in means. Most of the significant coefficients range from $r = .20$ to $r = .33$; the stability coefficient for relational-contextual responses is .40, and for Binet IQ is .63. When stability coefficients for boys and girls are examined, a picture of inconsistent differences appears. Boys show more stable performance than do girls on the measures of part-whole, relational-contextual, nonverbal and category shifts responses. In all these cases, the girls' stability coefficients were not even statistically significant, whereas the boys' stability coefficients ranged from $r + .32$ to $r = .55$. On the other hand, girls showed greater stability on the measures for descriptive global, categorical-inferential and scorable responses. On the remaining measures, boys' and girls' stability coefficients were approximately the same.

An important question to ask when examining the relationship of cognitive behavior to educability concerns the relationship between different aspects of cognitive behavior, in particular, between cognitive style and intelligence. Table VI-6 shows that for our research group, IQ scores show a consistent pattern of significant relationship to only two of the Sigel Sorting task measures: nonscorable verbal and scorable verbal responses. This further supports the suggestion in the preschool report that the level of conceptualizing ability and the preferred mode of categorizing in a situation where alternatives are possible are clearly different through related aspects of cognitive functioning. However, a willingness to attempt an answer or the ability to give a verbal rationale were reflected in higher intelligence test performance. In light of other studies, it is interesting to note the number of Sigel measures for which girls' responses were significantly associated with IQ when the responses of boys and of the working-class children were not or were only inconsistently associated with IQ; these significant relationships for girls are found in measures of descriptive global, relational-contextual, categorical-inferential, and category shifts responses. Earlier studies (reported in Coop, 1969) have reported more significant relationships for boys (using other IQ tests than the Binet).

TABLE

INTERCORRELATIONS AMONG
PERFORMANCE ON
(WORKING CLASS;

Measures	2	3	4	5	6	7	8
Class Inclusion, Total Score							
1 Age 6	.08	.46**	b	.01	.10	.02	.07
	-.01	.42**	b	.17	.13	.04	.14
	.00	.68**	.00	.05	.10	.13	.02
2 Age 7		.03	b	.11	-.07	.03	-.08
		.01	b	.14	-.06	.01	-.05
		-.08	.[illegible]2**	.12	.16	.07	.17
Class Inclusion, Pass-Fail							
3 Age 6			b	.08	.05	.02	.01
			b	.01	.10	-.10	.10
			-.04	.20	-.02	.21	-.06
4 Age 7[b]				.14	.20	.08	.21
Length Conservation, Total Score							
5 Age 6					.31**	.77**	.26**
					.37**	.80**	.38**
					.27*	.81**	.27*
6 Age 7						.24*	.88**
						.39**	.90**
						.14	.86**
Length Conservation, Pass-Fail							
7 Age 6							.21*
							.38**
							.18
8 Age 7							
Liquid Quantity Conservation, Pass-fail							
9 Age 6							
10 Age 7							
Number Conservation Total Score							
11 Age 6							
12 Age 7							
Number Conservation Pass-Fail							
13 Age 6							
14 Age 7							
Ring Segment Illusion Pass-Fail							
15 Age 6							
Dream Interview Total Score							
16 Age 6							

* = p < .05
** = p < .01

a The first (top) coefficient in each group is for the working class (groups 2-4 combined);
b Data not available for working class or boys; coefficients are for girls only.

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MEASURES OF CHILDREN'S
PIAGETIAN TASKS
BOYS AND GIRLS)[a]

9	10	11	12	13	14	15	16
-.01 .11 -.11	.06 .16 .05	.16 .25* .09	.08 .18 .15	.03 -.01 .68**	.13 .23 .21	-.06 .02 -.13	-.05 .10 .03
.11 .13 .07	.11 .04 .37**	.07 .17 .03	.15 .17 .25*	.16 .08 .12	.16 .22 .24*	.00 .04 -.10	.11 -.10 .27*
.12 .20 -.07	.07 .15 .01	.04 .12 -.04	.16 .12 .21	-.05 -.07 -.06	.17 .11 .22	-.06 -.05 -.07	-.03 .03 .04
.13	.30**	.14	.21	.13	.23	-.07	.11
.23* .36** .12	.26** .41** .20	.38** .40** .39**	.27** .33** .36**	.28** .45** .25*	.27** .35** .37**	.04 -.03 .09	.20* .30* .24*
.20* .38** .09	.42** .50** .46**	.38** .26* .33**	.51** .55** .47**	.21* .38** .02	.52** .53** .50**	.00 .11 -.28*	.16 .24 .31**
.15 .37** -.06	.28** .42** .16	.32** .29* .35**	.25** .37** .26*	.27** .50** .19	.24* .34** .31**	.10 .06 .10	.16 .29* .10
.23* .43** .06	.45** .43** .48**	.26* .26* .25*	.45** .51** .45**	.15 .38** -.01	.52** .52** .54**	.06 .10 -.16	.10 .13 .32**
	.29** .38** .20	.30** .37** .30**	.21* .26* .18	.39** .57** .19	.24* .27* .23*	.11 .10 .00	-.02 .23* .06
		.27** .34** .21	.50** .57** .49**	.20* .34** .05	.54** .55** .57**	.02 .10 -.23*	.25* .22 .45**
			.43** .32** .50**	.61** .65** .61**	.35** .26* .45**	-.03 -.01 -.07	.08 .32** .15
				.28** .38** .25*	.85** .88** .87**	-.10 .06 -.34**	.26** .31* .35**
					.20* .33** .17	-.02 -.04 -.01	-.02 .26* .00
						-.04 -.03 -.15	.22* .32** .30**
							.02 .04 .17

the two coefficients below are for boys (middle) and girls (bottom).

Other cross-correlations show an irregular pattern of relationships among the different measures from the Sigel Conceptual Style Sorting task. Looking first at the intercorrelations between cognitive style dimensions or sorting categories, it can be seen that there are two sets of fairly consistent relationships: descriptive part-whole responses are negatively associated both with relational responses and with categorical responses. The negative relationship between part-whole and relational categorizations was expected, because relational responses indicate relatively low attention to stimulus details whereas descriptive part-whole responses reflect a tendency to analyze a visual stimulus into component parts (Kagan et al, 1964). A negative relationship was not, however, expected between part-whole and categorical responses, since these two types of responses are thought to be alike in being analytic, objective and detached, more general and more abstract than the often highly subjective relational response. Yet categorical responses represent more orderly and complex thought processes than do descriptive part-whole responses; therefore a post hoc hypothesis was suggested to the effect that categorical responses may interfere with or go a step beyond descriptive part-whole responses. The child who is learning to break down (analyze) stimuli into details may be unable or unwilling to handle simultaneously the complementary process of generalizing to a greater whole. Another pattern to be noted in the cross-correlations is the appearance of consistent and significant negative associations between global and relational responses in the second follow-up. This also was expected, for the categorizing and labeling involved in global responses seems to be the objective inverse of the subjective relational response. Yet the objectivity of a global response may or may not correspond to the abstractions required in a categorical response; Table VI-6 shows that only for boys in the second follow-up is there a significant relationship (negative) between categorical and global responses.

The remaining cross-correlations reflect for the most part the rather low stability found between administrations of the Sigel Sorting task. There also are signs of a sex difference in the relationship of preschool non-verbal responses to follow-up measures of sorting categories. The fewer non-verbal responses a preschool girl gave, the more likely she was to give a global, relational or categorical response in the follow-up task and the less likely she was to give nonscorable verbal responses. For boys there was effectively no correlation between these measures.

The Relationship between Children's Cognitive Behavior and Measures of Their School Performance

An obvious question to ask about the study of cognitive behavior and cognitive style is whether these factors influence classroom or other school-related performance. Table VI-7 presents correlations between school performance measures and cognitive behavior measures for the total group and the combined working-class group. All coefficients are in the expected direction, and differences between the total group and the working-class group are typical: coefficients for the total group are regularly somewhat larger than those for the working-class group. It will be noticed that the entries in Table VI-7 depart somewhat from those used previously, in that a number of Sigel Conceptual Style Sorting task measures are missing. These measures, omitted because they showed no meaningful relationship with the school measures, are the descriptive part-whole, descriptive global (FU-1), relational, nonverbal (FU-1 and FU-2) and category shifts responses. Most of the coefficients for these measures were less than $\underline{r} = \pm .10$. These omissions already suggest a partial answer (for the present research group) to the question of the influence of cognitive _style_ on school performance. Two measures of cognitive _style_, the "analytic" part-whole response and the "subjective" relational response, show no appreciable relationship to school performance; a third measure, descriptive global responses, shows some significant relationships only in the 7-year-old children. However, the fourth measure of cognitive style, categorical responses, shows consistent significant relationships with the standardized tests but not with the teachers' grades. It is interesting that a measure showing readiness to infer attributes of stimulus figures is consistently associated with objective test scores; it suggests that additional research should be performed to test the persistence of this relationship for other standardized tests and to identify those elements of reading readiness and achievement tests that may be related to a categorical-inferential cognitive style.

TABLE VI-7

The Relationship between Children's Cognitive Behavior and Measures of School Performance (Total Group; Working-class Group)

Measure	Standardized Tests						School Grades					
							Two-year Total					
	Lee-Clark Reading Readiness Test		Metropolitan Readiness Test		Lee-Clark Primer		Arithmetic		Reading		Conduct	
	Total Group	W-C Group	Total Group	W-C Group	Total Group	W-C Group	Total Group	W-C Group	Total Group	W-C Group	Total Group	W-C Group
Binet IQ												
Age 4	.56**	.48**	.59**	.48**	.47**	.38**	.53**	.47**	.49**	.44**	.41**	.26**
Age 7	.63**	.58**	.72**	.68**	.63**	.60**	.59**	.49**	.58**	.55**	.49**	.36**
Sigel (Conceptual Style Sorting Task) Responses												
Descriptive Global												
Follow-up 2	.04	.04	.20*	.16	.16*	.21*	.13	.17	.25**	.30**	.17*	.16
Categorical-Inferential												
Follow-up 1	.23**	.18*	.28**	.15	.28**	.19	.18*	.10	.15	.04	.07	.01
Follow-up 2	.28**	.21*	.27**	.21*	.28**	.20*	.16	.07	.13	.06	.20*	.15
Nonverbal												
Preschool	-.29**	-.22*	-.39**	-.34**	-.34**	-.28**	-.27**	-.16	-.25**	-.20*	-.24**	-.18
Nonscorable-Verbal												
Follow-up 1	-.24**	-.18	-.34**	-.26*	-.30**	-.24*	-.33**	-.27**	-.26**	-.20*	-.23**	-.15
Follow-up 2	-.43**	-.38**	-.38**	-.32**	-.42**	-.36**	-.41**	-.38**	-.40**	-.38**	-.38**	-.32**
Scorable												
Preschool	.37**	.32**	.48**	.34**	.39**	.23*	.36**	.19*	.29**	.21*	.27**	.12
Follow-up 1	.27**	.24**	.35**	.28**	.30**	.25**	.30**	.25**	.26**	.20*	.20*	.11
Follow-up 2	.42**	.36**	.37**	.30**	.42**	.35**	.41**	.38**	.39**	.38**	.37**	.32**

* = $p < .05$ W-C = Working-class
** = $p < .01$

The Sigel measures that show the greatest relationship to school performance measures are not, however, measures of cognitive style. They are instead more gross measures of the child's willingness to attempt a verbal response and ability to give verbal rationales for sorting behavior. Sex differences in magnitude of correlation coefficients for these variables are reported in Table VI-8. Although nonscorable verbal and scorable responses are on the whole significantly associated for both boys and girls with the school performance measures, girls' correlation coefficients are typically higher. Table VI-8 also shows that girls with many categorical responses (especially in FU-2) were more likely than boys to do well on school performance measures. The measure of descriptive global responses shows significant correlations with girls' grades and reading achievement (Lee-Clark Primer) but not with boys' school measures. It should be noted that this pattern favoring girls is not found in correlation coefficients for Binet IQ.

In general, IQ shows a much greater relationship with school grades than do any of the children's conceptual style sorting behaviors. All correlations are significant and, except for coefficients for conduct grades, range from .38 to .72. Coefficients for conduct are lower. For measures of reading ability, a pattern of sex differences favoring the boys emerges: brighter boys tend to receive slightly higher scores on reading readiness and reading achievement tests and slightly higher reading grades in school. On the other hand, brighter girls tend to receive higher conduct grades. Coefficients for arithmetic grades showed no pattern of sex differences. The relationship between children's IQ scores and school performance has already been discussed in greater detail in Chapter III; that discussion will not be repeated here.

Maternal Cognitive Behavior Used to Predict Children's IQ, Sigel Scores, and School Performance

Mothers' performance on the Adult Sigel Sorting Task (MAPS) was fully discussed in Chapter Six of the report of the preschool phase of this study (see Appendix H in this report for details of administration and scoring). For the reader's convenience, mothers' mean responses for the sorting categories by social status are presented here in Table VI-9. Table VI-9 also reports maternal mean IQ scores, by social status. Inspection of the

TABLE VI-8

The Relationship between Children's Cognitive Behavior and Measures of School Performance, by Sex

Measures	Standardized Tests						School Grades					
	Lee-Clark Reading Readiness Test		Metropolitan Readiness Test		Lee-Clark Primer		Two-year Total					
							Arithmetic		Reading		Conduct	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Binet IQ												
Age 4	.56**	.52**	.61**	.56**	.46**	.45**	.45**	.59**	.50**	.45**	.33**	.47**
Age 7	.64**	.65**	.75**	.70**	.67**	.63**	.55**	.54**	.65**	.49**	.49**	.52**
Sigel (Conceptual Style Sorting Task) Responses												
Descriptive Global												
Follow-up 2	-.07	.16	.21	.20	.01	.31**	.04	.26*	.19	.33**	.10	.31*
Categorical-Inferential												
Follow-up 1	.27*	.26*	.26*	.36**	.27*	.40**	.19	.26*	.15	.21	.05	.20
Follow-up 2	.23	.45**	.09	.53**	.21	.48**	.07	.38**	.00	.34**	.18	.36**
Nonverbal												
Preschool	-.10	-.44**	-.29*	-.50**	-.16	-.48**	-.10	-.39**	-.16	-.30**	-.13	-.30**
Nonscorable-Verbal												
Follow-up 1	-.33**	-.21	-.42**	-.32*	-.36**	-.29*	-.37**	-.35**	-.28*	-.26*	-.12	-.39**
Follow-up 2	-.39**	-.52**	-.36**	-.44**	-.30**	-.55**	-.28*	-.60**	-.27*	-.53**	-.28*	-.55**
Scorable												
Preschool	.34**	.40**	.53**	.42**	.34**	.43**	.31**	.41**	.28*	.30**	.17	.39**
Follow-up 1	.34**	.29*	.37**	.39**	.35**	.31**	.37**	.33**	.28*	.29*	.13	.33**
Follow-up 2	.37**	.52**	.32*	.44**	.30*	.55**	.25*	.60**	.26*	.53**	.25*	.56**

* p = < .05
** p = < .01

table reveals that relational-contextual responses were most frequently offered; categorical-inferential were the next most common, and descriptive most infrequent. The middle-class group was higher on descriptive and categorical categories; low-status groups were higher on relational ones.

The greater use of relational categories by working-class mothers is interpreted to be especially significant. Relational responses indicate relatively low attention to stimulus details (Kagan et al, 1964); in the present study it was also found that relational responses were very subjective, reflecting a tendency to relate objects to personal concerns. Descriptive and categorical responses, on the other hand, tended to be objective and detached, more general and more abstract. In particular, categorical responses represented more orderly and complex organizations of stimuli, suggesting more efficient strategies of information processing.

The implication that mother's use of descriptive and categorical responses is related to greater intelligence and abstraction behavior is supported by the maternal intercorrelation data presented in Table VI-10. The table presents data for mothers of boys and girls and of the working-class group. Coefficients for the total group were in the same direction as those for the working-class group, and typically higher. The difference in magnitude mattered only in the correlations of IQ with average reaction time per sort; these coefficients are low and not significant for the working class (*r* ranges from .09 to .16) but higher and significant for the total group (*r* ranges from .25 to .28). Looking first at coefficients for the working class, it can be seen that descriptive and categorical responses, which both entail categorizing and labeling, are positively correlated and the relationship between descriptive global and categorical responses is significant. But descriptive and categorical responses showed unusually high negative relationships ($r = -.62$ to $-.74$) with relational-contextual responses. This pattern was also seen in the correlation of sorting categories with IQ: mothers with high IQ's were more likely to give descriptive and categorical responses and less likely to give relational responses, reflecting the greater use of intellective factors in descriptive and categorical responses.

Correlation coefficients were similar in direction for mothers of both boys and girls. Correlations between maternal IQ scores and maternal responses for sorting

TABLE VI-9

Mean Scores for Adult Sigel Sorting Task (MAPS) and Mother's IQ by Social Status

Maternal Measures	Social Status			
	Middle Class	Working-class		
		Skilled	Unskilled	
			Father Present	Father Absent
Sigel (MAPS) Responses				
Total Descriptive	3.2	2.2	2.1	2.6
Descriptive Part-Whole	1.6	1.3	1.3	1.5
Descriptive Global	1.5	0.9	0.8	1.1
Relational-Contextual	5.5	6.8	7.5	6.7
Categorical-Inferential	3.3	3.0	2.2	2.7
WAIS				
Verbal IQ	109.4	91.8	82.5	82.4
Performance IQ	107.3	92.3	83.6	86.7
Full IQ	109.3	91.8	82.1	83.8

TABLE VI-10

Intercorrelation of Maternal Variables
(Working-class; Boys and Girls)[a]

Maternal Measures	1	2	3	4	5	6	7	8
Sigel Responses								
Descriptive								
1 Part-Whole	--	.30**	-.62**	.10	-.02	.06	.09	.06
		.36**	-.72**	.18	-.02	.05	.15	.10
		.35**	-.50**	.01	-.09	.25*	.15	.20
2 Global		--	-.63**	.21*	-.05	.25**	.21*	.24**
			-.71**	.32**	-.13	.29**	.23*	.27*
			-.65**	.22	-.06	.31**	.28*	.30**
3 Relational-Contextual			--	-.74**	.10	-.23**	-.24*	-.25**
				-.73**	.10	-.23*	-.26*	-.26*
				-.78**	.16	-.33**	-.32**	-.33**
4 Categorical-Inferential				--	-.18	.20*	.21*	.23*
					-.08	.18	.17	.19
					-.24*	.22	.27*	.27*
5 Average Reaction Time per Sort					--	-.09	-.16	-.13
						-.19	-.23*	-.21
						-.33**	-.38**	-.39**
WAIS								
6 Verbal IQ						--	.75**	.95**
							.82**	.97**
							.81**	.97**
7 Performance IQ							--	.91**
								.94**
								.92**
8 Full IQ								--

*p = < .05
**p = < .01

a The first (top) coefficient in each group is for the working-class (groups 2-4 combined); the two coefficients below are for boys (middle) and girls (bottom).

categories tended to be greater in magnitude for mothers of girls than boys, and more of them were significant. The average reaction time/sort, which might have been expected to correlate with relational responses (indicating less reflection and evaluation of alternate hypothese), showed no meaningful trend of relationship with the sorting categories. Average reaction time did, however, show a significant negative relationship with the IQ mean scores of girls' mothers; it showed a similar but weaker relationship for the boys' mothers.

The usefulness of these maternal variables for predicting children's performance on the Binet IQ tests (ages 4 and 7) and the Sigel sorting task (ages 6 and 7) is indicated by Table VI-11. In contrast to the significant relationships found between mothers' and children's IQ, maternal IQ scores tended not to be useful predictors of the children's conceptual style responses in the first and second follow-up. One or two significant relationships were found among the correlations for IQ with descriptive and relational responses, e.g., in descriptive-global responses. Mother's IQ showed consistent significant relationships, however, with girls' categorical-inferential responses, and some relationship in FU-1 with the boys' categorical responses. In the preschool phase of this study, it appeared that children's cognitive abstraction (as measured by categorical-inferential responses) was related to the mother's abstraction behavior but not to her abstraction ability, (as measured by WAIS IQ). The present data suggest that maternal abstraction ability may be found to influence older children's cognitive abstraction (especially girls'). Maternal IQ also seems to be negatively related to girls' nonscorable or nonverbal responses: the higher the mother's IQ, the less likely her daughter was to give an unscorable or unspoken response. For both boys and girls, maternal IQ was a useful predictor of scorable responses on the preschool administration of the Sigel task, but maternal IQ predicted only girls' scorable responses on the two follow-up administrations. Maternal IQ also, it should be noted, shows higher correlations with girls' IQ than with boys' IQ.

Turning now from maternal IQ scores to mothers' responses on the Adult Sigel Sorting Task (MAPS) as predictors of children's cognitive behavior, it becomes clear that no meaningful trends are present. Mother's sorting category responses have no significant relationship to children's IQ, to children's categorical-inferential responses, to nonscorable verbal responses, and to category

TABLE

MATERNAL COGNITIVE VARIABLES
IQ AND SIGEL SCORES (WORKING

Maternal Measures	Child's IQ Binet Age 4	Child's IQ Binet Age 7	Child's Sigel Responses: Descriptive Part-Whole FU-1	Descriptive Part-Whole FU-2	Descriptive Global FU-1	Descriptive Global FU-2	Relational-Contextual FU-1	Relational-Contextual FU-2
Sigel Responses								
Descriptive								
Part-Whole	.04	-.02	.04	-.02	.02	.03	-.07	-.01
	.01	-.12	.04	.07	.04	-.01	-.09	-.04
	.17	.16	.17	.08	.03	.11	-.14	-.12
Global	.15	.14	.00	.05	.28**	.25**	-.04	-.14
	.15	.16	-.04	.23*	.21	.13	-.07	-.26*
	.17	.20	.13	-.04	.28*	.27*	-.08	-.06
Relational-Contextual	-.14	-.17	.01	-.07	-.15	-.16	.02	.09
	-.09	-.07	.03	-.14	-.11	-.02	-.01	.11
	-.15	-.23*	-.12	-.07	-.18	-.17	.12	.05
Categorical-Inferential	.09	.18	-.10	.11	.10	.04	.07	-.05
	.03	.11	-.05	.02	.03	-.03	.15	.02
	.05	.14	-.09	.12	.13	-.01	-.02	.03
Average Reaction Time per Sort	-.11	-.17	.12	.12	-.09	-.10	-.18	-.06
	-.08	-.15	.12	.16	-.06	-.03	-.10	-.15
	-.37**	-.41**	.10	.13	-.10	-.21	-.26*	.01
WAIS								
Verbal IQ	.42**	.46**	.03	.12	.21*	.14	-.02	-.03
	.34**	.52**	-.05	.14	.12	.06	-.03	-.09
	.64**	.60**	.00	-.07	.21	.21	.14	.12
Performance IQ	.30**	.38**	.04	.15	.17	.15	-.08	-.04
	.26*	.40**	.01	.17	.13	.08	-.18	-.11
	.54**	.54**	.00	.00	.16	.17	.18	.12
Full IQ	.42**	.47**	.04	.15	.22*	.18	-.05	-.04
	.34**	.48**	-.03	.17	.13	.08	-.09	-.09
	.64**	.62**	.04	-.04	.22	.23*	.16	.10

* p = <.05
** p = <.01

a The first (top) coefficient in each group is for the working-class (groups

V I - 1 1

A S P R E D I C T O R S O F C H I L D R E N ' S
- C L A S S G R O U P ; B O Y S A N D G I R L S)[a]

Child's Sigel Responses											
Categorical-Inferential		Nonscorable Verbal		Nonverbal			Scorable			Category Shifts	
FU-1	FU-2	FU-1	FU-2	Preschool	FU-1	FU-2	Preschool	FU-1	FU-2	FU-1	FU-2
-.15	.08	.16	-.08	.10	-.08	.06	.02	-.09	.06	-.08	.07
-.22	-.02	.21	-.04	.17	.04	.03	-.05	-.20	.01	-.09	.04
.08	.05	-.03	-.12	-.15	-.18	.07	.20	.13	.11	.06	.02
-.08	-.10	-.07	-.05	-.08	-.03	.11	.09	.08	.04	.12	.01
-.06	-.02	-.01	-.08	-.12	.24*	.14	.10	-.05	.00	.16	-.09
.05	.02	-.22	-.10	-.17	-.13	-.04	.21	.24*	.10	.12	.09
.08	.11	-.08	.08	.07	.14	-.12	-.06	-.01	-.04	-.08	.00
.14	.06	-.07	.09	.07	-.09	-.13	-.06	.08	-.01	-.06	.02
-.02	.11	.01	.11	.18	.23*	.00	-.15	-.13	-.10	-.08	-.03
.04	-.12	.07	-.06	-.10	-.14	.08	.01	.01	.02	.18	-.07
-.01	.00	-.07	-.08	-.19	-.03	.12	.07	.07	.01	.07	-.01
-.01	-.14	.14	-.08	-.06	-.16	.00	-.01	-.04	.07	.11	-.03
-.09	.00	.03	-.02	.06	.15	.04	-.12	-.10	.02	-.22*	-.24*
-.20	-.02	.12	-.01	-.02	.16	.09	-.13	-.15	-.02	-.29*	-.39**
-.16	-.19	.10	.14	.34**	.24*	-.03	-.38**	-.20	-.12	-.14	-.19
.12	-.02	-.12	-.24**	-.28**	-.21*	-.05	.21*	.20*	.24**	.20*	.00
.28*	-.04	-.23*	-.10	-.31**	-.05	-.11	.28*	.22	.09	.18	.01
.28*	.33**	-.28*	-.46**	-.45**	-.23*	-.05	.46**	.33**	.45**	.24*	.18
.12	-.05	-.09	-.23*	-.14	-.15	-.10	.21*	.15	.24*	.04	.00
.20	-.05	-.10	-.09	-.21	-.04	-.17	.30**	.10	.12	.11	.01
.31**	.24*	-.32**	-.45**	-.34**	-.18	-.04	.47**	.35**	.45**	.09	.13
.13	-.03	-.11	-.26**	-.25**	-.20*	-.08	.25**	.19*	.27*	.15	.01
.26*	-.07	-.18	-.10	-.30**	-.04	-.14	.33**	.17	.11	.16	.02
.31**	.34**	-.31**	-.49**	-.44**	-.23*	-.06	.50**	.36**	.50**	.21	.18

2-4 combined); the two coefficients below are for boys (middle) and girls (bottom).

shifts. Maternal sorting category responses show only sporadic significant relationships to children's descriptive-relational and scorable responses. For preschool children's Sigel measures, it appeared that mothers' use of a predominant mode of relational categorizing was significantly related to the child's use of nonscorable and non-verbal responses. The follow-up data, however, suggest that this was no long-term trend; only for girls' nonverbal responses in FU-2 is a significant relationship found. The positive correlation between mothers' and children's relational responses that was predicted in the preschool phase is just barely supported by the follow-up data: the direction of most of the correlations is indeed positive, but the magnitude is very small. More longitudinal data would be needed to see if the magnitude would increase with time and the correlations become significant.

Sex differences in the correlations of maternal and child Sigel scores were present, but showed no meaningful trend, largely because the correlations themselves were not significant. Girls' correlation coefficients tended to be larger than boys' for mother's relational responses; inconsistent differences in magnitude were found for boys' and girls' correlations of maternal descriptive responses with children's Sigel responses.

In summary, it was found that mother's use of descriptive and categorical sorting behaviors was related to abstract and intellective factors in her own cognitive ability and perf. rmance. Yet mother's IQ showed very little relationship to children's categorizing behavior, except occasionally for the girls. And mother's conceptual sorting behaviors were effectively useless as predictors for children's sorting behaviors. At the most, it could be said that mothers who tended to give descriptive global responses had daughters who also tended to give global responses. This did not hold true for the other kinds of sorting responses.

Table VI-12 reports correlations of maternal IQ and average reaction time (Sigel sorting task) with children's school performance for the working-class group, boys, and girls. Directions of correlation coefficients for the total group were consistent with those for the working-class group; magnitudes of coefficients were regularly higher for the total group, and all correlations were significant for the total group except for the relationship of average reaction time to arithmetic grades. Only average reaction time per sort is reported from the group of maternal Sigel measures, since it was the only one showing significant associations with school performance.

TABLE VI-12

The Relationship between Mother's IQ and Sigel Reaction Times and Children's School Performance (Working-class; Boys and Girls)[a]

Maternal Measures	Standardized Tests			School Grades		
				Two-year Total		
	Lee-Clark Reading Readiness Test	Metropolitan Readiness Test	Lee-Clark Primer	Reading	Arithmetic	Conduct
WAIS						
Verbal IQ	.33**	.43**	.37**	.37**	.43**	.20*
	.35**	.49**	.43**	.37**	.41**	.26*
	.28*	.61**	.51**	.50**	.42**	.38**
Performance IQ	.32**	.27**	.32**	.24*	.21**	.04
	.28*	.46**	.36**	.29**	.31*	.17
	.51**	.47**	.50**	.35**	.26*	.18
Full IQ	.40**	.39**	.41**	.35**	.39**	.14
	.35**	.49**	.42**	.35**	.38**	.22
	.56**	.60**	.58**	.47**	.38**	.31**
Sigel						
Average Reaction Time per Sort	-.18	-.19	-.12	-.14	-.09	-.15
	.00	-.20	-.08	-.20	-.08	-.17
	-.51**	-.46**	-.37**	-.13	-.16	- 27*

* p < .05
** p < .01

a The first (top) coefficient in each group is for the working-class (groups 2-4 combined); the two coefficients below are for boys (middle) and girls (bottom).

As mentioned earlier, average reaction time per sort is sometimes thought to be an indication of degree of reflectivity and evaluation of alternative hypotheses: low reaction times are seen to suggest "impulsivity" or impatience and high reaction times to suggest a more careful, "reflective" style of responding and categorizing. Inspection of Table VI-12 reveals that, for girls only, maternal response times are significantly associated with aspects of school performance. The association is negative, i.e., "reflective" mothers are likely to have daughters who receive low scores on standardized reading readiness and achievement tests, and low grades in conduct. This finding seems surprising, if one expects daughters to imitate the styles of their mothers--surely a more "reflective," less "impulsive" girl would receive <u>higher</u> scores on tests and show more conventional classroom conduct. Table VI-10, however, reported that the correlation between maternal IQ and response times was $-.39$ ($p < .01$); thus it appears that more intelligent mothers tend to have <u>lower</u> average reaction times per sort. This correlation of intelligence with low response times suggests that "reflectivity" and "impulsivity" may not be wholly useful terms to connect with response times, unless implications of links between reflectivity and high intelligence, and impulsivity and low intelligence, are avoided. Moreover, it becomes difficult to suggest any sound interpretation of the negative association of maternal reaction times with girls' school performance.

Table VI-12 also reports the relationship of maternal IQ to children's school performance. As discussed earlier in this chapter, maternal IQ shows no clear pattern of meaningful relationships with children's Sigel cognitive style preferences. But, as is evident in Table VI-12, maternal IQ does show a definite pattern of positive significant relationship with children's school performance, except for conduct grades. For the working-class group, correlations of Verbal and Full IQ with children's school performance measures range between .33 and .43; coefficients for Performance IQ range between .24 and .32 (except for coefficients for conduct grades which are low and, in two cases, not significant.) A pattern of sex differences is also found: girls regularly show greater association with maternal IQ for reading tests and grades than do boys. For both boys and girls, correlations of mothers' verbal and full IQ with <u>arithmetic</u> grades are similar, but performance IQ shows a higher association with boys' arithmetic grades than with girls' arithmetic grades. Additional discussion of the relationship of maternal IQ to children's school performance is included in Chapter III and thus will not be repeated here.

Selected Maternal Measures Related to Children's Cognitive Behavior

As discussed in the previous section, mothers' IQ and conceptual sorting behaviors showed little relationship to children's categorizing ability. In an attempt to see whether other measures of maternal behavior might be related to children's cognitive behavior, correlations with children's Sigel scores were obtained for all maternal variables. Table VI-13 reports correlations with child Sigel variables for those maternal measures for which more than one or two significant relationships were found. The reader will note that the maternal variables contained in Table VI-13 have regularly been discussed throughout this report as showing significant relationships to the dependent variables. But it will also be noted that only two of the children's Sigel measures, categorical-inferential responses and scorable responses, are included in the table. The others were omitted because they showed effectively no relationship with the maternal variables. Thus the ensuing discussion is confined to maternal influence on the child's ability to give sorting rationales and tendency to use the relatively complex categorical-inferential responses.

As indicated in Table VI-13, the directions of significant coefficients are consistent and expected. The magnitude of the coefficients for the working class group is regularly less than that for the total group, and fewer are significant. For the total group, seven of the maternal variables found to correlate significantly with scorable responses also showed a significant association with categorical-inferential responses: it appeared that children giving many categorical-inferential responses might be likely to have mothers who appeared warm to others, who included praise and interest-eliciting techniques when teaching, who felt optimistic and who made rich, varied use of home resources in an uncrowded home. Their mothers were also more likely to use personal-subjective control strategies and avoid status-normative control strategies. Yet only the mother's apparent warmth, optimism, use of resources and

TABLE VI-13

The Relationship of Selected Maternal Variables to
Aspects of Children's Cognitive Behavior
(Total Group; Working-class Group)

Maternal Measures	Child's IQ				Child's Sigel Responses									
	Binet				Categorical-Inferential				Scorable					
	Age 4		Age 7		FU-1		FU-2		Preschool		FU-1		FU-2	
	Total Group	W-C Group	Total Group	W-C Group	Total Group	W-C Group	Total Group	W-C Group	Total Group	W-C Group	Total Group	W-C Group	Total Group	W-C Group
Rooms per person	.36**	-.01	.41**	.10	.21**	.17	.18*	.09	.34**	.06	.25**	.14	.17*	.03
Availability and Use of Home Resources	.43**	.31**	.55**	.44**	.28**	.21*	.26**	.24*	.42**	.25**	.28**	.24**	.21**	.12
Out-of-Home Activities	.33**	.19*	.31**	.16	.15	.05	.15	.17	.37**	.22*	.16*	.13	.19*	.09
"Powerlessness"	-.32**	-.27**	-.35**	-.33**	-.15	-.05	.01	.07	-.24**	-.16	-.22**	-.21*	-.15	-.13
Personal Optimism	.31**	.17	.33**	.21*	.16*	.05	.18*	.13	.24**	.05	.17*	.09	.17*	.12
First day: % Imperative	-.32**	-.28**	-.41**	-.40**	-.16	-.11	-.10	-.09	-.25**	-.13	-.18*	-.14	-.12	-.08
Mastery: % Status-Normative	-.23**	-.12	-.37**	-.24*	-.18*	-.08	-.10	-.04	-.21**	-.05	-.25**	-.14	-.22*	-.16
Mastery: % Personal-Subjective	.25**	.19*	.37**	.30**	.22**	.14	.08	.03	.16*	.07	.21*	.13	.18*	.13
No. of Models Mother Shows Child (Etch-a-Sketch)	.39**	.26**	.45**	.26**	.15	-.04	.14	.04	.37**	.27**	.18*	.02	.23**	.14
No. of Specific Turning Directions (Etch-a-Sketch)	.30**	.19*	.28**	.13	.09	-.06	.11	-.01	.31**	.18	.17*	.09	.11	.02
Orientation	.37**	.30**	.45**	.41**	.15	.06	.14	.13	.32**	.25**	.26**	.23*	.23**	.23*
Praise & Engagement	.30**	.25**	.39**	.40**	.25**	.16	.15	.17	.27**	.20*	.07	.00	.19*	.17
Specificity of Feedback in Block Sorting Task	.26**	.14	.34**	.28**	.08	.01	-.01	-.03	.21**	.17	.19*	.18	.14	.21*
Language Factor Score	.32**	.21*	.37**	.28**	.12	.05	.08	-.01	.38**	.20	.26**	.21*	.30**	.23*
Support toward Child (Interviewer's Rating)	.34**	.31**	.48**	.47**	.19*	.19*	.21**	.18	.29**	.23*	.21**	.17	.14	.07
Affectionateness	.24**	.23*	.32**	.31**	.07	.03	.03	-.01	.16*	.13	.04	-.01	.09	.04
Use of Reading Material by Child with Adult	.37**	.36**	.39**	.35**	.25**	.26**	.20*	.16	.27**	.16	.23*	.18	.16	.11

* $p < .05$ ** $p < .01$

reading material and degree of crowding in the home were associated with categorical-inferential responses in the second follow-up (the stability coefficient for categorical-inferential responses for the total group was $\underline{r} = .34$). In addition, when the middle-class group was excluded from the analysis, it was found that only the mother's use of home resources (FU-1; FU-2), use of reading material in the home (FU-1), and apparent support of her child (FU-1) were associated with categorical-inferential responses (the stability coefficient for the working-class group was $\underline{r} = .28$).

More consistent and meaningful trends were found in the relationship of maternal variables to children's scorable responses. In the report of the preschool phase of this project, it was suggested that children's ability to delineate stimulus aspects for classifying may be affected by the language specificity and focusing on relevant attributes and rationales that are reflected in a number of maternal factors. Table VI-13 provides additional support for this suggestion (Table VI-14 shows that the major effect is on girls). For both the total and working-class groups, the mother's language factor score and use of orientation techniques in teaching show consistent significant associations with the child's ability to product task-relevant responses (sorting rationales). For the total group such factors as specificity of feedback, praise and engagement, number of specific turning directions and models shown on the Etch-a-sketch task also show relationships with the child's scorable responses. Measures of the home environment, of mother's attitudes toward the outside world, and of maternal control strategies are additional factors related to the child's ability to categorize when the middle-class is included in the analysis.

Table VI-14 presents data on sex differences in the effect of maternal behavior and home environment on children's ability to give sorting rationales and tendency to use categorical-inferential and relational-contextual sorting responses. Correlations of children's relational-contextual responses with maternal measures have been included in Table VI-13 because some interesting sex differences were found even though, when boys' and girls' scores were combined, only two barely significant relationships with maternal variables were found. (These two, both from the first follow-up, were the association of relational responses with the maternal orientation factor, for which $\underline{r} = .19$, and the language factor score, for which $\underline{r} = .17$.)

TABLE VI

THE RELATIONSHIP OF SELECTED
TO ASPECTS OF CHILDREN'S COGNI

Maternal Measures	Child's IQ				Child's Sigel Responses			
	Binet				Categorical-Inferential			
	Age 4		Age 7		FU-1		FU-2	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Rooms per Person	.31**	.44**	.30*	.55**	.22	.25*	.02	.37**
Availability and Use of Home Resources	.26*	.64**	.49**	.66**	.26*	.35**	.10	.48**
Out-of-Home Activities	15	.52**	.19	.48**	.15	.18	.02	.34**
"Powerlessness"	-.28*	-.35**	-.30**	-.38**	-.10	-.25*	.18	-.23*
Personal Optimism	.26*	.36**	.27*	.37**	.14	.20	.10	.29**
First day: % Imperative	-.28*	-.35**	-.41**	-.40**	-.23	-.08	-.01	-.25
Mastery: % Status Normative	-.21	-.31**	-.41**	-.39**	-.24*	-.12	.05	-.31**
Mastery: % Personal-Subjective	.19	.36**	.39**	.40**	.24*	.21	-.04	.27*
No. of Models Shown Child (Etch-a-Sketch)	.16	.60**	.33**	.57**	.10	.23*	.08	.27*
No. of Specific Turning Directions (Etch-a-Sketch)	.37**	.23*	.40**	.22	.23	.00	.00	.28*
Orientation	.40**	.37**	.42**	.47**	.06	.23*	.05	.21
Praise & Engagement	.29**	.32**	.47**	.32**	.23	.30**	.06	.27*
Specificity of Feedback in Block Sorting Task	.29*	.27*	.33**	.38**	-.09	.30**	-.19	.18
Requests for Block Placement	-.34**	-.39**	-.42**	-.42**	-.14	-.17	.01	-.29**
Language Factor Score	.14	.54**	.25*	.50**	.12	.14	-.14	.32**
Support towards Child (Intervier's Rating)	.28*	.41**	.46**	.49**	.14	.28*	.02	.46**
Warmth Typology (Block Sorting Task)	.28*	.16	.41**	.13	.18	.03	-.05	.03
Affectionateness	.27*	.17	.42**	.20	.17	-.01	.03	.09

* p < .05
** p < .01

- 14

MATERNAL VARIABLES
TIVE BEHAVIOR, BY SEX

Child's Sigel Responses									
Scorable						Relational-Contextual			
Preschool		FU-1		FU-2		FU-1		FU-2	
Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
.22	.44**	.15	.32**	.03	.27*	-.05	.28*	.08	.12
.42**	.42**	.26*	.32**	.04	.36**	-.09	.29**	-.10	.08
.28*	.44**	.11	.22	.12	.27*	-.09	.22*	-.09	.12
-.23*	-.28*	-.17	-.29*	.01	-.28*	.02	-.10	-.05	-.05
.14	.37**	.22	.15	-.12	.41**	-.13	.11	-.03	.02
-.24*	-.28*	-.20	-.18	.06	-.28*	-.08	-.22	-.03	-.16
-.22	-.21	-.23	-.28*	-.07	-.37**	-.15	-.03	-.23	-.01
.15	.17	.15	.29*	.03	.34**	-.11	.08	.08	-.01
.17	.54**	.12	.25*	.01	.41**	-.04	.21	.02	.02
.41**	.22*	.30*	.13	.04	.20	.13	.14	.01	.02
.28*	.36**	.09	.35**	.09	.30**	-.07	.39**	-.15	.20
.29*	.24*	.12	.04	.19	.20	-.07	.01	-.12	.02
.24*	.20	.14	.24*	.01	.25*	.01	.16	-.05	-.10
-.26*	-.25*	-.16	-.16	-.02	-.24*	.11	-.10	.06	.02
.32**	.47**	.24*	.28*	.14	.40**	.10	.25	.18	.06
.29**	.30**	.29*	.17	.08	.18	-.07	.24*	-.01	.08
.10	.07	.08	-.10	.14	.03	.00	-.14	-.03	.04
.12	.24*	.15	-.02	.14	.06	.01	-.13	-.14	-.02

When the two response categories (relational-contextual and categorical-inferential) are examined, a noticeable sex difference appears in magnitude of significant coefficients (although not in the directions of the coefficients). Boys' relational responses showed no significant relationship with maternal variables, and boys' categorical-inferential responses were associated ($p < .05$) only with the mothers' use of home resources and use of personal-subjective control strategies. On the other hand, girls' relational responses (FU 1) showed significant relationships with several maternal and environmental variables (degree of crowding in the home, use of home resources, out-of-home activities, use of orientation techniques when teaching, maternal language, and mother's apparent warmth) and no relationship with personal-subjective control strategies. Girls' categorical-inferential responses showed even more significant relationships with maternal variables than did relational responses, especially in the measures taken at age 7. In fact, for girls, only mother's use of imperative control strategies and warmth during the interaction tasks seemed unconnected with their tendency to use categorical responses.

These data on sorting categories suggest that mothers may have more influence on girls' cognitive styles than on boys' cognitive styles. Girls' and boys' correlation coefficients for scorable responses, or the ability to give sorting rationales regardless of type, strengthen the suggestion that mothers influence the cognitive behavior of their daughters more than their sons. This varies, of course, from one variable to another and from one type of variable to another:

1) Correlation of scorable responses with home environment measures (degree of crowding, use of resources) and the language factor score show the most consistent sex differences favoring girls. Girls' production of task-relevant responses seems to be more affected by opportunity for adult-child interaction and by mother's use of facile, standard English and provision of a rich, varied home environment.
2) The mother's involvement in the community and sense of efficacy and optimism also are more closely associated with girls' than with boys' scorable responses. In fact, for both follow-ups, boys' ability to categorize shows no significant relationship with these three maternal variables.

3) A lack of significant relationships for boys is also found in the coefficients for maternal control strategies, and the magnitude of boys' coefficients decreases with time. On the other hand, girls' coefficients for status-normative and personal-subjective control strategies increase with time, becoming significant at age 6; coefficients for imperative control strategies show a less consistent pattern but still one favoring girls.
4) Mothers' teaching techniques are not as regularly or significantly associated with girls' behavior, and it is not possible to discover clear patterns of sex differences in the coefficients for teaching techniques. It may be, however, that girls' production of task-relevant responses is more affected by maternal specificity in teaching interactions, since girls' coefficients are significant for number of models shown (but not number of specific turning directions given) by the mother in the Etch-a-Sketch task, mother's use of effective orientation (introduction to and explanation of tasks), and mother's use of specific feedback, whereas boys' coefficients show no significant relationship to these maternal variables in Follow-up 1 and 2.

In sum, the number of sex differences favoring girls in the relationship of maternal variables to scorable responses suggests strongly that girls' ability to categorize may in fact be affected more strongly by maternal behavior than is boys' ability to categorize.

Locus of Control and Conservation Measures Related to the Child's Ability to Give Rationales and Tendency to Use a Categorical-Inferential Cognitive Style

When correlations of children's Sigel data with other children's measures were examined, two sets of particularly provocative relationships were found, one with locus of control and the other with conservation tasks. These relationships, puzzling and inconclusive as they were, suggest that further research might produce some very interesting results. For that reason, Tables VI-15 and VI-16 report the correlation coefficients found for the variables in question.

Table VI-15 presents coefficients for the total group and working-class group of Sigel categorical-inferential responses and scorable responses with measures of conservation and locus of control. (The other types of Sigel sorting category responses, descriptive et al, are not reported since no meaningful or suggestive pattern was found among the correlation coefficients.) Directions of correlations are consistent and expected; the magnitude of coefficients for the working-class group is typically less than that of coefficients for the total group. Inspection of the table reveals that both maternal and child measures of locus of control show significant and quite consistent associations with the Sigel variables: the more internalized choices made, the higher the child's score on scorable and categorical-inferential responses. The question to be raised for further study is why this pattern is found: what is the relationship between what is apparently a sense of responsibility and the ability to give sorting rationales, or the preference for a particular dimension of cognitive style? Are these two types of abilities or attitudes in the children merely examples of parallel development, or is there interrelated development? Does the mother's sense of responsibility affect the child's cognitive style preferences, and if it does, what specific factor is playing a dominant role? Table VI-16, which reports sex differences, moreover, indicates that the relationship is primarily between mothers and daughters, not mothers and sons.

Inspection of the correlations between conservation task measures (age 7) and Sigel measures reveals a regular pattern of significant relationships for scorable responses in the first and second follow-ups. The pattern is less clear and consistent for categorical-inferential responses, but a tantalizing number of significant relationships is found. Can these relationships be explained away as a matter of parallel development, and is the more consistent pattern found for scorable responses a matter of magnification and reliability? Or is there perhaps some aspect of the cognitive functioning reflected in the conservation tasks that also affects the development of cognitive style preferences, and ability to give sorting rationales? Moreover, Table VI-16 shows sex difference favoring girls for the categorical-inferential responses; boys' performance on the conservation tasks is unrelated to their preference for categorical responses, but girls' performance is often significantly related with it and the magnitude of girls' coefficients is in all cases greater than that of the boys. There is, however, no consistent pattern of sex differences found in the coefficients for scorable responses.

TABLE VI-15

Child's Cognitive Behavior Related to Piaget Tasks and Measures of Internality-Externality (Total Group; Working-class Group)

Child's Sigel Response	Conservation												Internality - Externality			
	Length (Age 7)				Number (Age 7)				Liquid (Age 7)				Child		Maternal	
	Total		Conserves Consistently		Total		Pass-Fail		Conserves Consistently		Conserves with Help		Total Internalized Choices		Externality Score (Rotter I-E Scale)	
	Total	W-C	Total	W-C	Total	W-C	Total	W-C	Total	W-C	Total	W-C	Total	W-C	Total	W-C
Categorical-Inferential																
Follow-up 1	.18*	.07	.16*	.06	.15	.03	.17*	.05	.17*	.08	.14	.12	.21*	.21*	-.28**	-.18
Follow-up 2	.15	.17	.16*	.20*	.15	.10	.18*	.14	.10	.03	.12	.09	.10	.08	-.22*	-.21
Scorable																
Preschool	.10	.08	.11	.04	.24*	.11	.21*	.05	.15	-.02	.13	.02	.32**	.22*	-.31**	-.14
Follow-up 1	.18*	.15	.18*	.13	.35**	.24**	.27**	.17	.33**	.29**	.35**	.36**	.29**	.23*	-.37**	-.32**
Follow-up 2	.28**	.34**	.27**	.29**	.34**	.31**	.31**	.30**	.21**	.20*	.25**	.21*	.21*	.20*	-.28**	-.22

TABLE VI-16

The Relationship of the Child's Cognitive Behavior to Piaget Tasks and Measures of Internality - Externality, by Sex

Child's Sigel Response	Conservation												Internality - Externality			
	Length (Age 7)				Number (Age 7)				Liquid (Age 7)				Child		Maternal	
	Total		Conserves Consistently		Total		Pass-Fail		Conserves Consistently		Conserves with Help		Total Internalized Choices		Externality Score (Rotter I-E Scale)	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Categorical-Inferential																
Follow-up 1	.09	.22	.03	.27*	.02	.28*	.06	.25*	.04	.28*	-.01	.28*	.16	.33**	-.17	-.46**
Follow-up 2	-.01	.25*	.11	.19	-.05	.37**	.01	.35**	.01	.18	.03	.22	.13	.17	-.13	-.36**
Scorable																
Preschool	.09	.14	.06	.16	.18	.29**	.19	.23*	.19	.13	.11	.15	.34**	.29**	-.25	-.37*
Follow-up 1	.27*	.11	.10	.23*	.43**	.30**	.34**	.23*	.34**	.31**	.41**	.30**	.14	.43**	-.13	-.56**
Follow-up 2	.17	.34**	.21	.30**	.28*	.39**	.30*	.32**	.16	.24*	.22	.27*	.20	.25*	-.12	-.38*

* p < .05 ** p < .01

Summary

Longitudinal data on the children's classificatory behavior indicated that the ability to give sorting rationales increases with age in all social status groups, although middle-class children continue to give more scorable responses than do working-class children. At age 4, boys had been found to give fewer scorable responses than did girls, but boys gave more scorable responses than did girls at ages 6 and 7. The use of the several sorting categories also increased with age in all social status groups; children from father-absent families showed large increases in all categories relative to children in other groups. Support was provided for the hypothesis (V. preschool report) that older children would be found to prefer descriptive part-whole ("analytic") responses to relational-contextual or descriptive-global responses. At age 7, boys were found to use significantly more categorical-inferential responses than did girls; girls on the other hand showed a tendency to prefer "analytic" responses.

When cross-correlations of measures of cognitive style and intelligence were examined, additional support was found for the suggestion (V. preschool report) that the *level* of conceptualizing ability (IQ) and the preferred *mode* of categorizing are clearly different though related aspects of cognitive functioning. However, willingness to attempt an answer or ability to give a verbal rationale were reflected in higher intelligence test scores. It was found as predicted that children whose preferred mode of categorizing indicated subjectivity and relatively low attention to stimulus details (relational-contextual responses) were likely to give relatively few responses indicating a tendency to analyze a visual stimulus into component parts (part-whole responses) or a tendency to objectively classify and label the visual stimulus (global responses). A negative relationship was also found between use of categorical responses and use of part-whole responses, suggesting that the child who is learning to split his environmental stimuli into parts may be unable or unwilling to handle simultaneously the complementary process of generalizing to a greater whole.

Successful school performance appeared to be strongly linked with IQ and somewhat less strongly linked with Sigel measures indicating the child's willingness to attempt a verbal response and ability to give verbal rationales for sorting behavior. A pattern of sex differences was found: school performance tended to be more closely related to IQ for boys than for girls; school performance tended to be more closely related to scorable and nonscorable verbal responses for girls than for boys. Cognitive style, or preferred mode of categorizing, showed only limited relationship to children's school performance; the only consistent and significant associations found were those between categorical responses and standardized tests. It may be that the readiness to infer attributes of stimulus figures is an important aspect of successful performance on reading readiness and achievement tests.

When the measures of maternal cognitive behavior were correlated with each other, it was found that maternal use of descriptive and categorical sorting behaviors was related to abstract and intellective factors in her own ability and performance. Mothers with high IQ's were more likely to give descriptive and categorical responses and less likely to give relational responses. But when these maternal variables were correlated with measures of children's cognitive behavior and school performance, it was found that mother's conceptual sorting behaviors were effectively useless as predictors for children's sorting behaviors; at the most it could be said that mothers who tended to give descriptive global responses had daughters who also tended to give global responses. And maternal IQ showed few significant relationships to children's categorizing behaviors. Mother's IQ did show consistent significant relationships with girls' categorical-inferential responses, suggesting that maternal abstraction ability (IQ) may be found to influence older children's (girls') cognitive abstraction. For preschool children, mother's abstraction behavior but not her abstraction ability was found related to children's categorical responses (cognitive abstraction). Maternal IQ was also found related to girls' nonverbal and scorable responses in the follow-up administrations of the Conceptual Style Sorting task. And mothers' IQ was generally related to children's school performance, except for conduct grades. Here again patterns suggesting sex differences were seen: maternal IQ was more highly associated with girls' reading tests and grades than with boys' reading tests and grades; maternal performance IQ was more highly related to boys' than to girls' arithmetic grades.

Other maternal variables were found associated with children's ability to give sorting rationales and tendency to use the relatively complex categorical-inferential responses. For the total group, it appeared that children with high scores on these two measures were likely to have mothers who appeared warm to others, who included praise and interest-eliciting techniques when teaching, who felt optimistic and who made rich, varied use of home resources in an uncrowded home. Their mothers were also more likely to use personal-subjective control strategies and avoid status-normative control strategies. In addition, the ability to produce task-relevant responses (scorable responses) seemed to be influenced by the mother's language and by her use of specific feedback and specific directions during interaction. For the working-class group, however, only measures of the home environment, mother's support toward the child, use of standard English, and use of orientation techniques showed consistent significant associations with the child's ability to give sorting rationales.

A marked pattern of sex differences favoring girls appeared in the association of maternal environmental and behavior variables with children's performance on the Conceptual Style Sorting task. It was felt that mothers affect both cognitive style preferences and ability to categorize to a greater degree in girls than in boys. Girls' production of task-relevant responses seemed to be more affected by opportunity for adult-child interaction, a rich, varied home environment, mother's attitudes toward the non-family world, and mother's use of facile, standard English. Girls' ability to categorize is also more affected by maternal control strategies and specificity in teaching interactions.

Finally, the data revealed that both maternal and child measures of internal locus of control were significantly and consistently related to the child's production of task-relevant responses and preference for a catagorical-inferential mode of categorizing. The question is raised for future research: what is the relationship between what is apparently a sense of responsibility and the ability to give sorting rationales, or the preference for a particular dimension of cognitive style?

CHAPTER VII

THE CHILD'S LANGUAGE

Language Sample

During the second-grade school year, immediately following administration of the Stanford-Binet, each child was administered the Doll Play Interview. The child was asked to make up a story about school, and was given a set of Creative Playthings' rubber dolls to represent Negro and white children, parents, and teacher. His story was recorded verbatim and later examined for information in a variety of areas. The purpose of this chapter is to present data on the language used by the child in telling his story. Details of administration, scoring procedures, and types of data obtained are found in Appendix I.

Language Scales

Most measures applied to the language sample obtained in the Doll Play interview consisted of tallies of different parts of speech and percent usage scores (e.g., tallies divided by number of words or number of sentences). A first step in analyzing the child's language was to examine the intercorrelations among the various language measures. Sufficient interrelationship was found to warrant factor analysis of the series of measures, in an attempt to reduce the number of scales by combining or eliminating redundant measures. Factor analysis of maternal language samples obtained during the preschool phase of the study (and discussed in Chapter VII of the preschool report) isolated a cluster of four scales; from these scales, summary scores of mother's language elaboration were obtained. The measures applied to the child's language were simpler, less sophisticated than those used for the mother's language, and only a single sample of the child's language was obtained, as contrasted with three samples of the mother's language. Nonetheless, the first unrotated factor obtained in analysis of the child's language was heavily loaded with a group of measures roughly corresponding to those obtained in analysis of the mother's language. In addition, successive rotations led to increasing separation of two groups of measures of the child's language, roughly labeled quantity vs. elaboration. This initial analysis allowed reduction of the original measures to ten, four concerned with sheer quantity of language obtained in the interview, and six concerned with the degree of complexity of elaboration characterizing the child's language. The quantitative scales include Number of Units, Total Words, Total Activities, and Total Importations; the elaboration scales include Words per Unit, Average Pre-Verb

Words, Percent Use of Simple Verbs, Subordinate Clauses per Unit, Non-dialogue Subordinate Clauses per Unit, and Percent Use of Verbs and Adverbs.

Quantitative Scales

(a) Number of Units

For purposes of scoring the Doll Play Interview, a unit was defined as an independent clause, including any clause subordinate to it. (See Appendix I for further details.) Greetings, interjections, and non-substantive responses--common occurrences in the Doll Play stories because of frequent use of dialogue rather than narrative--were not included as units. Units, as defined for the child's language sample, correspond generally to Sentences as defined for the maternal language samples.

(b) Total Words

This scale includes greetings, interjections, and non-substantive responses, as well as the total words in the Units defined above. The children's Total Words scale corresponds to Total Words obtained in the mother's speech samples.

(c) Total Activities

For linguistic analysis, only one measure of the content of the children's stories about school was considered important, Total Activities. This measure corresponds to the maternal measure, Stimulus Utilization.

(d) Total Importations

An importation was defined as a statement not necessarily related to the stimuli of the test situation. Importations included inferred characteristics of the dolls such as anatomy, thought, motivation, emotion, and role-characteristics, plus introduced items such as places, events, objects, and animals. This scale corresponds to the Introduced Content scale obtained from the maternal speech samples.

Elaboration Scales

(a) Words per Unit

This scale was obtained by dividing the total number of words contained in the Units by the total number of Units;

note that the numerator is not Total Words, as defined above, but total words contained in Units. This scale corresponds to the maternal language scale, Mean Sentence Length.

(b) Average Pre-verb Words

To obtain this measure, which is similar to the mother's Mean Pre-verb Length scale, the total number of words before each main verb was divided by the number of main verbs in the child's story.

(c) Percent Use of Simple Verbs

A simple verb was defined as a single word that expresses an act, occurrence, or state of being. Percent use was determined by dividing the total number of simple verbs by the total number of words contained in Units (i.e., greetings, interjections, and non-substantive responses were excluded from the denominator). Simple verbs, it should be noted, are contrasted with complex verbs, or groups of words that express an act, occurrence, or state of being. Complex verbs were also tallied, and percent use computed, but complex verbs occurred so rarely in the stories that the scale was of little use in differentiating children and relating the language scales to other variables. Complex verbs include infinitive, subjunctives, perfect tenses, and passive verbs; because the stories tended to be dialogues rather than narratives, and also perhaps because the children were young and used relatively simple speech, simple verbs--commands, for example--were more numerous and typical. The child's use of simple verbs is thus inversely correspondent to the mother's use of complex verb forms, as measured by the maternal language scale, Verb Elaboration.

(d, e) Subordinate Clauses per Unit and Non-dialogue Subordinate Clauses per Unit

Subordinate Clauses per Unit was obtained by dividing the total number of subordinate clauses--including dialogue contained within narrative Units--by the total number of Units in the story. Non-dialogue Subordinate Clauses per Unit was obtained in the same manner as Subordinate Clauses per Unit, except that dialogue quotations were excluded from the numerator. These two measures in a very general way correspond to the mother's language scale, Syntactic Structure Elaboration, which includes other types of clauses in the numerator.

(f) Percent Use of Verbs and Adverbs

This scale, like Percent Use of Simple Verbs, is an inverse-elaboration measure. It consists of the total number of verbs, simple or complex, plus adverbs, divided by the total number of words contained in Units. A high score on this scale indicates a story high in action and low in all other types of speech--i.e., the child may list a series of acts or events, with no elaboration, qualification, or description. It has no correspondence to any of the maternal language scales.

Relationships Among Child and Maternal Language Scales

In descriptions of the procedure for reducing the number of language measures, and in definitions of the ten measures so selected, reference has been made to the comparability of maternal and child language scales, and it was noted that factor analysis of the child language scales produced two separate groupings of measures. The purpose of this section is to present evidence for the independence of the two sets of child language scales--quantity and elaboration--and for the degree to which corresponding maternal and child language scales are found to correlate with each other. Intercorrelations of child and maternal language scales are shown in Table VII-1. Correlation coefficients are reported for the total sample; with the exceptions noted in the following discussion, correlations were in the same direction and of similar magnitude and statistical significance for the combined working-class groups. The maternal scores used in this analysis were obtained from mothers' stories told to their children in response to a projective stimulus (CAT Lion-Mouse card).

Independence of Quantity and Elaboration in Children's Language Measures

As Table VII-1 shows, all four of the quantity scales are significantly intercorrelated (within the combined working-class sample, Total Activities was not significantly correlated with Number of Units nor with Total Words). And the six elaboration scales are also significantly intercorrelated, except that neither of the measures of use of subordinate clauses is significantly related to either of the two measures of use of verbs (use of simple verbs and use of verbs and adverbs). More importantly, the level of correlations between the two sets of measures is low and not significant, with few exceptions: Total Activities is significantly and negatively correlated with Words per Unit, Average Pre-verb Words, and Subordinate Clauses per Unit, and it is significantly and positively correlated with both measures of use of verbs. This relationship is exemplified in a large number of protocols in which the child merely

TABLE

Correlation of Child
(Total

	Child's			
	Quantity			
	Number of Units	Total Words	Total Activ-ities	Total Impor-tation
CHILD'S LANGUAGE				
Quantity:				
Total Words	.96**	--		
Total Activities	.24**	.18*	--	
Total Importations	.74**	.72**	.34**	--
Elaboration:				
Words per Unit	.09	.24**	-.22**	.09
Average Pre-verb Words	.06	.18*	-.18*	.05
Percent Use of Simple Verbs	-.04	-.10	.21*	-.10
Subordinate Clauses per Unit	.03	.13	-.22**	.02
Non-Dialogue Subord. Cl. per Unit	-.13	-.04	-.12	-.07
Percent Use of Verbs & Adverbs	-.04	-.11	.20*	-.10
MOTHER'S LANGUAGE				
Quantity:				
Number of Sentences	.14	.16*	-.02	-.02
Total Words	.25**	.26**	-.02	.06
Stimulus Utilization	.08	.08	.00	.00
Introduced Content	.01	.03	-.08	-.10
Elaboration:				
Mean Sentence Length	.18*	.20*	-.12	.13
Mean Pre-verb Length	.14	.18*	-.08	.11
Verb Elaboration	.11	.14	-.14	.11
Syntactic Structure Elaboration	.14	.14	-.13	.11
Average LET[a]	.13	.17*	-.14	.07
Language Factor Score	-.13	-.18*	.10	-.08

$^{*}p \leq .05$ $\quad$ $^{**}p \leq .01$

[a]LET = Language Elaboration T-score

VII-1

and Maternal Language Scales
Sample)

Language					
Elaboration					
Words per Unit	Average Pre-verb Words	Percent Use of Simple Verbs	Subordinate Clauses per Unit	Non-Dialogue Subord. Clauses per Unit	Percent Use of Verbs and Adverbs
--					
.66**	--				
-.42**	-.38**	--			
.64**	.30**	-.07	--		
.62**	.34**	-.14	.82**	--	
-.45**	-.40**	.54**	-.08	-.14	--
.03	.03	-.12	.07	.02	.01
.04	.01	-.12	.01	-.03	.04
.13	.07	-.17*	.12	.13	-.11
.10	.02	-.07	.05	.08	.10
.10	.04	-.09	.01	-.08	.01
.07	.05	-.06	.04	-.02	.03
.11	.03	-.13	.15	.03	.00
.11	.10	-.13	-.02	-.06	-.02
.11	.08	.07	.09	-.02	.07
-.10	-.11	-.00	-.09	-.01	-.07

listed a string of verbs describing what went on in school (e.g., "Sit down, read, write, spell, eat lunch, work, go home."). The other incidence of interrelationships among the two sets of measures occurs for Total Words; as might be expected, Total Words is positively and significantly correlated with Words per Unit and Average Pre-verb Words.

Intercorrelations of Maternal and Child Language Scales

The degree of intercorrelation among maternal and child language measures is negligible. Only in measures of sheer quantity is there consistent evidence of relationship between the mother's language during her child's preschool years and her child's language several years later: for the total group, Number of Units and Total Words from the children's stories are positively related to Number of Sentences and Total Words, the comparable measures from the mother's stories; correlations obtained within the combined working-class samples were not significant.

Other instances of intercorrelation of maternal and child language measures include a negative relationship between the child's use of simple verbs and all four of the maternal quantitative measures: although the coefficients reported in Table VII-1 for correlation of child's use of simple verbs and mother's Number of Sentences, Total Words, and Introduced Content are not statistically significant, the coefficients obtained within the combined working-class samples were significant. Two of the children's quantitative measures, Number of Units and Total Words, were significantly and positively correlated with mother's Mean Sentence Length and Mean Pre-verb Length; this finding is similar to the relationship obtained among comparable measures within the group of children's language measures. Maternal summary scores for language elaboration, the Language Elaboration T-Score (LET), and the language factor score, are significantly correlated with Total Words.

In summary, mothers with lengthy CAT stories tended to have children whose Doll Play Interview stories were also lengthy. Mothers whose language was relatively complex tended to have children who produced longer Doll Play stories with fewer simple verbs.

Social Status Differences in Children's Language Scales

Although significant differences among the four social status groups were found for the various maternal language scales, very little significant differentiation is found among the children's scales (Table VII-2).

TABLE VII-2

Mean Language Scores (and Standard Deviations) for Children in Four Social Status Groups

Language Scale	Social Status: Middle Class 1	Working-class: Skilled 2	Unskilled: Father Present 3	Unskilled: Father Absent 4	Significant Differences in Group Means
Number of Units	19.9 (17.32)	13.0 (11.19)	12.1 (12.43)	11.4 (11.34)	1 x 2* 1 x 3* 1 x 4*
Total Words	127.9 (96.82)	79.9 (68.93)	69.4 (76.08)	70.1 (72.60)	1 x 2* 1 x 3** 1 x 4**
Total Activities	2.7 (2.89)	1.7 (2.21)	3.4 (3.54)	2.6 (2.45)	
Total Importations	5.0 (5.38)	3.5 (3.42)	3.1 (3.61)	3.4 (3.89)	
Words per Unit	6.4 (1.62)	5.8 (1.76)	5.2 (2.04)	5.5 (2.29)	1 x 3**
Average Pre-verb Words	1.9 (0.74)	1.7 (0.74)	1.5 (0.99)	1.5 (0.78)	
Percent Use of Simple Verbs	14.9 (9.0)	14.6 (10.1)	15.3 (9.7)	14.9 (11.2)	
Subordinate Clauses per Unit	.18 (0.17)	.18 (0.21)	.13 (0.16)	.13 (0.10)	
Non-dialogue Subordinate Clauses per Unit	.10 (0.14)	.12 (0.18)	.10 (0.14)	.10 (0.13)	
Percent Use of Verbs and Adverbs	33.2 (8.7)	35.0 (16.4)	33.1 (9.5)	34.9 (10.6)	

* $p \leq .05$
** $p \leq .01$

In general, the middle-class children produced longer stories than did children in the three working-class groups. But the variability was great within each group, as evidenced in standard deviations as large as the mean scores. There is no clear social status trend in Number of Activities described by children in the four groups, and again the variability within each group is quite large. Although differences in means are not significant, middle-class children did tend to introduce more events and objects, as shown in their higher importations scores.

Complexity of language similarly seems to be less associated with social status among the children than it was among the mothers. Middle-class children did produce more words per unit, and tended to elaborate their sentences before introducing the main verb; children in the two higher social status groups used more subordinate clauses per unit than did the unskilled-working-class children. But there are virtually no differences among the groups in Percent Use of Simple Verbs, in Non-dialogue Subordinate Clauses, nor in relative use of Verbs and Adverbs.

Sex Differences in Children's Language Measures

There is general consensus, supported by research, that girls can be expected to score higher than boys on verbal aptitude and achievement measures; as has been seen in previous chapters, data from language measures used in the present research tend to support the consensus. In this section, similar patterns of sex differences will be shown in data from the children's Doll Play language scales.

Table VII-3 shows mean scores on the ten language scales for boys and girls in the total sample. As Table VII-3 indicates, girls produced longer stories with more importations than did boys. Girls scored highest on all measures of quantity, except Total Activities; the difference was small, however, and not significant. In measures of elaboration, the girls scored higher than boys on all scales except Use of Verbs and Adverbs; boys' mean score for Use of Verbs and Adverbs was significantly higher than girls'. In general, then, girls' Doll Play stories tended to show greater language elaboration as well as greater quantity of language.

TABLE VII-3

Mean Language Scores (and Standard Deviations) for Boys and Girls

Language Scale	Boys	Girls	Significance Level (if less than .05)
Number of Units	11.9 (13.22)	16.2 (13.71)	
Total Words	72.9 (81.97)	100.1 (80.63)	p = .04
Total Activities	2.6 (3.17)	2.5 (2.51)	
Total Importations	3.2 (4.00)	4.3 (4.30)	
Words per Unit	5.7 (2.15)	5.8 (1.80)	
Average Pre-verb Words	1.6 (0.77)	1.7 (0.85)	
Percent Use of Simple Verbs	14.7 (11.0)	15.0 (9.0)	
Subordinate Clauses per Unit	.13 (.14)	.18 (.20)	
Non-dialogue Subordinate Clauses per Unit	.09 (.12)	.12 (.17)	
Percent Use of Verbs and Adverbs	36.4 (14.5)	32.2 (8.6)	p = .03

Relationship between Child's Language Scores and Other Variables

The child's language scales as a group were not correlated significantly with many other variables from the preschool and follow-up phases of the study; taken separately, however, the individual language scales were found related with a good many other child and maternal variables. For the sake of brevity, only those variables with which more than one language scale was significantly associated are reported in Tables VII-4 and VII-5.

Measures of Language Quantity

Because the four quantitative language measures were found to be related to social status, with the middle-class children producing longer stories with fewer school activities but more importations, the correlations reported in Table VII-4 are for the working-class sample only: middle-class data have been excluded from this analysis. Correlation coefficients for the total sample (middle-class subjects included) are generally of greater magnitude and in the same direction as those reported here.

Children who told the longest stories tended to have mothers who were less likely to spend time visiting outside the home and to give descriptive responses on the Sigel sorting task, and more likely to give relational-contextual responses on the Sigel task, to have long reaction times on the Kagan task, to receive high scores on the Exploratory Interest Questionnaire, and to express high need for aggression.

The length of children's stories was also significantly associated with a number of children's preschool variables: IQ, non-kindergarten preschool experience, lengthy viewing times on the Preference for Visual Complexity task, and relatively low verbal participation in the interaction sessions. Correlations of approximately the same magnitude (roughly .20 - .25) were found for the relationship of children's follow-up variables to length of Doll Play stories. Quantity of verbal output was associated with IQ at age 7, with scorable responses on the Sigel task, with scores on some Dream Interview measures, and with the ability to delay gratification. Children who told long stories were more likely to see themselves as personally responsible for their academic and social success or failure. They were also more likely to do well on the Lee-Clark Reading Readiness Test; there was some indication that they might receive higher school grades in reading and arithmetic.

The direction of correlation of Total Importations with other variables was the same as that of correlation of length measures with maternal and child variables; but the magnitude,

TABLE VII-4

Correlation of Child's Language Scales (Quantity) with Demographic, Maternal, and Other Child Variables (Working Class only)

Variable	Correlation with Language Scales*			
	Number of Units	Total Words	Total Activities	Total Importations
Maternal Variables:				
Amount of Visiting per Week				
Preschool	-.25	-.25	.10	-.18
Sigel (Conceptual Style Sorting Task)				
Preschool				
Descriptive Part-Whole	-.23	-.22	-.12	-.30
Relational-Contextual	.18	.18	.14	.31
Plutchik (E-I),				
Preschool				
Total Exploratory Items Liked	.22	.22	.03	.13
Kagan (Matching Familiar Figures)				
Follow-up 2				
Average Reaction Time	.18	.21	-.02	.19
Total Errors	.00	-.01	.21	.06
Edwards Personal Preference Scale				
Follow-up 2				
Aggression Score	.24	.24	-.14	.13
Child Variables:				
Preschool Experience	.22	.21	.07	.20
Curiosity Total Time score, Preschool	.27	.16	.17	.25
Verbal Task Interaction Preschool	-.12	-.05	-.20	-.06

TABLE VIII-4 (Continued)

	Number of Units	Total Words	Total Activities	Total Importations
Binet IQ				
Age 4	.19	.18	-.01	.02
Age 7	.20	.22	.08	.02
Sigel (Conceptual Style Sorting Task)				
Follow-up 1				
Scorables	.20	.20	.18	.19
Lee-Clark Reading Readiness Test				
Total Score	.18	.21	-.08	-.04
Reading Grade-Semester 2	.24	.25	.14	.17
Arithmetic Level-Grade 2	.21	.23	.17	.14
Piagetian Dream Interview				
Follow-up 1				
Knows dreams do take place inside	.28	.28	-.02	.20
Total Score	.21	.21	.09	-.06
Delayed Reward Task (Mischel)				
Follow-up 2	.21	.25	-.06	-.09
Internality-Externality				
Follow-up 2				
Internalizes Positive Academic Achievement	.21	.22	.03	.19
Total Internalized Choices	.20	.22	-.06	.16

* $p \leq .05$ when $r \geq \pm .19$
$p \leq .01$ when $r \geq \pm .25$

TABLE VII-5

Correlation of Child's Language Scales (Elaboration) with Maternal and Other Child Variables (Total Sample)

Variable	Correlation with Language Scales*					
	Words Per Unit	Average Pre-Verb Words	Percent Use of Simple Verbs	Subordinate Clauses per Unit	Non-Dialogue Subordinate Clauses per Unit	Percent Use of Verbs and Adverbs
Maternal Variables:						
Block Sorting Task						
Preschool						
Word Count per Minute	.24	.20	-.17	.09	.06	-.12
Affirmation/Negation Balance	.17	.23	-.06	.09	.03	-.19
Sigel (Conceptual Style Sorting Task)						
Preschool						
Descriptive Part-Whole	.06	-.07	-.26	.06	.12	-.02
Relational-Contextual	-.09	-.02	.22	-.02	-.05	.12
Child Variables:						
Block Sorting Task						
Preschool						
Verbal Task Interaction	.16	.23	-.02	.18	.10	-.20
Verbal Participation	.17	.17	.03	.29	.20	-.11
Errors	-.16	-.26	.06	-.01	-.04	.17
Non-meaningful Block Placement	-.25	-.24	.01	-.09	-.12	.03
Use of Correct Labels	.10	.15	-.27	.01	.01	-.19

TABLE VII-5 (continued)

Binet Confidence Factor Age 4	.23	.10	-.02	.20	.16	-.24
Binet General Factor (optimal behavior during testing) Age 4	.23	.14	-.05	.24	.20	-.16
Binet IQ Age 7	.16	.12	.01	.04	-.03	-.17
Lee Clark Reading Readiness Test Total Score	.30	.26	-.02	.16	.13	-.16
Spelling Grade 2	.22	.20	-.13	.08	.01	-.28
Delayed Reward Task (Mischel), Follow-up 2	.21	.16	.00	.15	.09	-.07
Sigel (Conceptual Style Sorting Task) Follow-up 2 Descriptive Part- Whole	.21	.12	-.09	.15	.22	-.02
Kagan (Design Recall) Follow-up 1 Non-meaningful Response Sequences	-.21	-.28	.00	-.03	-.01	.13
Total Errors (CA regressed out)	-.21	-.29	.04	-.06	-.06	.21
Follow-up 2 Good First Responses	.15	.21	-.07	.02	.06	-.20

* $p \leq .05$ when $\underline{r} \geq \pm .17$; $p \leq .01$ when $\underline{r} \geq \pm .23$

although usually roughly the same, varied noticeably in a few cases. Importations were not associated with the child's IQ, and only weakly associated with the Dream Interview and Delayed Reward task. On the other hand, the level of correlation with mother's Sigel scores was higher for Importations than for measures of length.

Correlation coefficients for Total Activities were often found to be opposite in direction from, or noticeably smaller than, the coefficients for the other three measures of quantity. Total Activities were significantly associated only with mother's errors in matching familiar figures, with low task-specific verbal interaction in the preschool teaching situations, and with children's scorable responses on the Sigel conceptual sorting task (first follow-up).

Measures of Language Elaboration

The relationships among the six language elaboration scales and other variables are reported in Table VII-5. Correlation coefficients are reported for the total sample, since there was little relationship between these scales and social status.

The elaboration scales were associated with several measures from the mother-child interaction sessions administered at the preschool level. For all but use of simple verbs and use of verbs and adverbs, described previously as essentially negative indicators of language complexity, the relationships are in the expected direction: language elaboration is positively associated with both the mother's and child's successful performance. Specifically, the child's language elaboration is associated with mother's verbal output and her tendency to use positive rather than negative reinforcement in correcting the child's errors, and with the child's verbal task-participation, and correctness of performance on both physical (placement) and verbal (labeling) dimensions.

Other measures of the child's performance associated with language elaboration include optimal behavior during administration of the preschool Binet, Lee-Clark Reading Readiness, spelling grades, correct performance on the Kagan matching task, and descriptive-analytical responses on the Sigel sorting task.

Conclusions

Before summarizing the findings reported in this chapter, two points should be reiterated: first, the language sample obtained from the children in this study was a limited one, and the data are based on a single stimulus situation. Second, although some evidence for interrelationships among the measures was found, the scales discussed here are relatively simple, straightforward measures of quantity and of complexity of language produced by the children. Yet even the relatively limited number and degree of meaningful relationships obtained with these simple scales serve to underscore the importance of language in all phases of early cognitive development.

The children's language measures related to one another in much the same manner that maternal language measures had been found to be related: a group of items which were essentially measures of complexity or elaboration emerged relatively independent of another group which dealt primarily with quantity of language. Although the children's elaboration measures were not so highly related to the maternal language scores as were the quantitative measures, their composition was similar to the group of items which had been found to be most meaningful in describing the complexity of maternal language.

Limited evidence was found for social status differences in children's language: although the middle-class children talked more than the working-class children, less difference was found in complexity of language than might have been expected. Similarly, although girls tended to produce more language, and of greater complexity, than did boys, the differences were not, on the whole, statistically significant. The attractiveness of the stimulus situation--the opportunity to manipulate dolls and to talk about a familiar experience, school--might have helped to overcome some of the test-sophistication factors and facility with fantasy which work in favor of middle-class children and of girls.

The child's language was related in expected and meaningful ways to both the mother's and child's performance at different phases of the study. The maternal performance measures with which the child's language was found to be associated were more typically measures of mother's _style_ than _level_ of ability--for example, the children's language scales were not associated with mother's IQ--and the relationships were in the expected direction: more effective maternal strategies were associated with lengthier, more complex Doll Play stories.

The final observation, however, must be that these data were _not_ related to a number of variables with which relationships were expected; considering the wealth of data obtained in preschool and follow-up phases of this study, the child's language scales were associated with relatively few variables; the almost total lack of significant association between Elaboration scales and other measures of verbal ability such as the Sigel and Binet is especially disappointing. But it is important to remember that the task involved projective materials and that the speech sample contained fantasy material; the degree to which such speech corresponds to the child's spontaneous verbalization, in dialogue with peers, for example, is not known.

CHAPTER VIII

THE CHILD'S EXPLORATORY BEHAVIOR AND INTERESTS

The concept of curiosity was defined and discussed in Chapter VI of the report of the preschool phase of the Cognitive Environments Study. Most basically, curiosity refers to interest in environmental variation. The young child's preference for complex stimuli is assumed by cognitive-developmental theories to be a vital factor in progression from one cognitive stage to the next (Piaget, 1954; White, 1960). The child who is aroused by complexity is expected to seek progressively more complex stimulation as his abilities and experience allow him to assimilate more complex events. "Curiosity" is assumed to be fostered by a rich environment in which stimulation is relatively well-organized along a dimension of complexity.

Curiosity behavior was measured in this study by determining for each subject the ratio of time spent looking at complex visual stimuli to total time spent looking at both complex and simple stimuli. (The procedure and stimuli are described in Appendix J.) The measure of curiosity, or interest in complex visual stimuli, was repeated in each of the follow-up testing sessions. An experimental measure, it was included not to test specific hypotheses but to explore the role of curiosity motivation in early cognitive development and the effects of the environment on curiosity behavior in the early years. It has been suggested that the lower-class home is characterized by relatively less-organized stimulation than is the middle-class home, and that the child in such a home is confronted by overwhelming stimulation interfering both with the maintenance of curiosity motivation and with development of skills for dealing with complex events (Bear, 1967; Gray & Klaus, 1968).

Some evidence for this expected social class difference was obtained in the preschool administration of the curiosity measure and discussed in the preschool report. Briefly, the findings were that the unskilled-working-class children scored lower on the ratio score for preference for complexity than did the middle- and skilled-working-class children. But these differences were not significant, and there was an apparently complex interaction of sex and housing status with socioeconomic level. The general suggestion of these data was that working-class children are less interested in complexity than higher-status children. The preschool data were based on a single measure of interest in visual complexity--with no data on locomotor or manipulatory exploration--and the possibility was entertained that lower-class children might express curiosity motivation in more active exploratory behaviors. Thus, an attempt was made in the follow-up studies to collect data on this latter type of curiosity.

Midway in the first follow-up testing session, each child was given a fifteen-minute free-play break. He was shown a toy-filled bookcase he had not previously seen, and was told he could play with whatever he wanted; his mother was present, but had been given a paper-and-pencil task in order to minimize mother-child interaction. Mother and child were left alone in the testing room, and the child's behavior was observed through a one-way window. A running description of the child's behavior was recorded, with emphasis on which and how many toys he played with, length of time spent with each toy, and type of play engaged in.

This chapter will present follow-up and longitudinal data on the experimental curiosity measure; play observation data will be presented and discussed, with emphasis on its relationship with the curiosity measure.

The Experimental Curiosity Measure

Longitudinal Data on the Experimental Curiosity Measure

The major findings in longitudinal study of scores on the experimental measure of preference for visual complexity were that the ratio score for preference increased with age and that the differentiations among the major groupings in the sample decreased with age. These data are presented in Tables VIII-1 and VIII-2.

TABLE VIII-1

Mean Ratio Scores (and standard deviations) for Visual Curiosity at Three Administrations, by Social Status

Administration	Social Status				Total Sample
	Middle Class	Working Class			
		Skilled	Unskilled		
			Father Present	Father Absent	
Preschool	.533 (.087)	.542 (.069)	.503 (.082)	.517 (.083)	.524 (.081)
Follow-up 1	.542 (.063)	.541 (.058)	.546 (.077)	.532 (.056)	.540 (.064)
Follow-up 2	.546 (.085)	.528 (.077)	.555 (.081)	.543 (.082)	.543 (.081)

TABLE VIII-2

Mean Ratio Scores (and standard deviations) for Visual Curiosity at Three Administrations, by Sex and Housing Type

Adminis-tration	Sex				Housing (Working Class Only)	
	Boys		Girls			
	Total	Working Class	Total	Working Class	Private	Public
Preschool	.534 (.074)	.527 (.068)	.514 (.087)	.515 (.089)	.509 (.085)	.533 (.071)
Follow-up 1	.542 (.059)	.545 (.063)	.539 (.068)	.534 (.064)	.542 (.061)	.537 (.067)
Follow-up 2	.547 (.077)	.545 (.076)	.540 (.086)	.539 (.084)	.530 (.081)	.553 (.078)

None of the contrasts among the social status, sex, and housing groups yielded significant _t_'s for the follow-up administrations ($p > .20$ for all except housing at follow-up #2, where $p = .13$). At the preschool level, there were clearer suggestions of group trends, with the two unskilled-working-class groups scoring lower than the middle- and skilled-working-class groups (probability levels for most of the contrasts were only slightly greater than .10). Similarly, the difference between public and private housing groups was minimally significant ($p = .10$), and there was evidence for a complex sex-by-housing-by-social status interaction.

Table VIII-3 shows intercorrelations of preschool and follow-up curiosity ratio scores for the major sample groups.

It is clear from the data in Table VIII-3 that the relationships among ratio scores preclude prediction from one administration to another. And the relationship between viewing time and preference score is negligible. These data contrast with the greater magnitude and significance of correlations obtained among total viewing time scores at the different administrations, as reported in Chapter IV.

TABLE VIII-3

Relationship between Preschool and Follow-Up Curiosity Scores for Major Sample Groupings

Correlation	Total Sample	Working Class	Boys	Girls
Preschool Ratio x Follow-up 1 Ratio	-.03	-.06	.00	-.06
Preschool Ratio x Follow-up 2 Ratio	.20*	.14	.18	.20
Follow-up 1 Ratio x Follow-up 2 Ratio	.00	-.12	-.10	.06
Preschool Ratio x Preschool Viewing Time	-.10	-.11	-.24*	.03
Follow-up 1 Ratio x Follow-up 1 Viewing Time	-.07	-.04	-.13	-.03
Follow-up 2 Ratio x Follow-up 2 Viewing Time	-.02	-.24*	-.14	.05

*p = .05

Relationship of Curiosity Scores to Other Variables

There are virtually no variables with which curiosity scores from the different administrations are consistently related. The pattern of correlations with other variables, examined separately for the major social status and sex groupings, is generally hit-and-miss: occasional significant correlations occur, but hold for only one of the three administrations. More importantly, such correlations occur between a single ratio score and a single variable from another area of investigation: where the curiosity scores appear to be related to more than one variable in such an area, we find that at one administration curiosity is correlated with one variable representing a general behavior and at another administration curiosity is correlated with a different variable from that area. Table VIII-4 demonstrates this pattern for an extremely limited number of variables for which correlations approached some interpretable significance.

TABLE VIII-4

Correlation of Curiosity Scores at Three Administrations with Maternal and Other Child Variables

Variable \ Administration	Total[a] First	Total[a] Second	Total[a] Third	Working-Class[b] First	Working-Class[b] Second	Working-Class[b] Third	Boys[c] First	Boys[c] Second	Boys[c] Third	Girls[d] First	Girls[d] Second	Girls[d] Third
Maternal Behavior:												
Edwards Personal Preference Schedule: Abasement	-.22	-.01	-.18	-.18	.01	-.13	-.23	.02	-.17	-.22	-.04	-.19
Externality (Rotter)	-.17	-.24	-.11	-.13	-.19	-.02	-.20	-.19	-.05	-.16	-.29	-.15
Specificity of Feed-back in Block Sorting Task	.11	.23	.17	.09	.23	.14	.12	.30	.24	.08	.16	.12
Child's Performance:												
Lee-Clark Reading Readiness Test: Total Score	.13	.16	.06	.19	.11	.05	.22	-.03	.06	.11	.34	.06
Metropolitan Reading Readiness: Total Score	.08	.21	.06	.06	.16	.06	.16	.08	.23	.04	.35	-.09
Aptitude Test in first grade	.13	.10	.22	.15	.06	.24	.09	.08	.05	.21	.13	.20
Sigel Follow-up 1 Nonverbal Responses	-.08	-.17	.02	-.11	-.24	.00	-.19	.17	-.05	-.04	-.28	.04

a $p \leq .05$ when $r \geq \pm .16$; $p \leq .01$ when $r \geq \pm .21$
b $p \leq .05$ when $r \geq \pm .17$; $p \leq .01$ when $r \geq \pm .23$
c $p \leq .05$ when $r \geq \pm .23$; $p \leq .01$ when $r \geq \pm .30$
d $p \leq .05$ when $r \geq \pm .23$; $p \leq .01$ when $r \geq \pm .28$

It is tempting to conclude from the evidence in Table VIII-4 that some evidence has been amassed for a relationship of maternal feelings of low self-regard and low belief in control over events with the child's lack of interest in complexity; or for a relationship between the mother's organization of events in the interaction situation and the child's preference for complex stimulation; or for a relationship between the child's curiosity and his performance on verbal intelligence measures. These conclusions are in harmony with the general model assumed here that curiosity behavior is related to risk-taking or at least to an attitude of openness to the environment, that it is fostered by experience in a relatively organized environment, and that it is a vital factor in the development of intelligence. But the pattern of correlations does not give very strong support to these conclusions, for the reasons described above. It is vital to note that these data represent the most consistently significant and meaningful patterns obtained from correlation of the curiosity scores with all other variables from preschool and follow-up testing of mother and child.

The Child's Behavior during the Free-Play Observation

Midway in the first follow-up testing session, each child was given a fifteen-minute free-play session. He and his mother were left alone in the testing room, the mother having been instructed to work on a paper-and-pencil test; the child was shown a bookcase containing ten toys and was told that he could play with them as he wished. The toys included a set of plastic construction bricks, a set of blocks, a set of tinker toys, a coloring book, crayons, a pad of plain white paper, colored pencils, several cans of colored Play-Doh, a mechanical baby doll, and a dump truck.

A running account of the child's behavior was recorded by an observer watching through a one-way mirror. From this account, the following measures were later obtained:

Play Time. The number of seconds the child spent playing with each toy was noted. Two scores were obtained, one for the longest time spent with a single toy, and one for the total time spent on the two toys played with longest. Because the correlation between these two measures, .88, was highly significant, only the first will be considered here.

Play Score. Scores were given for each toy, indicating whether the child had played with the toy (score = 3), touched it but not played with it (score = 2), or not touched it at all (score = 1).

Number of Toys Touched. A simple tally was made of how many of the ten toys were touched by the child.

Average Play Score. The Average Play Score is the sum of Play Scores 2 and 3 divided by the number of toys touched. This score excludes toys not touched by the child.

Exploration of the Room. The child's response to objects in the room other than the toys was scored:

0 = no exploration
1 = passive exploration, looking from his seat
2 = leaves seat to inspect at close range
3 = prolonged deliberate inspection at close range

Initiation of Interaction. A mild suggestion had been made to the mother, who knew that the child's play would be observed, that she avoid joining in; but the task she was given to work on during the play session was sufficiently simple to allow her to respond to the child, and no instructions were given the child except to do as he wished. Accordingly, note was made of which person--mother or child--first spoke to the other during the play observation.

Major Group Differences in Free-Play Behavior

Tables VIII-5 and VIII-6 report mean scores grouped by social status and by sex for the child's behavior during the play session.*

* The data for 85 subjects for Toys Touched, Average Play Score, and Exploration of Room was unfortunately lost during analysis; the N reported for these measures is, therefore, only 61. Even with this limited N, however, some interesting and significant correlations of play variables with other maternal and child variables were found; thus it was decided to report and discuss the data for the 61 subjects.

TABLE VIII-5

Mean Scores for Child's Free-Play Behavior, by Social Status

Score	Social Status			
		Working Class		
			Unskilled	
	Middle Class	Skilled	Father Present	Father Absent
Play Time (one toy)	549.13 (N=38)	506.36 (N=36)	563.56 (N=34)	523.47 (N=38)
Toys Touched	5.8 (N=8)	5.2 (N=12)	5.9 (N=18)	5.9 (N=23)
Average Play Score	2.7 (N=8)	2.8 (N=12)	2.7 (N=18)	2.5 (N=23)
Exploration of Room	1.5 (N=8)	0.8 (N=12)	0.7 (N=18)	1.0 (N=23)

TABLE VIII-6

Mean Scores for Child's Free-Play Behavior, by Sex

	Sex	
	Boys	Girls
Seconds of Play Time (one toy)	546.89 (N=70)	524.57 (N=76)
Toys Touched	5.4 (N=34)	6.1 (N=27)
Average Play Score	2.6 (N=34)	2.7 (N=27)
Exploration of Room	0.9 (N=34)	1.0 (N=27)

For Play Time and Number of Toys Touched, there were no significant group differences. The girls' Average Play Score was significantly higher than the boys' ($p = .10$), and the father-absent, unskilled-working-class group scored significantly lower ($p \leq .10$) than each of the other three social status groups. Middle-class children scored significantly higher ($p < .05$) than either of the unskilled-working-class groups on Exploration of the Room, and the difference between middle-class and skilled-working-class children approached significance.

Although the children's use of the various toys did not differ significantly by social status (Table VIII-7), there were significant sex differences (Table VIII-8). Chi-squares (for play vs. touch vs. no contact) were computed separately for each toy.

TABLE VIII-7

Child's Use of Toys in Free-Play Observation, Percent Distribution by Social Status

Toy	Social Status							
			Working Class					
	Middle Class (N=8)		Skilled (N=12)		Unskilled			
					Father Present (N-18)		Father Absent (N=22)	
	touch	play	touch	play	touch	play	touch	play
Bricks	37.5	12.5	8.3	58.3	27.8	44.4	30.4	47.8
Blocks	25.0	12.5	8.3	16.7	11.1	11.1	4.5	36.4
Tinker Toys	50.0	25.0	16.7	16.7	33.3	16.7	27.3	40.9
Coloring Book	12.5	62.5	16.7	50.0	44.4	33.3	18.2	50.0
Crayons	0.0	75.0	25.0	41.7	27.8	33.3	9.1	54.5
Paper	37.5	25.0	33.3	25.0	27.8	33.3	13.6	31.8
Pencils	37.5	25.0	25.0	33.3	44.4	27.8	22.7	36.4
Play-Doh	0.0	50.0	33.3	41.7	44.4	44.4	50.0	27.3
Doll	0.0	37.5	0.0	16.7	5.5	33.3	4.5	40.9
Truck	12.5	37.5	8.3	41.7	5.5	38.9	4.5	63.6

TABLE VIII-8

Child's Use of Toys in Free-Play Observation,
Percent Distribution by Sex

Toy	Sex			
	Boys (N=33)		Girls (N=27)	
	touch	play	touch	play
Bricks	20.6	50.0	33.3	37.0
Blocks	3.0	36.4	18.5	3.7
Tinker Toys	33.3	33.3	25.9	18.5
Coloring Book	24.2	39.4	25.9	55.6
Crayons	12.1	42.4	22.2	55.6
Paper	24.2	21.2	25.9	40.7
Pencils	33.3	24.2	29.6	40.7
Play-Doh	48.5	21.2	25.9	59.2
Doll	0.0	12.1	7.4	59.2
Truck	6.1	69.7	7.4	22.2

Differential use by sex of the doll and the truck were the most striking ($p < .0001$ for each); the boys' greater play with the blocks was next in magnitude ($p < .005$); the girls' greater use of the coloring book and Play-Doh were also significant ($p < .02$). All other chi-squares for sex differences, and all chi-squares computed for social status failed to reach the .10 level of significance.

Social status differences appeared in initiation of interaction between mother and child during the play session, but the trend was not linear. The percent of cases in which the child initiated interaction, in order from middle-class to father-absent, unskilled working-class, was 75.0, 91.7, 56.2, and 47.6. (Chi-square for social status was significant at the .10 level.) Sex differences were not significant: 61.3 of the boys and 65.4 of the girls addressed the mothers first.

Intercorrelation of the Play Session Variables

Significant intercorrelations were obtained among the four variables for which correlation is a meaningful statistic.

Play Time was negatively related to Number of Toys Touched, for the total sample, working-class sample, boys and girls. Play Time was positively associated with Average Play Score for total, working-class, and male samples, but the correlation within the sample of girls was not significant. Number of Toys Touched was negatively associated with Average Play Score for the same three samples (i.e., not for girls), but the coefficients were of lesser magnitude than for Play Time and Average Play Score. Finally, for the girls only, Exploration of the Room was positively associated with Number of Toys Touched.

Correlation of Play Time with Other Variables

Table VIII-9 presents correlations of selected variables with the amount of time the child spent playing with a single toy, grouped for total sample, for boys, and for girls.

The length of time spent by children in playing with a single toy is associated with a number of maternal attitudes and behaviors assessed when the children were four years old: lengthy play times are associated with relatively little use of status-normative control strategies, with a relatively progressive attitude toward education and the schools, and with generally good teaching behavior, the latter involving both positive regard for the child and attention to mapping out the task for him in advance of requesting performance responses. Mother's preference for exploratory endeavors is associated with lengthy play times, as are reflectiveness on the Kagan matching task and maternal intelligence. Both anxiety and feelings of lack of control over the environment are negatively associated with the child's play time.

Lengthy play time with a single toy is associated with both successful performance and non-disruptive behavior on the child's part, as assessed at the preschool level: low resistance, correct use of labels, and success in the Block Sorting task are all positively associated with Play Time.

In follow-up testing sessions, among the variables which were found to be associated with lengthy play time were lengthy Draw-a-Circle and reaction times to a design recall task, both essentially measures of reflectiveness and behavior management; IQ and optimal behavior during administration of the intelligence test administered in the second grade were also associated with Play Time.

TABLE VIII-9

Correlation of Play Time (one toy) with Other Variables

	Total Sample[a]	Boys[b]	Girls[c]
Maternal Variables:			
First Day: % Imperative	-.18	-.24	-.11
First Day: % Status-normative	-.17	-.21	-.12
"More Traditional Education"	-.20	-.16	-.25
Number of Models Mother Shows Child (Etch-a-Sketch)	.11	.02	.21
Affectionateness during Interaction	.20	.22	.20
Orientation in Interaction	.25	.36	.15
"Tug-of-War" in Interaction	-.26	-.10	-.39
Plutchik (E-I)--Total Exploratory Items Liked	.15	.21	.10
WAIS			
Verbal IQ	.18	.21	.16
Performance IQ	.20	.24	.17
Full IQ	.20	.22	.18
Kagan Matching Familiar Figures--Average Reaction Time	.15	.24	.06
Anxiety Score	-.15	-.28	-.03
Externality Score (Rotter I-E)	-.15	-.05	-.25

TABLE VIII-9 (continued)

	Total[a]	Boys[b]	Girls[c]
Child Variables, Preschool:			
Resistance during Interaction	-.18	-.07	-.28
Use of Correct Labels (Block Sorting)	.15	.10	.20
Block Sorting Task Score	.24	.17	.29
Activity Factor (Binet)	.14	.11	.19
Sigel (Conceptual Style Sorting Task) Nonverbal Responses	-.14	-.10	-.20
Curiosity Ratio Score	.06	.14	-.02
Child Variables, Follow-up 1:			
Sigel (Conceptual Style Sorting Task) Number of Category Shifts	-.13	-.26	-.03
Draw-a-Circle-Slowly Total Time	.19	.09	.27
Sears Sex-Role Activity Preference Score (Total sex-appropriate choices)	-.25	-.23	-.28
Curiosity Ratio Score	.01	.12	-.08
Child Variables, Follow-up 2:			
Kagan Design Recall--Average Reaction Time	.18	.06	.28
Sears Sex-Role Activity Preference Score (Total sex-appropriate choices)	.07	.22	-.03
Curiosity Ratio Score	.12	.10	.13
Second Binet Administration:			
Binet IQ	.20	.21	.20
General Factor (Optimal Behavior during Testing)	.16	.18	.12

[a] $p \leq .05$ when $r \geq \pm .15$; $p \leq .01$ when $r \geq \pm .21$
[b] $p \leq .05$ when $r \geq \pm .21$; $p \leq .01$ when $r \geq \pm .30$
[c] $p \leq .05$ when $r \geq \pm .19$; $p \leq .01$ when $r \geq \pm .26$

Correlation of Number of Toys Touched with Other Variables

The number of different toys touched or played with by the child during the fifteen-minute play session was found to be negatively related to the amount of time spent playing with a single toy; such a relationship might have been predicted, since the time limit imposed a degree of mutual exclusiveness on the possible behaviors of handling all toys and lengthy engagement with a single toy. But the strong negative correlation between the two--the coefficient was in the .60's for all samples considered--appears to reflect a genuine exclusivity of the two types of behavior. Lengthy play time was found to be generally associated with maternal behaviors and skills recognized as conducive to the child's cognitive growth, and further to be associated with the child's success in both cognitive and behavioral areas. The correlations reported in Table VIII-10 demonstrate the opposite for the relationship of number of toys touched with other variables.

Touching and/or playing with a relatively large number of toys during the play session is associated with poor availability and use of resources in the home, with relatively unsupervised freedom in the child's play with others, with maternal endorsement of traditional attitudes toward education, with poor orientation and specificity in the mother's attempts to teach the child sorting tasks, and with relatively high control by the mother and friction between mother and child during the preschool interaction session. Handling of many toys is also associated with low maternal IQ, with poor performance and lack of reflectivity on a matching task, with maternal anxiety and feelings of lack of control over the environment.

This general pattern of correlation between maternal variables and Toys Touched is the reverse of that obtained for Play Time. Many variables are involved in both sets of correlations, and the strong negative correlation between Play Time and Toys Touched would suggest that these two measures of the child's behavior in the play session would be correlated in opposite directions with identical variables. This is roughly true for those variables appearing in both correlational patterns; in addition, in each correlational pattern there are variables not appearing in the other which enforce the general association of "good" behaviors and ability with Play Time and of "poor" behaviors and failure with Toys Touched.

Thus it is not surprising to find that a pattern of "poor" behaviors is found in correlation of Toys Touched with child variables as well as with maternal variables. The child who handled a relatively large number of toys did poorly on both the Toys and Block Sorting Tasks at the preschool level, and was likely to have displayed behavioral problems during the interaction. Toys Touched is also negatively associated with Binet IQ, reading achievement, and generally good performance in the early school years.

TABLE VIII-10

Correlation of Number of Toys Touched with Other Variables

Variable	Total Sample[a]	Boys[b]	Girls[c]
Demographic and Maternal Variables:			
Availability and Use of Home Resources	-.21	-.20	-.34
Extent of Child's Unsupervised Play with Other Children (low score = restricted)	.32	.39	.22
"More Traditional Education"	.28	.32	.22
Number of Models Mother Shows Child (Etch-a-Sketch)	-.22	-.35	-.15
Affectionateness during Interaction	-.20	-.17	-.39
Specificity of Feedback in Block Sorting Task	-.28	-.24	-.37
Orientation in Interaction	-.43	-.45	-.43
Coercive Control during Interaction	.40	.44	.40
"Tug-of-War" in Interaction	.30	.16	.44
WAIS			
Verbal IQ	-.17	-.05	-.34
Performance IQ	-.15	-.10	-.24
Full IQ	-.15	-.07	-.29
Kagan Matching Familiar Figures -- Average Reaction Time	-.22	-.13	-.35
Kagan Matching Familiar Figures -- Total Errors	.25	.18	.38
Anxiety Score	.20	.10	.32

TABLE VIII-10 (continued)

	Total[a]	Boys[b]	Girls[c]
Externality Score (Rotter I-E)	.21	.05	.42
Child Variables, Preschool:			
Toys Sorting Task Score	-.33	-.15	-.60
Block Sorting Task Score	-.49	-.52	-.47
Test Period Combination Score (low score = no problems)	.38	.27	.42
Errors (Block Sorting)	.17	.34	-.03
Use of Correct Labels (Block Sorting)	-.40	-.39	-.43
Curiosity Ratio Score	.03	-.02	.21
Child Variables, Follow-up 1:			
Sigel (Conceptual Style Sorting Task) Number of Category Shifts	.23	.30	.18
Aptitude Test (in first grade)	-.14	.06	-.59
Curiosity Ratio Score	-.21	-.42	-.02
Child Variables, Follow-up 2:			
Draw-a-Circle-Slowly -- Total Time	-.23	-.35	.00
Lee-Clark Reading Primer -- Total Score	-.20	-.16	-.32
Curiosity Ratio Score	.08	.12	.00
Second Binet Administration:			
Binet IQ	-.25	-.23	-.34
General Factor (Optimal Behavior during Testing)	-.25	-.31	-.09

a $p \leq .05$ when $r \geq \pm .21$; $p \leq .01$ when $r \geq \pm .30$
b $p \leq .05$ when $r \geq \pm .30$; $p \leq .01$ when $r \geq \pm .41$
c $p \leq .05$ when $r \geq \pm .32$; $p \leq .01$ when $r \geq \pm .44$

Sex Differences in Relationships between Play Time, Toys Touched, and Other Variables

Both Tables VIII-9 and VIII-10 report correlations separately for boys and girls. While few differences appear in the direction of correlation for the two groups, in several instances the magnitude of correlation is much greater for one sex than for the other. Significant correlations generally occur with greater frequency in the sample of girls than among the boys. The differential patterns of correlation suggest no meaningful trends, and may be to a large degree an artifact of the reduced size of the samples.

Correlation of Average Play Score with Other Variables

Table VIII-11 presents correlations of the Average Play Score (total Play Score divided by number of toys handled) with selected variables from various phases of the project's concern.

Average Play, a composite index of toys touched and played with weighted in favor of toys played with, is positively associated with Play Time. This association is reflected in some maternal measures significantly related to both Average Play and Play Time. High scores for Average Play and Play Time are both associated with relatively little use of imperative-normative control strategies, with reflectiveness on the Kagan matching task, and with generally good teaching behavior.

Teaching behaviors strongly associated with Average Play involve mapping out the task for the child and giving him specific verbal feedback; mapping out the task, or orienting the child, is even more strongly associated with Average Play than with lengthy play time.

A high Average Play Score is further associated with intelligence and successful performance on the child's part, as assessed in the preschool study; success in sorting blocks and using the correct labels for them, scorable responses on the Sigel conceptual sorting task, and Binet IQ scores all showed positive correlations with Average Play. Other scores suggest that the child with a high Average Play Score tends to be confident, and justifiably so, of his understanding of concepts and ability to express himself: Average Play correlates positively with the Binet Confidence Factor, but negatively with nonverbal responses to the Sigel conceptual sorting task and also negatively with spuriously successful block sorting.

In follow-up testing sessions, both IQ and the ability to inhibit motoric activity were found to be positively associated with Average Play; and, in the second follow-up as in the preschool sessions, non-verbal responses to the Sigel sorting task were negatively correlated with Average Play.

TABLE VIII-11

Correlation of Average Play Score with Other Variables

Variable	Total Sample[a]	Working Class[b]	Boys[c]	Girls[d]
Demographic and Maternal Variables				
Maternal Support toward Child (Interviewer's Rating)	.13	.10	.34	-.22
First Day: % Imperative	-.21	-.14	-.14	-.27
First Day: % Status-normative	-.22	-.17	-.17	-.23
"More Traditional Education"	-.02	-.03	-.23	.33
Specificity of Maternal Feedback in Block Sorting Task	.34	.34	.35	.32
Maternal Orientation in Interaction	.49	.49	.60	.38
Kagan Matching Familiar Figures Follow-up 1 Average Reaction Time	.21	.11	.28	.16
Draw-a-Circle-Slowly Follow-up 2 Total Time	-.19	-.19	-.05	-.34
Locus of Control (James) (High score = external locus)	-.16	.05	.18	-.45
Edwards Personal Preference Schedule Abasement	-.06	-.12	.17	-.34
Child's Variables, Preschool:				
Block Sorting Task Score	.33	.36	.23	.47
Spuriously Successful Block Placement	-.30	-.30	-.39	-.23

TABLE VIII-11 (continued)

	Total[a]	W-C[b]	Boys[c]	Girls[d]
Use of Correct Labels (Block Sorting)	.31	.33	.33	.33
Verbal Participation in Interaction	-.06	-.06	-.32	-.15
Sigel (Conceptual Style Sorting Task) Nonverbal Responses	-.30	-.26	-.23	-.30
Scorable Responses	.24	.18	.10	.39
Binet IQ	.26	.24	.23	.22
Confidence Factor (Binet)	.29	.24	.15	.42
Curiosity Ratio Score	-.06	-.03	-.04	-.10
Child Variables, Follow-up 1:				
Motoric Impulsivity (total time child sat without moving)	.36	.41	.30	.44
Delayed Reward Task (Mischel)	-.01	-.06	-.32	.38
Curiosity Ratio Score	.10	.04	.12	.04
Child Variables, Follow-up 2:				
Motoric Impulsivity (total time child sat without moving)	.24.	.33	.11	.47
Sigel (Conceptual Style Sorting Task) Nonverbal Responses	-.24	-.24	-.32	-.03
Curiosity Ratio Score	.08	.04	.48	-.38
Binet IQ (second administration)	.29	.28	.21	.37

a $p \leq .05$ when $r \geq \pm .21$; $p \leq .01$ when $r \geq \pm .30$
b $p \leq .05$ when $r \geq \pm .23$; $p \leq .01$ when $r \geq \pm .32$
c $p \leq .05$ when $r \geq \pm .30$; $p \leq .01$ when $r \geq \pm .41$
d $p \leq .05$ when $r \geq \pm .32$; $p \leq .01$ when $r \geq \pm .44$

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TABLE VIII-12

Correlation of Child's Exploration of Room with Other Variables

Variable	Working Class Only[a]	Boys[b]	Girls[c]
Demographic and Maternal Variables			
Number of People in the Home	-.23	-.26	-.26
Rooms per Person	.17	.42	.05
Extent of Child's Unsupervised Play Outside the Home (low score = restricted)	.24	.24	.12
Mother's Out-of-Home Activities	.07	.35	.05
First Day: % Imperative	-.18	-.02	-.34
Number of Specific Turning Directions Given to Child (Etch-a-Sketch)	.05	.36	-.03
Specificity Index (Block Sorting Task)	-.28	-.06	-.42
General Verbal Specificity in Block Sorting Task	-.19	.03	-.39
Locus of Control (James) (high score = external locus)	.02	-.32	-.08
Edwards Personal Preference Schedule Abasement	-.21	-.48	.15
Child Variables, Preschool:			
Test Period Inhibition in Interaction	-.08	.04	-.35
Sigel (Conceptual Style Sorting Task) Nonverbal Responses	-.05	.30	-.45

TABLE VIII-12 (continued)

	W-C[a]	Boys[b]	Girls[c]
Confidence Factor (Binet)	-.23	-.36	.16
Curiosity Ratio Score	.22	.19	-.04
Child Variables, Follow-up 1			
Kagan Design Recall -- Total Errors (CA regressed out)	.24	.20	-.14
Curiosity Ratio Score	.16	.23	.21
Child Variables, Follow-up 2			
Sigel (Conceptual Style Sorting Task) Nonscorable Responses	.24	.06	.20
Lee-Clark Reading Primer -- Total Score	-.28	-.04	-.22
Curiosity Ratio Score	.12	-.10	.31
Optimal Behavior during Second Binet Administration	-.24	-.13	-.23
Summed Reading and Math Grades for First Two Years in School	-.26	-.03	-.29

[a] $p \leq .05$ when $r \geq \pm .23$; $p \leq .01$ when $r \geq \pm .30$
[b] $p \leq .05$ when $r \geq \pm .30$; $p \leq .01$ when $r \geq \pm .41$
[c] $p \leq .05$ when $r \geq \pm .32$; $p \leq .01$ when $r \geq \pm .44$

Sex Differences in Relationships between Average Play Score, Exploration of Room, and Other Variables

Tables VIII-11 and VIII-12 report correlations separately for boys and girls. In several instances, the magnitude of correlation is markedly higher for one sex than for the other, and significant correlations occur with greater frequency in the girls' sample than in the boys' sample. Yet these differential patterns of magnitude and significance suggest no meaningful trends; it is only from differences in the direction of correlation for the two groups that observations of apparent sex differences can be made.

Boys with high Average Play Scores were likely to have supportive mothers who felt relatively little control over their environments, who had a more progressive attitude toward education and the schools, and who received higher scores on the Abasement measure. The opposite was true for girls: their mothers were relatively unsupportive, had a strong feeling of control over the environment, wanted more traditional education, and ranked relatively low on the Abasement scale. High Average Play Scores further correlated negatively with the boys' ability to delay gratification, and positively with the girls' delaying of rewards. In two cases, the child's willingness to delay rewards and mothers' attitudes toward education, the differences in magnitude and direction of girls' and boys' correlations balanced for the total group, causing both delayed rewards and educational attitudes to appear uncorrelated in the total group to Average Play Scores.

Boys who actively explored the room tended to have mothers with low abasement scores, whereas actively exploring girls had mothers with relatively higher abasement scores. A pattern of inversion for boys and girls is also found in the correlation of Exploration of Room with Sigel non-verbal responses, the Binet Confidence Factor, and errors on the Kagan Design Recall: boys who explored the room were likely to receive high nonverbal scores, low confidence ratings, and high error scores. Girls were the opposite.

Summary

Interest in the child's exploratory behavior was guided by a model assuming that curiosity or preference for complex stimuli, fostered by experience in a relatively organized environment, is a vital factor in the development of intelligence. Findings from the project's preschool phase suggested that working-class children are less interested in complexity than higher-status children and, therefore, if the model is correct, likely to do less well on measures of cognitive development and performance and also likely to receive relatively less-organized stimulation from their maternal and home environments. In this follow-up phase of the study, investigation of exploratory behavior was guided by the following questions: To what extent is the Preference for Visual Complexity task a useful measure of curiosity motivation, especially in working-class children? Might not more active exploratory behaviors, such as those exhibited in free play, be more indicative of preference for complexity, especially in working-class children?

The measure of curiosity (Preference for Visual Complexity task) administered to the children at age 4 was readministered at both follow-up sessions. Analysis of the longitudinal data revealed that the preference ratio increased with age, but that differences between sex and social status groups decreased with age. The levels of intercorrelations among ratios and viewing time scores were low and inconsistent, thus precluding prediction from one administration to another. In addition, no consistent and significant patterns could be found in the correlations of Preference for Visual Complexity scores with other maternal and child variables. It was concluded that preference for visual complexity, as measured in this study, is of little use in examining cognitive development and the socialization of educability. It was felt that, in order to be useful, such a measure would have to be painstakingly developed in light of the children's experience, expectations, and cognitive structures. When complexity is defined without knowledgeable regard to the subject's frame of reference, it may be perceived as meaningless chaos; poorly organized stimulation, even though rich, is likely to overwhelm rather than excite.

Measures from the children's free-play behavior, on the other hand, were found more in accord with the model of curiosity behavior: they were meaningfully associated both with some postulated antecedents of active exploratory behavior (maternal and demographic variables) and postulated consequents (children's performance variables). Because the data were incomplete for three of the reported measures, interpretations of the correlations found must be received with caution. It appeared, however, that

children who received high scores for Play Time (single toy) and Average Play were likely to have mothers who showed behaviors found in this study to enhance the child's cognitive growth: relatively little use of imperative and status-normative control strategies, for example, and generally good (i.e., specific and organized) teaching behaviors. Moreover, children with high Play Time and Average Play scores were likely to perform successfully and to avoid disruptive behavior in the various experimental tasks and interactions. The other two scores reported from the free-play sessions, Number of Toys Touched and Exploration of Room, showed a strikingly different (nearly inverse) pattern of correlations with both maternal and other child variables. Toys Touched and, to a lesser degree, Exploration of Room tended to be associated with less well-organized maternal environments and ineffective maternal teaching behaviors; they were also found related to low grades, low performance scores, and disruptive behavior in the children. It was tentatively concluded, therefore, that free-play sessions provided more useful measures of exploratory behavior than did the Preference for Visual Complexity task, but that much work remains to be done in developing adequate theoretical and operational definitions of productive exploratory behavior. The kind of curiosity measured by number of toys touched and exploration of the room seems qualitatively different from the interest in complexity expressed through lengthy play times or (weighted averages of) toys handled and played with. It seems likely that Play Time and Average Play represent a desire for more complex stimulation than do Toys Touched and Exploration of Room; the latter behaviors might better be described as aimless roaming than as motivated exploration. But further research is needed to evaluate these speculations and render meaningful the complicated concept of exploratory behavior.

As predicted, the exploratory behavior measured in the free-play sessions does not support an hypothesis that working-class children are less interested in complexity than are middle-class children. Significant differences between middle-class and working-class children were found only in the room exploration measure and, as noted earlier, scoring categories in Exploration of Room were gross and unspecific. The middle-class child was more likely to leave his seat to inspect objects at close range, it is true, but there was no way to determine whether, considering the small N, this was a meaningful difference, or whether, if meaningful, it should be understood as reflecting greater curiosity in the middle-class child. When the experimenter is both white and middle-class, his assurance that the child is free to explore does not necessarily mean that a lower-class Negro child will in fact feel permitted to express his curiosity.

Sex difference, however, did appear to play a significant role in exploratory behavior as measured in the free-play sessions. The girls' mean score for Average Play was higher than boys': that is, when handling toys, girls were more likely to play a bit with each one before going on to the next. Sex differences in Average Play were also found in its correlations with other maternal and child variables. In a number of cases, correlations were in opposite directions for boys and girls: maternal supportiveness, desire for more progressive education, high Abasement scores, and feelings of being unable to control one's destiny were positively associated with boys' Average Play scores and negatively associated with those for the girls. Boys with high Average Play scores were likely to choose not to delay gratification, but girls with high Average Play scores were likely to prefer more candy later to less candy immediately. A similar pattern of inversion was found in the correlations of room exploration with maternal and child variables: boys with high scores had mothers with low abasement scores and were likely to show low confidence, give non-verbal responses, and make more errors in various testing and experimental situations. Girls were the opposite.

CHAPTER IX

SUMMARY OF THE FOLLOW-UP PHASE RESULTS

The Study of the Cognitive Environments of Urban Preschool Children was designed to examine the processes through which socioeconomic disadvantages affect the early cognitive development and educability of urban Negro children. The preschool phase of the project, begun in 1962, attempted to identify the specific elements of maternal behavior and home environment which are related to the cognitive performance of children. It was assumed that the effects of disadvantaged social, cultural, and economic environments upon the young child are mediated in large part by his mother; thus the preschool phase of the project focused on the mother's behavior and attitudes, especially those involving interactions with the preschool child, and mothers were viewed as teachers. In the second, or follow-up, phase of the research program, additional information was obtained about the cognitive environments, the cognitive development, and the educability of the children in the study. These data, collected during the children's first two school years, were further examined for the effects of factors in the preschool environment upon later cognitive behaviors and educational performance.

The research group consisted of mother-child pairs from three socio-economic status levels: middle class, skilled working class, and unskilled working class; the unskilled-working-class subjects were selected from both father-present and father-absent families. At the end of two full years of follow-up, 158 of the original 163 families were still cooperating with the research by participating in interviews and testing. Follow-up data were gathered from school records, from two testing sessions at the University in which both the mothers and the children were seen, and from an additional testing session in which the child was seen at his school during second grade. For the mothers, testing sessions at the University included administration of a standard IQ test, measures of personality characteristics and problem-solving behaviors, and an interview examining changes in the family situation, activities, and experiences that may have affected the child's development between the ages of four and seven. For the children, testing sessions at the University included administration of a series of tasks measuring variables of cognitive development, cognitive style, and personality. Longitudinal data was obtained for the experimental curiosity measure, the conceptual sorting task, and the design recall test first administered to the children when four years old. The child's free-play behavior was also observed. During the testing session at the school, the child was readministered the standard IQ test given previously at age 4, and given a brief self-concept task and doll-play interview. School records provided data on grades, attendance, and standardized tests administered by the school systems.

The Child's School Achievement in the First and Second Grades

Data on school achievement were obtained from standardized tests of reading readiness and achievement and from teachers' judgments (grades) of the child's academic performance and classroom conduct. Measures obtained from mothers and children during the follow-up testing sessions, and from the preschool phase of the study, were found to be more closely related to the aspects of cognitive development measured by standardized tests than to the teachers' operational definitions of cognitive (academic) achievement. Conduct and academic achievement were found to be significantly different aspects of educability. It is suggested that in the absence of greater knowledge about the influence of conduct on learning and vice versa, intervention programs should include techniques specifically designed to affect conduct as well as techniques designed to enhance academic performance. It appeared that "good conduct" may be closely related to an internal locus of control, or feeling of responsibility for success or failure.

Both social status and sex differences were found in measures of school performance. Middle-class children received higher grades and test scores than did working-class children; father-absent children tended to do less well than children in the other three groups. Girls as a group received higher scores on standardized tests and higher grades in conduct and academic subjects than did boys. The data further suggested that teachers' judgments (grades) may be influenced by the child's sex to a greater degree than that warranted by actual sex differences (as measured by standardized tests).

Teacher's judgments also appeared to be influenced by the effects of accommodation of teacher to child and child to system, and the proportion of academic grades dependent upon conduct appeared to decrease from the beginning of first grade to the end of second grade.

Preschool maternal variables found significantly associated with the children's performance on preschool measures were also significantly related to the children's performance in school. For both the total group and the working-class group, maternal control strategies, ability to teach effectively (as defined in the preschool phase), and affective behaviors were related to academic grades and standardized test scores. The child who did well in school was likely to have a warm, supportive mother who stressed personal-subjective control strategies and avoided imperative commands and status-normative appeals. His mother also used effective teaching techniques such as orienting the child to the task, giving specific feedback, accompanying directions with rationales, eliciting the child's interest and cooperation, and giving praise. The mother's use of standard English was found to affect the child's performance to the same degree as her control strategies, teaching styles, and affective behavior (as rated by the home interviewer). The relationship between maternal variables and conduct grades was lower than that found for academic grades and standardized test scores. Maternal measures obtained when the children were 6 and 7 years old also appeared to affect children's school performance. Significant relationships were found between children's likelihood of success in school and mother's IQ, internal locus of control, and accurate matching of familiar figures.

Children's performance in experimental situations in both the preschool and follow-up phases of the study was found related to their school performance, with child's IQ and measures indicating absence of detrimental behaviors proving to be the strongest predictors of school performance. Detrimental behaviors included both overt signs of resistance and refusal to cooperate and the more covert resistance indicated in non-meaningful responses to the tasks. Children who did well in school were likely also to do well on the design recall test, to give many scorable responses to the conceptual style sorting task, and to express an internal locus of control.

In general, girls' school performance (including reading readiness) was found to be more influenced by maternal variables than was boys' school performance. Mothers' affective behavior, use of imperative control strategies, and feelings of anxiety were exceptions to this generalization, for they usually showed greater relationship to boys' school performance. Sex differences were also found in the relationship of school performance to other children's variables. Girls' conduct grades were more closely related than boys' conduct grades to all other child variables; girls' academic grades and standardized test scores were more closely related to scores on the conceptual style sorting task, and girls' reading grades were more closely related to IQ. For boys, school performance (except conduct grades) was more closely related to Piagetian measures, locus of control, and the absence of detrimental behaviors in experimental situations; boys' IQ was more closely related to arithmetic grades than was girls' IQ.

Stylistic Aspects of Children's Behavior

Non-cognitive and non-intellective types of behavior were also related to children's school readiness and school performance. Positive and significant correlations were found with measures reflecting the child's ability to delay gratification, to control motor movement, to reflect before responding, and to minimize errors and non-meaningful responses. These aspects of behavior management were also related to maternal variables. Mothers of children who could regulate their behaviors in these ways were likely to have higher IQ's and greater language facility, and to provide a rich variety of home resources, use effective teaching techniques, and avoid both the imperative and the status-normative control strategy. Mother's language was more highly related to girls' performance than to boys' performance on these behavior management measures; maternal IQ and locus of control tended to show more relationship to girls' measures than to boys' measures.

There was a general trend for higher status children to perform more effectively on the various measures; these differences tended to increase with age. The most notable group difference was found between father-absent children and children from other SES groups; this difference (favoring the higher status children) was greater and more consistent on the behavior management measures than in the other child data. Preference for immediate over delayed reinforcement seemed to be clearly associated with father-absence in these young children, but it could not be concluded that delay of gratification is equivalent to impulse control.

In general, no evidence was found for an underlying factor of impulse control or "impulsivity" on these behavior management measures. In particular, a new interpretation was proposed for short response times on the design recall task: instead of indicating "impulsivity," short response times were seen as signs of alienation from the task. The present data strongly suggests that refusal to learn can and does occur even in the preschool years, especially among children from disadvantaged backgrounds.

Although the child's "reflective" attitudes tended to be independent of maternal behavior on similar measures they did tend to correlate with maternal control strategies. This finding is consistent with the general finding of this research that children's "cognition" and "educability" are understandable as behavior learned in reaction to parental socialization practices. Since maladaptive attitudes and behavior in children develop as learned responses to the environment, they should be modifiable through remedial education or other intervention procedures. Yet because maladaptive behavior can become "functionally fixed"—e.g., the refusal to learn found in some children in this study—the problem of eliminating these behaviors must be described as a re-socialization problem rather than merely a socialization problem.

The Child's Cognitive Development

Six Piagetian tasks were administered to the children: a dream interview and measures of number conservation, length conservation, liquid conservation, size conservation, and class inclusion. The sequentiality of stage progression was apparently confirmed: exceptions were thought to be artifacts. Limited evidence was obtained for social status differences favoring the middle-class and increasing with age. Breakdown of item scores indicated that the six and seven year old children were in the expected stage of transition between the period of intuitive thought and the period of concrete operations.

Children's school performance was related to their notions of reality and their ability to conserve. The ability to conserve also appeared to be associated with intelligence, with an internal locus of control, and with those aspects of cognitive development that affect test behaviors and performance.

Maternal variables indicating mother's attitudes, control strategies, teaching techniques, intelligence, and use of standard English were related to children's performance on Piagetian tasks. Eliminating the middle-class from the analysis, however, sharply reduced the number of maternal variables associated with performance on Piagetian tasks.

Girls as a group tended to receive lower (but not significantly lower) scores than did boys on the Piagetian measures. Girls' scores were typically more highly related with reaction times and problem behaviors during experimental tasks, and with maternal variables. But boys' Piagetian scores were more closely related to their IQ and school performance than were girls' scores on corresponding tasks.

Cognitive Behavior of Mother and Child

Longitudinal data on the children's classificatory behavior (conceptual style sorting task) indicated that the ability to give sorting rationales and the tendency to use the several categories increase with age in all social status groups. Middle-class children produced more task-relevant responses at all ages; children from father-absent families showed relatively large age-related increases in all categories. Preference for "analytic" responses was found in the older children.

The <u>level</u> of conceptualizing ability was related to the child's willingness to attempt an answer and ability to give verbal rationales; the preferred <u>mode</u> of categorizing, although a related aspect of cognitive functioning, was found to be clearly different from the level of conceptualizing ability. Children whose preferred mode of categorizing indicated subjectivity and relatively low attention to stimulus details were likely to give few responses indicating objectivity and a tendency to analyze visual stimuli into component parts. Successful school performance appeared to be strongly linked with IQ and somewhat less strongly linked with measures indicating willingness to attempt a verbal responses and ability to produce relevant task-related responses.

The mother's IQ and sorting behaviors were related to abstracting and intellective factors in their own ability and performance, but showed only limited relationship to the child's sorting behaviors. Maternal abstraction ability appeared to affect older children's (girls') cognitive abstraction, as measured by categorical-inferential responses. Maternal IQ was further related to girls' ability to give verbal rationales, and to school performance for both boys and girls. Other maternal variables were also associated with the children's production of task-relevant responses and cognitive abstraction (categorical-inferential responses). For the total group, the mother's techniques for controlling her child's behavior, teaching styles, use of standard English, provision of a rich and varied home environment, attitudes toward the non-family world, and support of her child were all useful predictors of the child's cognitive functioning.

Sex differences favoring girls appeared in the association of maternal variables with children's performance on the conceptual style sorting task. Mothers appeared to exert greater influence on girls than on boys in the development of classificatory behavior. Sex differences were also found in children's preferences for cognitive style dimensions; boys were more likely to use categorical-inferential responses and girls were more likely to use descriptive part-whole responses. Girls' locus of control, academic grades, and standardized test scores tended to show more relationship to their classificatory behavior than did corresponding measures for boys.

The Child's Language

Factor analysis of the language used by children in doll play stores indicated that the children's language measures were related to one another in much the same manner that maternal language measures had been found to be related. A group of items which were essentially measures of complexity or elaboration emerged relatively independent of another group which dealt primarily with quantity of language. Using these scales, limited evidence of social status and sex differences was found: middle-class children tended to talk more and to use somewhat more complex language than working-class children; girls produced more, and more complex, language than did boys. Maternal measures associated with the child's language were usually measures of mother's style rather than level of ability. Although the language sample obtained from the children was limited, the meaningful relationships found with other maternal and child variables served to underscore the importance of language in all phases of early cognitive development.

The Child's Exploratory Behavior and Interests

Longitudinal data obtained from the preschool-phase measure of curiosity indicated that it was of little use in examining cognitive development. Measures from the children's free-play behavior, on the other hand, were found more in accord with the model of curiosity behavior: they were meaningfully associated both with some postulated antecedents of active exploratory behavior (maternal control strategies and teaching behaviors) and postulated consequents (children's ability to perform successfully and to avoid detrimental behaviors). Some aspects of the data indicated, however, that more research must be done on the development of adequate theoretical and operational definitions of productive exploratory behavior.

As predicted, the exploratory behavior measured in the free-play sessions suggested that working-class children are no less interested in complexity than are middle-class children. There was some indication, however, that father-absence may be associated with "aimless" behavior.

APPENDICES

APPENDIX A

BRIEF DESCRIPTIONS OF THE BEHAVIOR MANAGEMENT TASKS

I. Draw-a-Circle Slowly Test

The Draw-a-Circle-Slowly test was administered to both the mothers and the children during each of the follow-up testing sessions. Procedures for administering and scoring the test are given below for the children; mothers' instructions were similar but suitably modified.

Administration

Materials used were sheets of 8 1/2 x 11" paper, primary pencils. The examiner, drawing a standard 1 1/2" circle, said: THIS IS A CIRCLE. I WANT YOU TO DRAW ONE FOR ME. The child then drew a circle with no comment from the examiner unless the shape (not size) was very wrong. Then the examiner said: THIS TIME I'D LIKE YOU TO DRAW IT AS SLOWLY AS YOU CAN, and demonstrated by drawing a line slowly. TAKE ALL THE TIME YOU WANT, AND SEE HOW SLOWLY YOU CAN DO IT.

If the child had not completed his circle at the end of ten minutes, the examiner said: THAT'S FINE. YOU CAN STOP NOW. If the child stopped in mid-circle, the examiner said: KEEP DRAWING AND DON'T STOP UNTIL THE CIRCLE IS ALL DONE. GO AS SLOWLY AS YOU CAN, BUT DON'T STOP.

Scoring

The total time required to complete the circle was recorded.

II. Impulsivity Task

This task, adapted from the work of Singer (1955), was administered to the children during both follow-up testing sessions.

Administration

The child was instructed to turn his chair around facing a corner formed by two blank walls. In a pleasant, quiet tone of voice, the examiner said: NOW, I WOULD LIKE TO SEE HOW LONG YOU CAN SIT VERY QUIETLY WITHOUT MOVING AT ALL. JUST SIT AND DON'T

MOVE AND DON'T TALK. LET'S SEE HOW LONG YOU CAN SIT WITHOUT MOVING OR TALKING. READY. . . BEGIN. The task was terminated when the child left his chair or talked, or when 180 seconds had elapsed. THAT'S VERY GOOD. YOU CAN TURN AROUND NOW.

Scoring

Using a stopwatch, the examiner recorded the total number of seconds (up to 180) during which the child neither left his chair nor talked. Descriptions were made of the child's behavior while in the chair, and answers to the following questions were recorded: HOW LONG DID YOU SIT? WHAT DID YOU THINK ABOUT WHILE YOU SAT?

III. Delayed Reward Task

This test, adapted from the work of Mischel (1958; Mischel & Metzner, 1962), was administered to the children at both follow-up testing sessions.

Administration

The examiner showed the child two quantities of candy, a small piece (two parts of a five-cent Tootsie Roll) and a larger piece (five parts of a five-cent Tootsie Roll), and said: . . .SINCE YOU'VE BEEN A GOOD BOY (GIRL), I WOULD LIKE TO GIVE YOU SOME CANDY. IS ONE OF THESE PIECES MORE TO EAT? SHOW ME THE BIG ONE WITH MORE TO EAT. After making sure the child knew which one was bigger, the examiner continued: I DON'T HAVE ENOUGH OF THESE BIG ONES WITH ME NOW SO I CAN'T GIVE IT TO YOU NOW, BUT I DO HAVE A LITTLE ONE. YOU CAN EITHER HAVE THIS LITTLE ONE RIGHT NOW, OR IF YOU WANT, I WILL GET A BIG ONE AND GIVE IT TO YOU WHEN IT'S TIME FOR YOU TO GO HOME. WHICH WOULD YOU LIKE? The examiner repeated as necessary until he was sure the child understood the choice.

If the child insisted on the big one now, the examiner said: I CAN'T GIVE YOU THIS ONE BECAUSE IT BELONGS TO SOMEBODY ELSE. I'LL GET ONE JUST LIKE IT FOR YOU IF YOU WANT TO WAIT UNTIL IT'S TIME TO GO HOME. NOW, YOU CAN EITHER HAVE THIS LITTLE ONE RIGHT NOW, OR IF YOU WAIT, I WILL GET A BIG ONE AND GIVE IT TO YOU WHEN IT'S TIME FOR YOU TO GO HOME.

Children who chose the big candy later were asked when they were given the big candy: DO YOU REMEMBER WHAT I TOLD YOU? WHAT DID I SAY?

Scoring

The quantity chosen by each child was recorded; choice of the larger delayed reward was interpreted as evidence of greater ability to delay gratification. Also recorded were children's explanations of why they picked the quantity they did, and (for those who chose the big candy later) their recollection of what the examiner had promised.

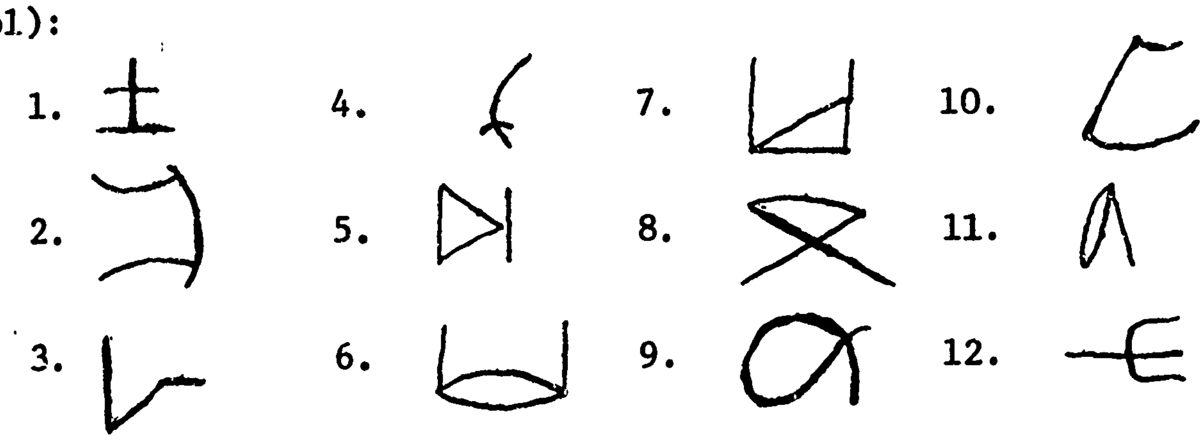
IV. Kagan Design Recall Test

The Kagan Design Recall test, administered to the children at both follow-up testing sessions, is one of a battery of tests developed by Kagan and his co-workers (Kagan, Rosman, Day, Albert, and Phillips, 1964; Kagan, 1965a, 1965b).

Procedure and Stimuli

For each of twelve trials, the child is asked to observe a single visual stimulus (line drawing) and then, with the stimulus figure out of sight, to point to its exact replica in an array of ten or twelve figures. The average response latency (average time elapsing before first choice on each trial) is recorded, as are also the total number of errors and the order in which they are made.

The twelve stimulus figures are as follows (Kagan, revised 11/61):



Administration

The examiner said: I AM GOING TO SHOW YOU A DESIGN FOR A FEW SECONDS. THEN I'M GOING TO TAKE IT AWAY AND YOU WILL HAVE TO REMEMBER WHAT IT LOOKED LIKE. AFTER A FEW MORE SECONDS, I WILL SHOW YOU A WHOLE GROUP OF DESIGNS THAT LOOK SOMETHING LIKE THE FIRST ONE AND YOU MUST POINT TO THE ONE THAT IS EXACTLY THE SAME AS THE ONE THAT YOU FIRST SAW. LET'S DO SOME FOR PRACTICE. (Practice items were repeated as necessary until child demonstrated understanding of the task.) The examiner showed each design for 5 seconds, then turned to a blank page for 15 seconds, and finally turned to the page with the 12 stimuli. When the child gave the correct answer, he was praised. If the child gave an incorrect answer, the examiner, attempting to minimize anxiety, said: NO, THAT'S NOT THE RIGHT ONE. TRY AGAIN. The child's responses were coded until he chose the correct figure.

Scoring

The response time (to the half second) to the first response for each trial was recorded. For each item, the total number of errors were coded along with the order in which they were made. Scores reported were: average response latency and total number of errors for all trials; the number of trials on which the first response was correct or was a minor error; the number of trials for which non-meaningful, systematic response sequences were given; and the number of trials for which non-meaningful respons sequences began with the first response. (Discussion of the definition and significance of non-meaningful response sequences is given in Chapter IV.)

V. Kagan Matching Familiar Figures Test

This measure, developed by Kagan and his associates in the research cited above, was administered to the mothers during both follow-up testing sessions. The task is similar to the Design Recall test, except that the subject has to choose from among 6 (instead of 10 or 12) alternatives; the alternatives are not line drawings but drawings of persons or objects (house, scissors, phone, bear, tree, leaf, cat, dress, giraffe, lamp, boat, cowboy). The Matching Familiar Figures test requires more careful, sustained attention and discrimination of subtle differences than does the Design Recall test, and thus is probably too difficult for children.

Average response latency and total number of errors are reported for this task.

APPENDIX B

ADMINISTERING AND SCORING THE NUMBER CONSERVATION TASK

The Piagetian task described below was an experimental measure developed by Nancy Kohn (Department of Psychology, University of Chicago) in part for use in this study and based on the work of Lawrence Kohlberg (School of Education, Harvard University) and Rheta DeVries (Early Education Research Center, University of Chicago). Further information can be obtained through sources listed in the References (Kohlberg, 1966; Kohlberg, in preparation; DeVries, in preparation; Kohn, in preparation).

Materials

The following arrangement was prepared before bringing the child into the room:

A. Two 14" pizza plates placed adjacent on a table. Plate to child's left has 6 M & M's of the same color equally spaced in a 12" line parallel to child's line of sight. Plate to child's right has 5 M & M's of the same color as on the other plate, equally spaced in an 8" line, parallel to the first line.

B. Two 14" pizza plates in another location, also adjacent to one another. Plate to child's left has 5 M & M's of the same color, equally spaced in an 8" line parallel to child's line of sight. Plate to child's right has 6 M & M's equally spaced in a 4" line, parallel to the first line.

Procedures

The Number Conservation task was administered to each child during both follow-up testing sessions. The testers' instructions for administering the task were as follows:

1a. Lead child to set of plates A: HERE'S SOME CANDY. ONE PLATE HAS MORE THAN THE OTHER PLATE. WHEN I SAY SO, YOU MAY PICK THE PLATE WITH THE MOST CANDY--THE ONE THAT HAS MORE TO EAT. IF YOU DON'T PICK THE ONE WITH THE MOST CANDY, YOU WON'T GET ANY CANDY THIS TIME. YOU'LL GET ANOTHER CHANCE LATER. NOW, IF YOU CAN SHOW ME THE ONE THAT HAS MORE CANDY, I'LL GIVE IT TO YOU TO EAT.

1b. If counts correctly or chooses correctly, say: THAT'S RIGHT. THIS ONE (point to plate with 6) HAS MORE CANDY. NOW WATCH. I'M GOING TO PUT THEM LIKE THIS (rearrange 6 M & M's into shorter 4 1/2" line). NOW LOOK AT THEM CAREFULLY (touch plates simultaneously and make sure child looks at both). SHOW ME THE ONE THAT HAS MORE CANDY. (After the child chooses, say:) HOW DID YOU KNOW THAT WAS MORE CANDY? WHICH PLATE HAD MORE BEFORE? (If says 5 is more now:) You say THIS (6) PLATE HAD MORE CANDY BEFORE; BUT YOU SAY THIS (5) HAS MORE CANDY NOW. DID THIS (5) REALLY GET TO BE MORE CANDY TO EAT? HOW DID THAT HAPPEN? HOW DOES IT GET TO BE MORE? (If says 6 is still more:) WHAT HAPPENED? DID IT CHANGE? (Then the child should be told:) NOW YOU TAKE THE PLATE WITH MORE CANDY TO EAT. (Note whether he chooses 5 or 6.)

2a. Lead child to set of plates B: NOW HERE'S SOME MORE CANDY. ONE PLATE HAS MORE THAN THE OTHER PLATE. WHEN I SAY SO, YOU MAY PICK THE PLATE WITH MORE CANDY--THE ONE THAT HAS MORE TO EAT. IF YOU DON'T PICK THE ONE WITH MORE CANDY, YOU WON'T GET ANY CANDY THIS TIME. YOU'LL GET ANOTHER CHANCE LATER. NOW, IF YOU CAN SHOW ME THE ONE THAT HAS MORE CANDY, I'LL GIVE IT TO YOU TO EAT. (After the child chooses, say:) HOW COULD YOU TELL WHICH HAD THE MOST CANDY? (If does not count:) IF I THOUGHT THIS (hand on child's non-choice) HAD MORE THAN THIS (other hand on child's choice), HOW COULD YOU SHOW ME IT DOESN'T? IF I STILL THOUGHT THIS (child's non-choice) HAD MORE THAN THIS (child's choice), COULD YOU COUNT THEM TO SHOW ME IT DOESN'T? (If counts only one plate:) CAN YOU COUNT THESE (other plate)? (If counts serially:) NOW COUNT THESE (point to plate with 6). COUNT THESE (plate with 5).

2b. SO WHICH HAS MORE CANDY? (Record the child's answer, and whether he does or does not count the candy.)

3. If the child failed Q1 or Q2, say: SEE (or yes), THERE ARE 1, 2, . . . 5 HERE, AND, 1, 2, . . . 6 HERE (spread out 6 into 12" line while counting them). THIS ONE (point to plate with 6) HAS MORE. NOW WATCH. I'M GOING TO PUT THEM LIKE THIS (rearrange 6 into shorter 4" line). NOW LOOK AT THEM CAREFULLY. SHOW ME THE ONE THAT HAS MORE CANDY. (After the child chooses, say:) HOW DID YOU KNOW THAT WAS MOST? (Record his answer and say:) OK, NOW YOU TAKE THE PLATE WITH MORE CANDY. (Note whether he takes 5 or 6.)

Scoring

Two points were awarded for each of the following items passed; 1 point awarded for each item failed:

1. Chooses correct plate originally

   Discriminates more correctly by choosing the plate with 6 candies in question 1a.

2. Counts correctly

   If counts aloud, serial order and one-to-one correspondence are both correct. If simply says he counted the candies, chooses correctly on Q2 or picks 6 as more on Q1 or Q2, saying 6 is more than 5.

3. Chooses correctly after counting (i.e. uses knowledge of comparative counting against illusion of array)

   Answers Q2b correctly.

4. Some understanding of comparative counting

   Counts plates separately, or counts from 1-5 and from 1-6. Says he can tell which is more by counting, or that "the other plate is just 5" (and chooses correctly).

5. Conserves with help

   Chooses correctly on Q3 without counting and/or passes questions 1b and 2.

6. Chooses correctly before expansion (i.e. discriminates array from amount)

   Passes Q2a.

7. Conserves (chooses correctly after constriction)

   Passes Q1b.

The measure Number Conservation, Total Score recorded how many of the 7 items described above were passed. The measure Number Conservation, Pass/Fail was reported as "pass" if items 5 and 7 above were both passed.

APPENDIX C

ADMINISTERING AND SCORING THE LENGTH CONSERVATION TASK

The Piagetian task described below was an experimental measure developed by Nancy Kohn (Department of Psychology, University of Chicago) in part for use in this study and based on the work of Lawrence Kohlberg (School of Education, Harvard University) and Rheta DeVries (Early Education Research Center, University of Chicago). Further information can be obtained through sources listed in the References (Kohlberg, 1966; Kohlberg, in preparation; DeVries, in preparation; Kohn, in preparation).

Materials

Four pairs of 4" and 4 1/4" gum sticks. In three of the pairs, the two sticks are of different colors; in the fourth pair, the sticks are the same color. An additional two pairs were used for the practice items.

Procedures

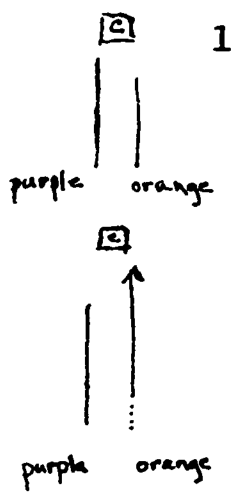
The Length Conservation task was administered to each child during both follow-up testing sessions. The testers' instructions for administering the task were as follows:

Practice Questions

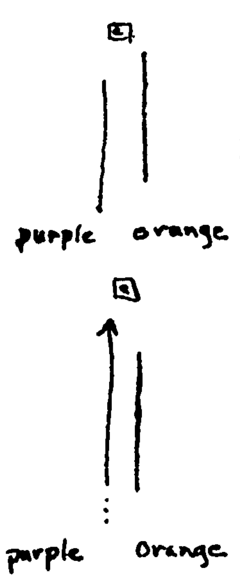
A. HERE ARE TWO GUM STICKS (4" yellow and 4 1/4" green, placed parallel to child's line of sight, with ends farthest from child aligned). SHOW ME THE BIGGER AND LONGER ONE. (Record stick chosen by child, whether right or wrong. Then continue:) NOW, WHEN I SAY SO, YOU CAN PICK THE BIGGER ONE THAT HAS MORE GUM TO CHEW. IF YOU DON'T PICK THE ONE WITH MORE TO CHEW, YOU WON'T GET ANY THIS TIME. YOU'LL GET ANOTHER CHANCE TO GET GUM LATER. NOW, BEFORE YOU PICK, I PUT THEM LIKE THIS (place card over aligned ends and push protruding longer stick into alignment with shorter stick). SHOW ME THE LONGER ONE WITH MORE GUM TO CHEW. (Record choice and ask:) HOW DID YOU KNOW THAT HAD MORE TO CHEW? WHICH ONE HAD MORE TO CHEW BEFORE I COVERED THEM?

B. HERE ARE TWO MORE GUM STICKS (4" pink and 4 1/4" yellow, placed parallel to child's line of sight, with ends closest to child aligned). SHOW ME THE BIGGER ONE. (Record choice and continue:) NOW, WHEN I SAY SO, YOU CAN PICK THE LONGER ONE THAT HAS MORE GUM TO CHEW. IF YOU DON'T PICK THE ONE WITH MORE TO CHEW, YOU WON'T GET ANY THIS TIME. YOU'LL GET ANOTHER CHANCE TO GET GUM LATER. NOW, BEFORE YOU PICK, I PUT THEM LIKE THIS (place card over aligned ends and push protruding longer stick into alignment with shorter stick). SHOW ME THE LONGER ONE WITH MORE GUM TO CHEW. (Record choice and ask:) HOW DID YOU KNOW THAT HAD MORE TO CHEW? WHICH ONE HAD MORE TO CHEW BEFORE I COVERED THEM?

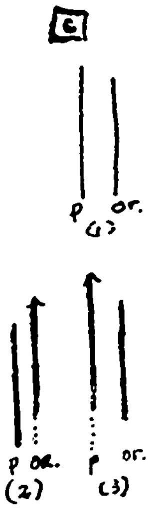
Task Questions



1. (One orange 4" and purple 4 1/4", placed parallel to child's line of sight with ends farthest from child aligned) HERE ARE TWO STICKS. ONE IS BIGGER AND LONGER THAN THE OTHER. YOU DON'T NEED TO SHOW ME, BUT CAN YOU SEE THAT ONE IS BIGGER AND LONGER THAN THE OTHER? (Record answer and continue:)
WHEN I SAY SO, YOU PICK THE BIGGER AND LONGER ONE TO KEEP OR CHEW. IF YOU DON'T PICK THE BIGGEST ONE, YOU WON'T GET GUM THIS TIME. YOU'LL GET ANOTHER CHANCE TO GET GUM LATER. BEFORE YOU PICK, I PUT THEM LIKE THIS (place finger in center of orange stick and slide it toward child so that it extends about 1/2" beyond other stick). <u>NOW</u>, LOOK AT THEM. IF YOU CAN SHOW ME THE BIGGEST AND LONGEST ONE, I'LL GIVE IT TO YOU TO CHEW AFTER A WHILE. (If he picks longer purple, ask the following questions, then let child take gum and move to Q3. If he picks shorter orange, ask the following and then move to Q2.) HOW COULD YOU TELL IT WAS BIGGER? (If says "I looked at it," or "I saw this was biggest," or similar ambiguous response which could refer to remembrance of which was bigger prior to advance, then ask following Q:) WHEN DID YOU SEE IT (look)? (If says "I measured," or demonstrates by measuring, replace in advanced position and ask following Q:) BUT HOW CAN YOU TELL WHEN IT'S LIKE THIS?

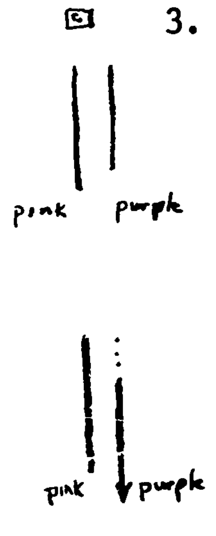


2. (Give this question <u>only if</u> child picked shorter orange on Q1.) (If sticks have been moved so that orange stick is not advanced toward child, replace them in this position.) YOU TOLD ME THIS WAS THE BIGGEST ONE (point to orange and then place finger in center of purple stick, moving it toward child so that it extends about 1/2" beyond other stick.) <u>NOW</u> SHOW ME THE BIG ONE. (If he picks longer purple, move to 2a. If he picks shorter orange, move to 2b.)



2a. (If chose longer purple in 2 above. Replace sticks in original position with ends farthest from child aligned, and then move orange stick toward child so that it extends 1/2" past purple.) BEFORE YOU SAID THIS (point to orange) WAS BIGGEST. (Move purple stick toward child so that it extends 1/2" past orange.) NOW YOU SAY THIS (point to purple) IS BIGGER. DOES IT REALLY CHANGE BIGNESS? DOES GET TO BE MORE GUM TO CHEW? HOW IS THAT (HOW DOES THAT HAPPEN)? (Move to 3.)

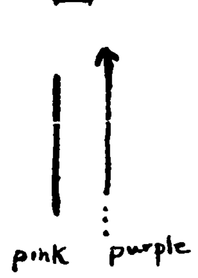
2b. (If shorter orange stick was chosen in 2 above. Move orange stick toward child so that ends of stick farthest from child are aligned.) YOU SAID THIS WAS BIGGEST (point to orange). IS IT BIGGEST NOW? DO THEY REALLY CHANGE BIGNESS? HOW IS THAT (i.e., HOW DOES THAT HAPPEN)? (Move to 3.)



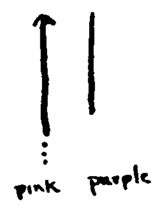
3. (Give to all children) (Take two other sticks of gum, one 4 1/4" pink, one 4" purple. Place them parallel to child's line of sight, with ends closest to child aligned.) HERE ARE TWO MORE STICKS OF GUM. ONE IS BIGGER AND LONGER THAN THE OTHER. YOU DON'T NEED TO SHOW ME, BUT CAN YOU SEE THAT ONE IS BIGGER AND LONGER THAN THE OTHER? (Record answer, then:)
WHEN I SAY SO YOU CAN PICK THE BIGGER AND LONGER ONE TO KEEP OR CHEW. IF YOU DON'T PICK THE BIGGEST ONE, YOU WON'T GET GUM THIS TIME. YOU'LL GET ANOTHER CHANCE TO GET GUM LATER. NOW BEFORE YOU PICK, I PUT THEM LIKE THIS. (Place finger in center of purple stick and move it away from child so that it extends about 1/2" beyond the pink stick.) NOW LOOK AT THEM. IF YOU CAN SHOW ME THE BIGGEST (AND LONGEST) ONE, I'LL GIVE IT TO YOU TO CHEW AFTER A WHILE. (If he picks longer pink stick, move to Q3a after asking the following Q's. If he picks shorter purple stick, move to Q4 after asking the following Q's.)
HOW COULD YOU TELL IT WAS BIGGER? (If says "I looked at it," "I saw this was biggest," or similar ambiguous response which could refer to remembrance of which was bigger prior to advance, ask:)
WHEN DID YOU LOOK (SEE IT)? WHICH WAS BIGGER BEFORE I MOVED IT? (If correct on 1 and 3) DOES IT CHANGE WHEN I MOVE IT?

3a. (Point to pink stick) YOU SAID THIS IS BIGGEST. (Place finger in center of short purple stick and move it toward child so that the end nearest the child extends 1/2" beyond other stick.) NOW SHOW ME THE BIG ONE. (If he picks longer pink stick, move to Q5. If he picks shorter purple stick, move to 3b.)

3b. (Replace sticks in original position, with ends closest to child aligned.) BEFORE (move purple away from child so it extends 1/2" beyond pink) YOU SAID THIS (point to pink) WAS BIGGEST. NOW (move purple toward child so it extends 1/2" beyond pink at end closest to child) YOU SAY THIS (point to purple) IS BIGGEST. DO THEY REALLY CHANGE BIGNESS? HOW IS THAT? HOW DOES THAT HAPPEN? (Move to Q5.)



4. (Start here only if picked shorter purple on Q3.) (If pieces have been moved so that purple stick is not advanced away from child, replace in this position.) YOU TOLD ME THIS (point to purple) WAS THE BIGGEST ONE. (Place finger in center of shorter purple stick and move it toward child so that it extends 1/2" beyond other stick) NOW SHOW ME THE BIG ONE. (If he picked longer pink, replace sticks in original position, with ends closest to child aligned, and then, while talking, move purple away from child) BEFORE YOU SAID THIS (point to purple) WAS BIGGEST. NOW (move pink stick so it extends 1/2" beyond purple) YOU SAY THIS (point to pink) is bigger. DOES IT REALLY CHANGE BIGNESS? DOES IT REALLY GET TO BE MORE TO EAT? HOW IS THAT? HOW DOES THAT HAPPEN? (Move to Q5.)



(If he picked shorter purple, move pink stick toward child so that ends of sticks close to child are aligned.) YOU SAID THIS (point to purple) WAS BIGGEST. IS IT BIGGEST NOW? DO THEY REALLY CHANGE BIGNESS? HOW IS THAT? HOW DOES THAT HAPPEN? (Move to Q5.)

5. (One 4" pink, one 4 1/4" orange placed parallel to child's line of sight, with ends aligned in accordance with which way he is seeing illusion; i.e., if incorrect and picked orange on Q1, align ends farthest from child; if incorrect on 3 and picked purple, align ends closest to child; if correct on 1 and 3, align ends closest to child if boy and farthest if girl.)
HERE ARE TWO CANDY STICKS. SEE, ONE IS BIGGER, ONE IS LONGER? WHEN I SAY SO, YOU CAN PICK THE BIGGER ONE TO KEEP OR TO EAT. IF YOU DON'T PICK THE BIGGEST ONE, YOU WON'T GET GUM THIS TIME. YOU'LL GET ANOTHER CHANCE TO GET GUM LATER. NOW, BEFORE YOU PICK, I PUT THEM LIKE THIS. (Bend orange stick so that a straight line drawn from end to end would be about 3 3/4" keeping alignment at one end with straight stick and not picking up from table.)

NOW LOOK AT THEM. IF YOU CAN SHOW ME THE BIGGEST ONE, I'LL GIVE IT TO YOU TO CHEW AFTER A WHILE. (Record choice, and if he picked incorrect pink:) WHICH WAS BIGGER BEFORE I BENT IT? WHAT HAPPENED? DOES IT REALLY CHANGE WHEN I BEND IT?

6. (One 4", one 4 1/4" of the same color, randomly arranged, non-parallel) HERE ARE TWO GUM STICKS. SHOW ME THE BIGGER ONE. (Record choice and presence or absence of attempts to measure. Then continue:) SHOW ME HOW YOU CAN TELL WHICH IS BIGGER. HOW CAN YOU MAKE SURE?
(If no measuring:) IF I THOUGHT THIS (point to child's non-choice) IS THE BIGGER ONE, HOW COULD YOU SHOW ME IT'S NOT? (If still no measuring:) CAN YOU MEASURE? (If no, or no response:) PUT THEM TOGETHER SO YOU CAN REALLY BE SURE.

Scoring

Two points were awarded for each of the following items passed; 1 point awarded for each item failed:

1. Discriminates length correctly

   With or without measuring, the child chooses correctly on Q6 and/or spontaneously points to longer stick on any question prior to advance.

2. Some attempt to measure

   Child shows some systematic adjustment of the position of the two sticks for comparison purposes, e.g. aligning ends with sticks flat on table, making long stick overlap short, using hands, using verbal concept of measurement, standing sticks on end and comparing tops.

3. Conserves on advance choice

   Correct answers for all of the following: Q1, Q3, Q3a.

4. Conserves on bending.

   Correct answer to Q5.

The measure Length Conservation, Total Score recorded how many of the 4 items described above were passed. The measure Length Conservation, Pass/Fail was reported as "pass" if items 3 and 4 above were both passed.

APPENDIX D

ADMINISTERING AND SCORING THE LIQUID CONSERVATION TASK

The Piagetian task described below was an experimental measure developed by Nancy Kohn (Department of Psychology, University of Chicago) in part for use in this study and based on the work of Lawrence Kohlberg (School of Education, Harvard University) and Rheta DeVries (Early Education Research Center, University of Chicago). Further information can be obtained through sources listed in the References (Kohlberg, 1966; Kohlberg, in preparation; DeVries, in preparation; Kohn, in preparation).

Materials

Two 10 ml. beakers, two 10 ml. graduates (one of which has been cut to a shorter height), one opaque 5 ml. graduate, one opaque 100 ml. beaker, plus a supply of "coke."

Procedures

The Liquid Conservation Task was administered to each child during both follow-up testing sessions. The testers' instructions for administering the task were as follows:

Practice Questions

A. (Two 10 ml. beakers and one opaque 100 ml. beaker) NOW, I'M GOING TO PUT SOME COKE IN THESE GLASSES. AFTER A WHILE WE'LL DRINK SOME. (Pour coke in both 10 ml. glasses, with more in one furthest from 100.) NOW, WHEN I SAY SO, YOU CAN PICK THE ONE THAT HAS MORE TO DRINK. IF YOU DON'T PICK THE ONE WITH MORE TO DRINK, YOU WON'T GET TO DRINK ANY THIS TIME. YOU'LL GET ANOTHER CHANCE TO DRINK SOME LATER. NOW, BEFORE YOU PICK, I TAKE THIS ONE (one with more coke) AND POUR IT ALL OUT INTO THIS ONE (100 ml. beaker). IF YOU CAN SHOW ME THE ONE WITH MORE TO DRINK, I'LL GIVE IT TO YOU TO DRINK. (Record choice and ask:) HOW DID YOU KNOW THAT HAD MORE TO DRINK? WHICH OF THESE (point to 10's) HAD MORE TO DRINK BEFORE I POURED IT HERE (point to 100)? (Record answer and continue:) CAN YOU SHOW ME ON THIS GLASS (point to 100) WHERE THE COKE WILL COME? SEE, THIS COKE (10 with less) COMES TO HERE (point to top of liquid). WHERE DOES THE COKE IN HERE (100) COME? (Record whether he indicates same level as in original beaker, same level as in 10 with less, or lower level than 10 with less. Then ask:) HOW DO YOU KNOW IT WOULD COME TO THERE?

B. (Two 10 ml. beakers and one opaque 5 ml. graduate) NOW, LET'S FILL THESE TWO GLASSES. NOW I FILL THIS GLASS (10 next to graduate) UP TO THE VERY TOP. I DON'T FILL THIS (other 10) GLASS UP. NOW, SEE, I PUT MORE COKE IN ONE GLASS THAN THE OTHER. WHEN I SAY SO, YOU CAN PICK THE ONE WITH MORE TO DRINK. IF YOU DON'T PICK THE ONE WITH MORE COKE TO DRINK, YOU WON'T GET TO DRINK ANY THIS TIME. YOU'LL GET ANOTHER CHANCE TO DRINK SOME LATER. NOW, BEFORE YOU PICK, I TAKE THIS ONE (10 with lesser amount) AND POUR THE COKE ALL OUT INTO THIS ONE (graduate). IF YOU CAN SHOW ME THE ONE WITH MORE TO DRINK, I'LL GIVE IT TO YOU TO DRINK. (Record choice, then:) HOW DID YOU KNOW THAT HAD MORE TO DRINK? WHICH OF THESE (point to 10's) HAD MORE TO DRINK BEFORE I POURED IT HERE (point to graduate)? (Record choice, then:) CAN YOU SHOW ME ON THIS GLASS (point to graduate) WHERE THE COKE WILL COME? SEE, THIS COKE (10 with less) COMES TO HERE (point to top of liquid). WHERE DOES THE COKE IN HERE (graduate) COME? (Record indication for same level as in original beaker, same level as in 10 with more, or higher level than 10 with more.)

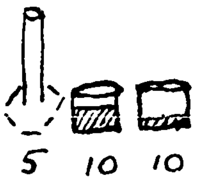
5 10 10

Task Questions

1. (Two 10 ml. beakers and one 100 ml. beaker)
NOW I'M GOING TO PUT SOME COKE IN THESE GLASSES. AFTER A WHILE WE'LL DRINK SOME. (Pour coke in both 10 ml. glasses, with more in one). YOU DON'T NEED TO SHOW ME, BUT CAN YOU SEE I PUT MORE COKE IN ONE GLASS THAN THE OTHER? (Record answer, then:) WHEN I SAY SO, YOU CAN PICK THE ONE WITH MORE TO DRINK. IF YOU DON'T PICK THE ONE WITH THE MOST TO DRINK, YOU WON'T GET TO DRINK ANY THIS TIME. YOU'LL GET ANOTHER CHANCE TO DRINK SOME LATER. NOW, BEFORE YOU PICK, I TAKE THIS ONE (10 with more coke) AND POUR THE COKE ALL OUT INTO THIS ONE (100 ml. beaker). NOW LOOK AT THEM. (Pause). IF YOU CAN SHOW ME THE ONE WITH MORE TO DRINK, I'LL GIVE IT TO YOU TO DRINK. (Record choice and ask the following questions:)
DID THAT ONE HAVE MORE? HOW COULD YOU TELL? (If says because empty was more:) BUT HOW CAN YOU TELL NOW WHEN IT'S LIKE THIS (pointing to 100)? (If says because it was more:) WHEN WAS IT MORE? (Let child drink coke in glass he chose. Go on to Q2.)

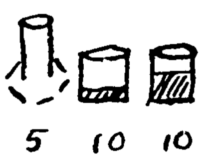
100 10 10

2. (Two 10 ml. beakers and one 5 ml. graduate)



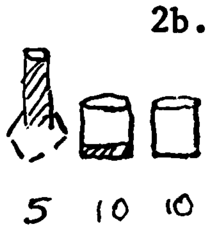
NOW LET'S FILL THESE TWO GLASSES. NOW I FILL THIS GLASS (one of 10's) UP TO THE VERY TOP. I DON'T FILL THIS (other 10) GLASS UP. NOW, SEE, I PUT MORE COKE IN ONE GLASS THAN THE OTHER. YOU DON'T NEED TO SHOW ME BUT CAN YOU SEE THAT ONE GLASS HAS MORE COKE? (Record answer, then:) WHEN I SAY SO, YOU CAN PICK THE ONE WITH MORE TO DRINK. IF YOU DON'T PICK THE ONE WITH MORE TO DRINK, YOU WON'T GET ANY THIS TIME, BUT YOU'LL GET ANOTHER CHANCE TO DRINK SOME LATER. NOW, BEFORE YOU PICK, I TAKE THIS ONE (10 with lesser amount) AND POUR THE COKE ALL OUT INTO THIS ONE (graduate). NOW LOOK AT THEM. (Pause.) IF YOU CAN SHOW ME THE ONE WITH MORE TO DRINK, I'LL GIVE IT TO YOU TO DRINK. (If he picks correct beaker, ask Q's below; then let child drink. If correct also on Q1, go to 2a. But if incorrect on Q1, go to Q5. If he picks incorrect graduate, ask Q's below. If correct on Q1, let child drink, go to Q3. But if also incorrect on Q1, don't let child drink yet. Move to Q4.) DOES THAT HAVE MORE? HOW COULD YOU TELL? SHOW ME HOW YOU COULD BE SURE? (If says because empty had less:) BUT HOW CAN YOU TELL WHEN IT'S LIKE THIS (pointing to grad)? (If says because it was more:) WHEN WAS IT MORE?

2a. (<u>If</u> <u>correct</u> <u>on</u> <u>Q1</u> <u>and</u> <u>correct</u> <u>on</u> <u>Q2</u>)
(Two 10 ml. beakers and one 5 ml. graduate)



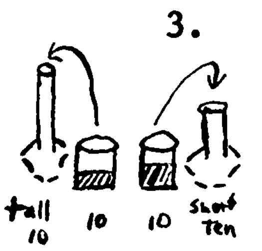
NOW LET'S POUR SOME MORE COKE. NOW I FILL THIS GLASS (one of 10's filled to just below top of white dot). BUT I DON'T FILL THIS (other 10) GLASS UP. NOW, SEE, I PUT MORE COKE IN ONE GLASS THAN THE OTHER. YOU DON'T NEED TO SHOW ME, BUT CAN YOU SEE THAT ONE GLASS HAS MORE COKE? (Record answer, then:) WHEN I SAY SO, YOU CAN PICK THE ONE WITH MORE TO DRINK. IF YOU DON'T PICK THE ONE WITH MORE TO DRINK, YOU WON'T GET ANY THIS TIME, BUT YOU'LL GET ANOTHER CHANCE TO DRINK SOME LATER. NOW BEFORE YOU PICK, I TAKE THIS ONE (10 with greater amount) AND POUR THE COKE ALL OUT INTO THIS ONE (graduate). NOW LOOK AT THEM. IF YOU CAN SHOW ME THE ONE WITH MORE TO DRINK, I'LL GIVE IT TO YOU. (If he picks correct graduate, ask Q's below, then let child drink his choice and terminate test. If he picks incorrect beaker, ask Q's below, go to 2b.) DOES THAT HAVE MORE? HOW COULD YOU TELL? SHOW ME HOW YOU COULD BE SURE?

2b. (If incorrect on 2a)

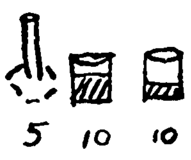


WHICH ONE HAD MORE BEFORE I POURED IT? (Record answer and continue:) NOW, THIS ONE (point to graduate) HAS MORE COKE IN IT. THIS ONE (point to beaker with less coke) HAS LESS. SEE (pouring graduate back into beaker), IT'S MORE. THEN THIS (pointing to beaker with more) HAS MORE. NOW, I POUR

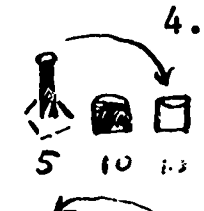
IT BACK (pour from beaker with more into graduate). NOW LOOK AT THEM (Pause). NOW, YOU TAKE THE ONE WITH MORE COKE TO DRINK. (If he picks correct graduate, let child drink choice and terminate test. If he picks incorrect beaker, ask Q's below.) DOES IT REALLY GET TO BE LESS WHEN I PUT IT IN HERE (point to graduate)? HOW DOES THAT HAPPEN? (Let child drink his choice and terminate test.)

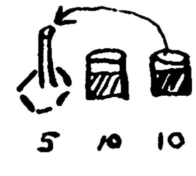


3. (If picked correct 100 on Q1 and incorrect graduate on Q2:) (Two 10 ml. beakers and two 10 ml. graduates, one of which has been cut to a shorter height) NOW LET'S POUR SOME MORE COKE. (Pour coke into two 10 ml. beakers, with more in one) CAN YOU SEE THAT I PUT MORE COKE IN ONE GLASS? (Record answer, continue:) WHEN I SAY SO, YOU CAN PICK THE ONE WITH MORE TO DRINK. IF YOU DON'T PICK THE ONE WITH MORE TO DRINK, YOU WON'T GET TO DRINK ANY THIS TIME. YOU'LL GET ANOTHER CHANCE TO DRINK SOME LATER. NOW, BEFORE YOU PICK, I TAKE THIS ONE (10 with more) AND POUR IT INTO THIS ONE (shorter graduate). NOW LOOK AT THEM. (Pause). IF YOU CAN SHOW ME THE ONE WITH MORE TO DRINK, I'LL GIVE IT TO YOU TO DRINK. (Record answer and ask:) DID YOU PICK THE ONE WITH MORE TO DRINK? (Let child drink. Go on to 3a)



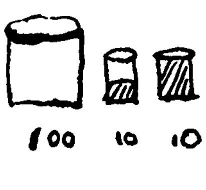
3a. (Two 10 ml. beakers and 5 ml. graduate) NOW LET'S FILL THESE TWO GLASSES. NOW I FILL THIS GLASS (one of 10's) UP TO THE VERY TOP. I DON'T FILL THIS (other 10) GLASS UP. NOW, SEE, I PUT MORE COKE IN ONE GLASS THAN THE OTHER. CAN YOU SEE THAT ONE GLASS HAS MORE COKE? (Record answer, continue:) WHEN I SAY SO, YOU CAN PICK THE ONE WITH MORE TO DRINK. IF YOU DON'T PICK THE ONE WITH MORE TO DRINK, YOU WON'T GET ANY THIS TIME, BUT YOU'LL GET ANOTHER CHANCE TO DRINK SOME LATER. NOW, BEFORE YOU PICK, I TAKE THIS ONE (10 with lesser amount) AND POUR THE COKE ALL OUT INTO THIS ONE (graduate). NOW LOOK AT THEM. (Pause). IF YOU CAN SHOW ME THE ONE WITH MORE TO DRINK, I'LL GIVE IT TO YOU TO DRINK. (If he picks correct beaker, let child drink and terminate test. If he picks incorrect graduate, go to Q4.)



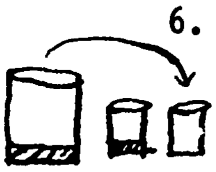


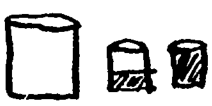
4. (If picked incorrect graduate on Q3, or was incorrect on Q1 and Q2) WHICH ONE HAD MORE BEFORE I POURED IT? (Record indicated answer of correct 10 with coke or incorrect empty 10. Continue:) SEE, THIS ONE (point to beaker) HAS MORE COKE IN IT. THIS ONE (point to graduate) HAS LESS. SEE (pouring graduate back into beaker), IT'S LESS. THEN THIS (pointing to beaker with more) HAS MORE. NOW I POUR IT BACK (pour from beaker with less into graduate). NOW LOOK

AT THEM. (Pause). NOW, YOU TAKE THE ONE WITH MORE COKE TO DRINK. (If he picks correct beaker, let child drink. If he picks incorrect graduate, ask Q following.) DOES IT REALLY GET TO BE MORE TO DRINK WHEN I PUT IT IN HERE (point to graduate)? HOW DOES THAT HAPPEN? (Let child drink his choice. If correct on Q1 terminate.)



5. (If picked incorrect 10 ml. beaker on Q1:) (Two 10 ml. beakers and one 100 ml. beaker) NOW LET'S PUT SOME COKE IN THESE GLASSES. (Pour coke in both 10 ml. beakers, with more in one.) YOU DON'T NEED TO SHOW ME, BUT CAN YOU SEE THAT I PUT MORE COKE IN ONE GLASS THAN THE OTHER? (Record answer, then:) WHEN I SAY SO, YOU CAN PICK THE ONE WITH MORE TO DRINK. IF YOU DON'T PICK THE ONE WITH MORE TO DRINK, YOU WON'T GET ANY THIS TIME. NOW, BEFORE YOU PICK, I TAKE THIS ONE (10 with more) AND POUR THE COKE ALL OUT INTO THIS ONE (100 ml. beaker). NOW LOOK AT THEM. (Pause). IF YOU CAN SHOW ME THE ONE WITH MORE TO DRINK, I'LL GIVE IT TO YOU TO DRINK. (If he picks incorrect 10, go to Q6. If he picks correct 100, ask Q's below.) HOW COULD YOU TELL? (If says empty had more:) BUT HOW COULD YOU TELL WHEN IT'S LIKE THIS (point to 100)? (Let child drink and terminate test)





6. (If picked incorrect 10 on Q5:) WHICH ONE HAD MORE BEFORE I POURED IT HERE (point to 100)? (Record answer, then:) SEE, THIS ONE (point to 10 with less coke) HAS LESS TO DRINK. SEE, (pouring coke from 100 ml. beaker back into 10 ml. beaker) THIS IS MORE. NOW, I POUR IT BACK (pour from 10 with more into 100). NOW LOOK AT THEM. (Pause). NOW, YOU TAKE THE ONE WITH MORE COKE TO DRINK. (If he picks correct 100, let child drink. If he picks incorrect 10, ask Q's below.) DOES IT REALLY GET TO BE LESS TO DRINK WHEN I PUT IT IN HERE? HOW DOES THAT HAPPEN? (Let child drink his choice and terminate test)

Scoring

A dichotomous pass/fail score was recorded, based on correct choice of beaker or graduate in Q1, Q2, and Q2a.

APPENDIX E

ADMINISTERING AND SCORING THE CLASS INCLUSION TASK

The Piagetian task described below was an experimental measure developed by Nancy Kohn (Department of Psychology, University of Chicago) in part for use in this study and based on the work of Lawrence Kohlberg (School of Education, Harvard University) and Rheta DeVries (Early Education Research Center, University of Chicago). Further information can be obtained through sources listed in the References (Kohlberg, 1966; Kohlberg, in preparation; DeVries, in preparation; Kohn, in preparation).

Materials

Four brown M & M's, one white mint.

Procedures

The Class Inclusion task was administered to each child during both follow-up testing sessions. The testers' instructions for administering the task were as follows:

1. LOOK, HERE IS SOME CANDY. SOME ARE CHOCOLATE CANDY (give child an extra chocolate M & M to eat). ONE IS MINT CANDY (give child extra mint to eat). ARE THESE CHOCOLATE CANDY? (Record answer.) IS THIS MINT CANDY? (Record answer.) NOW I'M GOING TO HAVE YOU PICK SOME, AND YOU MUST PICK THE MOST YOU CAN. IF YOU DON'T PICK WHAT HAS MORE TO EAT, YOU WON'T GET ANY CANDY THIS TIME. NOW, PICK EITHER ALL THE CHOCOLATE OR ALL THE CANDY. WHICH HAS MORE TO EAT? (Record answer of "Candy" or "chocolate".) WHY DID YOU PICK THAT? WHICH ARE THERE MORE OF, CHOCOLATE OR CANDY? WHY IS THAT?

2. PUT ALL THE CANDY IN MY HAND. (Record "Correct" or "Incorrect") PUT ALL THE CHOCOLATE IN MY HAND. (Record "Correct" or "Incorrect")

3. IS ALL THE CANDY CHOCOLATE? (Record "Correct No" or "Incorrect Yes") IS ALL THE CANDY MINT? (Record "Correct No" or "Incorrect Yes") IS SOME OF THE CANDY CHOCOLATE? (Record "Correct Yes" or "Incorrect No") IS SOME OF THE CANDY MINT? (Record "Correct Yes" or "Incorrect No")

4.a. NOW LISTEN CAREFULLY. IF YOU TOOK SOME OF THE CHOCOLATE AWAY, WOULD THERE BE ANY CHOCOLATE LEFT? (Record Yes or No.)

b. IF YOU TOOK ALL OF THE CHOCOLATE AWAY, WOULD THERE BE ANY CHOCOLATE LEFT? (Record Yes or No.)

c. IF YOU TOOK ALL THE CHOCOLATE AWAY, WOULD THERE BE ANY CANDY LEFT? (Record Yes or No.)

d. IF YOU TOOK ALL OF THE CANDY AWAY, WOULD THERE BE ANY CHOCOLATE LEFT? (Record Yes or No.)

5. THEN IS THERE MORE CANDY OR MORE CHOCOLATE? (Record "Candy" or "Chocolate".) WHY DO YOU SAY THERE IS MORE ________?

6. (Then ask:) WHAT KIND OF CANDY IS HERE?

7. YOU TAKE EITHER ALL THE CANDY OR ALL THE CHOCOLATE, WHICHEVER IS MORE. (Record: "All Candy," "Chocolate," or "Mint." Terminate test by giving child candy of his choice.)

Scoring

Two points were awarded for each of the following items passed; one point awarded for each item failed:

1. Responds correctly to specified parts of the help questions.

   Correct answers to Q2 and Q4b, c.

2. Says there are more candies at the end ("includes with help").

   Correct answer to Q5; or incorrect answer to Q5, but changes his mind and/or verbalizes the principle, and then takes all the candy (Q7).

3. Says there are more candies in the beginning.

   Correct answer to Q1; or incorrect answer to Q1 at first, but then changes mind and/or verbalizes principle, and then takes all the candy.

4. Verbalizes principle.

Verbalizes a recognition that there are 4 chocolates but 5 candies.

The measure Class Inclusion, Total Score recorded how many of the 4 items described above wer: passed. The measure Class Inclusion, Pass/Fail was reported as "pass" if at least 3 (any 3) of the 4 items were passed.

APPENDIX F

ADMINISTERING AND SCORING THE RING SEGMENT ILLUSION TASK

The Piagetian task described below was an experimental measure developed by Nancy Kohn (Department of Psychology, University of Chicago) in part for use in this study and based on the work of Lawrence Kohlberg (School of Education, Harvard University) and Rheta DeVries (Early Education Research Center, University of Chicago). Further information can be obtained through sources listed in the References (Kohlberg, 1966; Kohlberg, in preparation; DeVries, in preparation; Kohn, in preparation).

Materials

A set of four cookies in the shape of ring segments was used for each child. Three of the segments--one red, one blue, one green--were the same size; the fourth one--white--was 1/8" shorter than the others.

Procedure

The Ring Segment Illusion task was administered to each child during both follow-up testing sessions. The testers' instructions for administering the task were as follows:

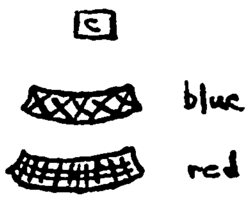
1.a. HERE ARE TWO COOKIES (large green closest to child, and small white on top). LOOK AT THEM. CAN YOU SEE ONE IS BIGGER AND HAS MORE TO EAT THAN THE OTHER? WHEN I SAY SO, YOU MAY PICK THE ONE WITH MORE TO EAT. IF YOU DON'T PICK THE ONE WITH MORE TO EAT, YOU WON'T GET A COOKY THIS TIME. YOU'LL GET ANOTHER CHANCE LATER. NOW BEFORE YOU PICK (place white on bottom closest to child), LOOK AT THEM. IF YOU CAN SHOW ME THE ONE WITH MORE TO EAT, I'LL GIVE IT TO YOU TO EAT. (If he chooses bigger top green: Ask B, then let child take cooky and move to Q3. If he chooses smaller bottom white: Ask b, then move to Q2.)

b. 1) HOW COULD YOU TELL THAT WAS MORE TO EAT?
2) IS ONE BIGGER? (Record answer. If yes, ask:) WHICH IS BIGGER? (Record answer.) HOW CAN YOU TELL? (If no, ask:) WHAT HAPPENED?

2.a. (If he chose smaller bottom white on Q1a) NOW LOOK, HERE'S THE ONE YOU PICKED. NOW I PUT IT HERE (place white on top away from child). DOES IT STILL HAVE MORE TO EAT THAN THE OTHER ONE? OR DOES THIS ONE (point to green) HAVE MORE TO EAT NOW? (If he chooses top white: Move to 2c. If he chooses bottom green: Move to 2b.)

b. 1) (If he said bottom green had more to eat, ask:) HOW IS THAT; HOW COULD YOU TELL? (Record answer; then:)
2) WHICH HAD MORE TO EAT WHEN THIS (point to white) WAS HERE (point to space below green while pointing to white)? (If he picks white, ask:) DID IT REALLY CHANGE: DID IT REALLY GET TO BE MORE TO EAT? (If he picks green, ask:) HOW IS THAT? (move green back to top) HERE IS THE WAY IT WAS BEFORE. DOES IT HAVE MORE TO EAT NOW? (Let child take cooky and move to Q3.)

c. 1) (If said top white had more to eat, i.e., conserved choice) HOW DID YOU KNOW THIS HAS MORE TO EAT? (Record answer.)
2) IS ONE BIGGER? (If he says yes, ask:) WHICH IS BIGGER? HOW CAN YOU TELL? (Record answers.) (If he says no, ask:) WHAT HAPPENED? (Record answer. In either case, let child take cooky and go to Q3.)



3.a. HERE ARE TWO MORE COOKIES. (Two cookies of the same size, blue on bottom closest to child, red on top) YOU CAN PICK THE ONE WITH MORE TO EAT WHEN I SAY SO NOW THIS IS HARDER. LOOK AT THEM. NOW BEFORE YOU PICK I CHANGE THEIR PLACES. (switch blue bottom to top) NOW LOOK AT THEM. WHICH HAS MORE TO EAT? (If he chooses equal blue top: Ask b, then go to Q4. If he chooses equal red bottom: Ask b, then ask c.)

b. HOW DID YOU KNOW; HOW COULD YOU TELL? (Record answer)

c. (Ask this only if chose red on 3a) WHICH HAD MORE TO EAT WHEN THIS (point to red) WAS HERE (point above blue while pointing to red also)?

(If he says red had more:) HERE'S THE WAY IT WAS BEFORE (move blue below red closest to child). DOES IT HAVE MORE TO EAT NOW? (If he says yes: go to Q4. If no:) DID IT REALLY GET TO BE MORE TO EAT? (If yes:) DID IT GET BIGGER? (Record answer and move to Q4.) (If no, ask:) WHAT HAPPENED? (Move to Q4.)

(If he says blue had more:) DID THIS (point to red) REALLY GET TO BE MORE TO EAT? (If he says yes:) DID IT GET BIGGER? (Record answer) (If no:) WHAT HAPPENED? (Move to Q4.)

4. LOOK, IT LOOKS LIKE THEY CHANGE (Switch red back and forth several times, leaving it on top if red was last chosen as more, and on bottom if blue was last chosen as more). WHICH HAS MORE TO EAT? IS ONE BIGGER? WHAT HAPPENS? DOES IT REALLY CHANGE FROM BIG TO SMALL WHEN I MOVE IT OR WHAT? (Record answers to all questions.)

5. SHOW ME HOW YOU CAN TELL WHICH IS REALLY THE BIG ONE. (If no measuring) IF I THOUGHT THIS (child's non-choice) IS THE BIGGER ONE, HOW COULD YOU SHOW ME IT'S NOT? (If no measuring yet) CAN YOU MEASURE THEM? (If still no measuring) CAN YOU PUT THEM TOGETHER TO SEE WHICH IS BIGGER AND HAS MORE TO EAT? (Record answers to all questions.)

Scoring

A dichotomous pass-fail score was given based on correct responses to Q1 and Q3. A correct response for Q1 was defined as choice of the green (larger) cookie. A correct response for Q3 was defined as consistent choice of cookie regardless of position change, with denial of change in real size due to position change.

APPENDIX G

ADMINISTERING AND SCORING THE DREAM INTERVIEW

The Piagetian task described below was an experimental measure developed by Nancy Kohn (Department of Psychology, University of Chicago) in part for use in this study and based on the work of Lawrence Kohlberg (School of Education, Harvard University) and Rheta DeVries (Early Education Research Center, University of Chicago). Further information can be obtained through sources listed in the References (Kohlberg, 1966; Kohlberg, in preparation; DeVries, in preparation; Kohn, in preparation).

Procedure

The Dream Interview questions and testers' instructions are reproduced below. Questions are reproduced in the order in which they were given.

After each question, record the child's answer.

1. (Introduction:) YOU KNOW WHAT A DREAM IS, DON'T YOU? DO YOU DREAM SOMETIMES DURING THE NIGHT? CAN YOU HAVE A DREAM IF YOU STAY AWAKE AND DON'T GO TO SLEEP? (If he says he does not dream, go on to 5) (If he says he dreams, ask:) WHAT DID YOU DREAM ABOUT LAST TIME: TELL ME A DREAM YOU HAD. WHAT HAPPENED AFTER THE DREAM WAS OVER? WHAT DID YOU THINK AND DO?

3.a. WHAT HAPPENED TO THE (object) AFTER YOU WOKE UP? WHERE DID IT GO; WHERE WAS IT AFTER YOU WOKE UP? (If it disappeared ask:) COULD YOU SEE IT LEAVING? (If it hadn't disappeared ask:) COULD YOU SEE IT WHEN YOU WOKE UP?

b. WHEN YOU SEE A DOG IN A DREAM, IS IT THE SAME AS WHEN YOU ARE AWAKE AT NIGHT AND SEE A DOG?

2.a. WHAT IS THIS? (picture of a dog)____________ IS THIS A REAL DOG YOU SEE HERE, OR IS IT A PICTURE, JUST SOMETHING THAT LOOKS LIKE A DOG? (If real:) CAN THIS DOG YOU SEE HERE BARK OR RUN?

3.c. WAS THE (object________) YOU SAW IN YOUR DREAM JUST PRETEND, JUST SOMETHING THAT LOOKED LIKE A (object), OR WAS IT A REAL (object)?

3.d. WAS THE (object) IN YOUR DREAM REALLY THERE WHERE YOU WERE, REALLY CLOSE TO YOU, OR DID IT JUST SEEM TO BE THERE? (If really there:) COULD YOU TOUCH THE (object) AND (smell, or other appropriate sense) IT?

5. (The Origin of the Dream)
   a. TELL ME, WHERE DOES A DREAM COME FROM
   b. WHERE ARE DREAMS MADE, WHERE DO THEY COME FROM?
   c. DO THEY COME FROM INSIDE YOU OR OUTSIDE OF YOU?
   d. WHO MAKES THE DREAMS COME OUT?
   e. IS IT YOU OR IS IT SOMEBODY ELSE?

6. (Location of the Dream)
WHILE YOU ARE DREAMING, WHERE IS YOUR DREAM, WHERE DOES IT GO ON (i.e. take place)?
IS IT INSIDE OF YOU OR IN YOUR ROOM? (If the dream is in the head, in the thoughts, etc. (thus internal and not external) say:) IF WE COULD OPEN YOUR HEAD WHILE YOU ARE DREAMING, IF WE COULD LOOK INTO YOUR HEAD, COULD WE SEE YOUR DREAM? (If not:) WHY DO YOU SAY THAT WE COULD NOT SEE YOUR DREAM?

7. (If the dream is in the room on the wall, close to his eyes, under the bed, etc., say:) IS IT ONLY THAT THE DREAM SEEMS TO BE IN YOUR ROOM OR IS IT REALLY IN YOUR ROOM? (If not really in room:) WHERE IS THE DREAM THEN?

8. (Substance of the Dream)
WHAT IS A DREAM MADE OF? IS IT MADE OF PAPER? THEN, WHAT IS IT MADE OF? CAN WE TOUCH DREAMS? IS A DREAM A THOUGHT OR IS IT A THING? (If he says he didn't dream at beginning, return now to introduction and ask again to tell about a dream he had.)

10. (If the child still says he did not dream, ask him:)
LET'S MAKE BELIEVE THAT YOU DREAM DURING THE NIGHT ABOUT A MONKEY. WOULD IT JUST SEEM THAT THE MONKEY WAS THERE, OR WOULD THE MONKEY REALLY BE THERE? LET'S MAKE BELIEVE YOU DREAM ABOUT A MONKEY DURING THE NIGHT. WHAT WOULD MAKE YOU DREAM ABOUT THAT, WHY WOULD YOU HAVE THAT DREAM? THEN DO YOU KNOW WHY WE DREAM, WHY THERE ARE DREAMS?

9. WHEN YOU HAD THE DREAM ABOUT THE (object), WHY DID YOU HAVE THAT DREAM? WHAT MADE YOU HAVE THAT DREAM? THEN DO YOU KNOW WHY WE DREAM, WHY THERE ARE DREAMS?

Scoring

Two points were awarded for each of the following items passed; one point awarded for each item failed:

1. Knows what a dream is
   Q1 answered "yes" and statement to the effect that people can't dream when awake except for daydreams.

2. Picture of dog is not real
   Q2 responses indicate child differentiates between pictured dogs and live dogs.

3. Partly aware of unreality of dream
   At least one answer to Q3a or 3b or 3c indicating that dream object is not real.

4. Fully aware of unreality of dream
   Q3a: "no" responses--unless object was also really in existence. Q3c, 3d: responds "pretend", "looks like," "just seemed to be there".

5. Dreams do not originate in external world
   Q5a, b, c: consistent answers indicating that dreams originate in the dreamer or in "dreamland," "heaven" ("sent by God") and not in the external real world.

6. Dreams may take place inside
   At least two answers indicating internal locus in questions 6 and 7.

7. Dreams do take place inside
   All answers from questions 6 and 7 indicate internal locus.

8. Dreams are not material things
   All answers to question 8 indicate concept of dreams as intangible and immaterial.

9. Dreams are caused by the dreamer
   Q5d and 5e: answers indicating that it is the child, and only the child (not God), who "makes dreams come out." Q9: some answer indicating that something the child has experienced or thought about is conceived as explaining dreams. A simple statement that the child has seen the dreamed-about thing is inadequate.

The measure Dream Interview, Total Score recorded how many of the items described above were scored as "pass."

APPENDIX H

ADMINISTERING AND SCORING THE SIGEL CONCEPTUAL STYLE SORTING TASKS*

Mother's Sigel Conceptual Style Sorting Task

During the first preschool testing session at the University, mothers were administered the adult form of the Sigel Conceptual Style Sorting Task. Materials were black-and-white paper cutouts of human figures, from the Make-A-Picture-Story Test (MAPS).

Administration

The tester spread the figures randomly on a table, with no obvious groups placed next to one another (e.g., males, females, nudes, uniformed figures, shading, etc.). The subject was instructed:

> YOU SEE BEFORE YOU PICUTRES OF PEOPLE. I WANT YOU TO PICK OUT AND PUT INTO ONE GROUP ALL THOSE FIGURES THAT ARE ALIKE OR THE SAME IN ANY WAY OR GO TOGETHER IN SOME WAY. YOU MAY HAVE AS MANY OR AS FEW FIGURES IN YOUR GROUP AS YOU WISH, BUT I JUST WANT YOU TO MAKE ONE GROUP. DO YOU UNDERSTAND? ALL RIGHT. GO AHEAD.
>
> *Reaction Time* was recorded, beginning immediately after the tester said, "Go ahead." The score was the number of seconds until the subject picked up the first figure. After the subject had completed a sort, the tester recorded the figures selected and asked: WHAT IS THE REASON YOU PUT ALL THESE TOGETHER? The subject's response was recorded *verbatim*.

*This manual is based on the conceptual style sorting task procedures and coding categories developed by Dr. Irving E. Sigel, Director of Research, The Merrill-Palmer Institute, Detroit, Michigan.

The tester then replaced the figures randomly on the table, and said:
ALL RIGHT. NOW I WOULD LIKE YOU TO MAKE ANOTHER GROUPING, TAKING THOSE FIGURES THAT ARE ALIKE OR THE SAME OR GO TOGETHER IN ANY WAY, BUT THIS TIME ON THE BASIS OF A DIFFERENT REASON THAN YOU USED BEFORE. DO YOU UNDERSTAND? ALL RIGHT. GO AHEAD.

Once the sort was made, the subject was asked for a reason. Again, reaction time, the figures selected, and the verbatim response were recorded. This procedure was repeated until the subject made 12 groupings or sorts. After two or three sorts, instructions were reduced to:
ALL RIGHT. I WOULD LIKE TO MAKE ANOTHER GROUPING BUT AGAIN ON THE BASIS OF A DIFFERENT REASON.

Child's Sigel Conceptual Style Sorting Task

During the second preschool testing session at the University, the four-year-old children were administered the children's form of the Sigel Conceptual Style Sorting Task. This task was readministered at both the first and second follow-up testing sessions. Materials included fifteen sets of black-and-white photographs of common objects, animals, and humans, and five sets of black-and-white cut-out paper figures from the Make-A-Picture-Story Test (MAPS). Each set was composed of a presentation picture and three choice pictures:

		Pictures		
	Presentation	1	2	3
1.	tomato	banana	orange	pear
2.	duck	fish	camel	hen
3.	chair	dresser	table	rocking chair
4.	MAPS #6	MAPS #11	MAPS #9	MAPS #101
5.	stagecoach	sailboat	airplane	jeep
6.	smiling cowboy	smiling man	neutral policeman	ranch
7.	banana	green beans	grapes	celery
8.	MAPS #71	MAPS #72	MAPS #3	MAPS #108
9.	cow	elephant	horse	sheep
10.	bed	cradle	chest	lamp
11.	baby	playpen	girl	man
12.	bread	tomato	apple	ham slice

13. MAPS #68	MAPS #32	MAPS #31	MAPS #18
14. Truck	dog	horse	sheep
15. ranch	stagecoach	horse	cowboy
16. MAPS #107	MAPS #118	MAPS #5	MAPS #67
17. tractor	engine	rocket ship	boat
18. fireman	fire station	soldier	policeman
19. smiling nurse	neutral nurse	smiling stewardess	sad stewardess
20. MAPS #109	MAPS #112	MAPS #104	MAPS #105

Administration

The presentation picture was placed on a table in front of the child, with three choice pictures immediately above it, aligned horizontally to the child's right (to his left if left-handed):

As the tester pointed to each of the four pictures, the child was asked to name it. His response was recorded, whether correct or not. A wrong label was not corrected, nor was the child given the name if he did not know it.

> The tester instructed the child:
> TAKE ONE OF THESE (pointing to three choice pictures) THAT BELONGS WITH THIS OR LOOKS LIKE IT (pointing to presentation picture) AND PUT IT WITH THIS ONE (presentation picture; i.e., the child was told to place his choice next to the presentation picture, under #3 in the figure above).
>
> Acceptable alternative wordings of the instructions include: TAKE (PICK OUT) THE ONE (OF THESE) THAT GOES WITH THIS (ONE), etc. or TAKE ONE OF THESE AND PUT IT WITH THIS (THAT) ONE.
>
> The selection was recorded, and the child was asked as the tester indicated the presentation picture and the one the child had selected: WHY DO THESE GO (BELONG) TOGETHER? or WHY DID YOU PICK THIS ONE? If the child gave no reason, but repeated the labels, or pointed to the pictures, the tester said: TELL ME ABOUT THESE. If the child said "because they're the same," the tester asked: IN WHAT WAY ARE THEY THE SAME?

The tester continued to encourage the child to tell her the basis of his sort, how the figures were the same, why they went together, until the child gave a scorable verbal response, or persisted in a non-scorable or nonverbal response. "How are they alike?" was not asked, since young children, especially lower-class children, are not as familiar with the word "alike" as they are with "the same" or goes with."

Scoring Procedures for Sigel Conceptual Style Sorting Tasks

Although the material and instructions differ for the adult and child versions of the task, the formal scoring categories are the same. In each task, the subject is asked to make a "conceptual sort": the child is asked to select one of three items to go with a presentation picture; the mother, to group together two or more figures from a large array. And in each task the subject is asked to explain his sort, to tell why the items go together. The formal coding categories described in this manual apply to that verbal response and refer to the subject's conceptualization of the similarities and relationships among the items constituting a sort. Possible bases for sorts include descriptive or stimulus-centered concepts, relational or functional concepts, and categorical or inferred-class concepts. The subject may offer a verbal response which cannot be scored, such as a disjunctive statement or a vague reference. He may be unable to verbalize the concept, in which case he is credited for having made a sort but receives a score for nonverbal conceptualization; or the subject may be unable to make a sort, in which case he receives a score for a non-sort.

Formal Scoring Categories

1. Descriptive: (Stimulus Centered) Concepts which are derived directly from the physical attributes of the stimulus and ones in which the conceptual label contains a direct reference to a physical attribute present in the stimulus. Descriptive responses are of two types: Analytic (Part-whole) and Global.

Descriptive-Analytic or Part-whole:

D-1: Sorts in which the physical attributes or properties of the materials presented are the basis of similarity; e.g., color (black and white only), texture, shading, shape, or size.

D-2: Sorts in which the description of physical attributes of the objects or figures depicted are employed: e.g., heads, legs, wheels, guns, holding objects in their hands, clothing (uniforms, well-dressed, casually dressed, professional dress), baldness, hair color, static posture (prone position, sitting position), nudity (lack of clothing, they are nude but not "These are nudes." Latter considered class of nudes and scored for D-3), crippled or physical disability (physical injury, physical handicap), etc. (smiling, frowning, straight mouths on human figures other than MAPS also included).

Descriptive-Global:

D-3: Sorts in which the label designates the status, occupation, etc. where the cues are manifest in the stimulus; e.g., policeman, soldiers or army men, nurses, nudes, boats, trucks, etc.

D-4: Sorts in which discrete age categories are employed; e.g., children, old people, adults, babies, young people, etc.

D-5: Sorts in which one of the sexes is grouped; e.g., males, females.

D-6: Sorts based on age and sex; e.g., old men, young women, boys, girls, etc.

Descriptive-Analytic or Part-whole (objects only):

D-7: Sorts based on or dealing specifically with the physical attributes or structural material; e.g., wood, plastic, steel, etc. (Does not apply to MAPS figures)

2. Relational-Contextual: Concepts which are used to tie together (or relate) two or more people or objects. In this category no stimulus is an independent instance of the concept; any one stimulus gets its meaning from a relationship with the other stimuli; e.g., a mental hospital scene, a family scene, the horse pulls the stagecoach. The relationship must be between the stimuli in the subject's sort and not between the stimuli and any external factor brought in by the subject. For example, "These people all belong in a mental hospital" is not scored as relational since there is no hospital present and no interaction among the stimuli in the sort--each stimulus is independent of every other stimulus. However, "This is a mental hospital scene. These are the patients and this is the doctor who is treating them," is scored as relational since no stimulus is an independent instance of concept, "mental hospital scene."

R-1: Thematic: Sorts which are based on themes, plots, or stories where no category is used; e.g., he killed this man, she is giving him food, the boy is helping the blind man to cross the street, etc.

R-2: Geographical: Sorts in which the instances are related in space--locale, geographic, domiciliary, etc.--where the spatial reference is not an external factor but is one of the stimuli in the sort; e.g., the wac and the soldier belong on the army base, these tools belong in the trunk of the car, these animals belong on the ranch.

R-3: Temporal: Sorts in which the figures are grouped on the basis of the temporal development of the individual; e.g., this is a person growing up, these are the stages of man; or temporal sequence; e.g., before and after of a crime.

R-4: Comparative: Sorts based on comparison between two or more stimuli; e.g., better than this one, different from this one, one is dressed casually and the other formally.

R-5: Functional: Sorts in which objects are grouped together on the basis of their interdependent use or function, behavior or activity; e.g., the steam shovel digs sand to put on the truck, sit on a chair to eat at the table, ham and bread are used to make a sandwich, the horse pulls the stagecoach, all these objects make up a home.

R-6: Sorts in which figures are grouped on the basis of an understood relationship state between them.

A. Kinship: a family group, husband and wife, mother and child, brother and sister, etc.

B. Other Relationship States: Doctor-nurse, teacher-student life drawing class, etc.

R-7: Conditional: Sorts in which the stimuli are related conditionally; e.g., if this, then that.

Note: All sub-categories grouped together: score for "R" in general only.

3. Categorical-Inferential: A group of figures or objects are put together where each stimulus in the sort is representative of the total class. These sorts are based on inferred or non-observable characteristics of the stimuli, each instance is not interdependent, and a class label is used--it is an inference. (Note: It must be kept in mind that the categorical response is not necessarily a conceptual one in the Goldstein

or Werner sense. What we are dealing with in the following instance, "People ride in these." is a categorical response tied to a concrete reality in contrast to "These are vehicles," which would be a more objectifying and abstracting statement.)

MAPS Sorts (human figures only)

C-1: Sorts in which the figures are grouped on the basis of a common behavior, role, or participles of action: e.g., these people all work for a living, these people all do services, these people do something worthwhile or constructive, these people are walking, modeling, sleeping. Also motivational states; they are intent on committing a crime.

C-2: Sorts in which the objects are grouped on the basis of status, class or attributes; e.g., professional people, criminals, handicapped people, dignified people, solemn people, intelligent looking, sick people, invalids, crippled, disabled, incapacitated, handicapped, people who need help, dead people, Negroes, Orientals, Caucasians, military people, these people represent justice or tolerance or crime or physical health, these people have a persuasive expression or ordinary expression, suffering people, artistic people, medical people, clergymen.

C-3: Sorts in which the basis of similarity is a moral or aesthetic value or judgment.
A. Aesthetic: pretty, ugly, beautiful, attractive, etc.
B. Moral: good, bad, wicked, evil, "shady" looking character, malicious intentions, etc. (realm of right and wrong.)

C-4: Sorts in which figures are grouped on basis of a common affect or emotion: state, e.g., sad, unhappy, suffering, aggression, hostility, anguish, sorrow, suffering people, crying, violence, etc.

C-5: Sorts in which stimuli are grouped on basis of spatial reference--common locale, geographic, domiciliary, etc., e.g., These people would all be found in a hospital, these people would all be in the street, or in a mental institution.

C-6: Sorts in which the basis of similarity is a sexual reference other than designation of sex of figures; e.g., these are the sexy ones, sensuousness, girls who think they know about life, look seductive.

Human and Object Sorts

C-1: Function, Use, or Behavior: (Includes all examples of C-1 for MAPS plus function and use for objects.) Examples are: things to build with, these carry people and freight, they swim in water, used for cutting, we eat these, these are rocking things, used to turn bolts, these are used by people.

C-2: Class-naming: e.g., professional people, homemakers, military men, human beings, furniture, farm animals, land vehicles, ways of transportation, foods.

C-3: Attributes: (Statis traits of stimuli are basis of similarity--non-functional, non-action, non-affective states.) Examples: juiciness, tough skins, wildness, these grow on vines, these run by motors, these move of wheel, these are sharp, these are self-propelling, these are manufactured, these are inanimate, these can be eaten without cooking, these people are handicapped, these people can't walk, they are dependent.

C-4: Affect or Emotional State: (Does not apply to object sorts.) This category is the same as C-4 on MAPS with one exception: The terms--smiling, frowning--are scored as D-2 on human figures but as affect on MAPS figures.

C-5: Geographical: (Same as MAPS) These people are found in the home, they belong in the jungle, see them in the zoo, grown on a farm, they go in the water, live on a farm. Note: The spatial reference is not one of the stimuli but is the only basis for the grouping. If there is another basis along with the spatial reference, score for the former; e.g., "These swim in water" or "These are used on a farm" are scored as C-1.

C-6: Value Judgment, moral judgment, or aesthetic judgment: (Same as C-3 on MAPS) For human figures would include: normal faces or normal expressions, look regular, look surprised, serious look on their faces (where specific affect or emotional state cannot be ascertained). Also, these (referring to foods) are good for you, these make you healthy, these (tools) are important for man. Egocentric responses, if they are the only basis for the sort, are included: e.g., I like these.

Object Sorts (objects only)

C-7: Presumed constituent parts or attributes: Basis of similarity is unseen (non-manifest) parts or inferred attributes of stimuli: e.g., seeds, motors, colors other than black and white (the tomato and apple are red), these are solid, etc.

Nonscorable Responses

Nonscorable Verbal: broad or vague statements: "looks like it", "the same", "just alike"; or disjunctive responses: "this is a truck and this is a horse".

Nonverbal: Subject makes a sort but does not verbalize a rationale; points, puts cards or figures edge-to-edge, on top of each other or otherwise together, or says "Don't know".

Nonsort: Subject is unable or refuses to make a sort.

APPENDIX I

THE DOLL PLAY INTERVIEW: ADMINISTRATION AND CODING FOR LANGUAGE SCALES*

Materials

The Doll Play Interview used seven dolls from sets B292 (bendable Caucasian family) and B492 (bendable Negro family) purchased from Creative Playthings. These included four school-age children (a boy and a girl of each race), a mother and father (the Negro parents), and a "teacher" (the Caucasian mother).

Administration

The Doll Play Interview was administered to each child during a testing session at his school. It followed the completion of the Stanford-Binet Intelligence Test. The testers' instructions for administering the interview were as follows:

> Show the child the dolls, labeling them as they are shown: THIS IS THE TEACHER, THIS IS THE FATHER, THIS IS THE MOTHER, AND THESE ARE THE CHILDREN AND THEY ARE ALL IN THE SECOND GRADE. Place dolls in front of E so that they face the S. Note any comments or reactions of S to the dolls on the recording sheet. Speak slowly--be sure you have the child's attention: I'D LIKE YOU TO MAKE UP A STORY ABOUT SCHOOL. YOU CAN USE SOME OR ALL THE DOLLS TO HELP YOU TELL THE STORY IF YOU WANT TO. BUT I WANT YOU TO TELL ME SOMETHING THAT MIGHT BE HAPPENING IN SCHOOL. If S asks if he can or has to use all the dolls tell him it's up to him, that he can use as many as he wants to: WHAT I WANT YOU TO DO IS TO MAKE UP A STORY ABOUT SOMETHING HAPPENING IN SCHOOL.

*The procedures described for unitizing the Doll Play Interview protocols, for Linguistic and Importation coding, and for rating Originality, are based on systems of coding devised by Dr. Irving E. Sigel, Director of Research, The Merrill-Palmer Institute, Detroit, Michigan.

Probes: WHAT'S GOING ON? TELL ME MORE ABOUT IT? THEN WHAT HAPPENS? After first spontaneous verbalization, wait--if child doesn't go on ask him to tell you more about it--then ask about feelings, endings, etc. After the story ask "why" questions, to find out about unexplained emotional reactions, etc. Try to get an ending to the story.
Recording. Record verbatim what the child says, describe all actions to dolls, especially when S is not verbalizing. Indicate dolls as BW, BN, GW, GN, M, F, and T.

Preparation of Protocol

The verbatim record of the child's response to the Doll Play Interview was later typed; this typed protocol, prepared as outlined here, was used for coding the child's story, according to the various systems presented in this manual.

Choose Eligible Content

From total interview, delete: asides with no content; procedural or factual questions to examiner re: task or dolls; sounds or sound effects; and non-substantive replies to probes.*

Include: asides--explanatory comments made by the subject (e.g., "kids are playing"), or by the examiner (e.g., description of subject's manipulation of materials, such as "BN hits T", or"GW falls down"); and material following probes, after indicating this by writing "PROBE" after last pre-probe unit on code sheet.

Eligible content will thus consist of: substantive narrative; and dialogue.

Unitizing

Divide Story into Scoring Units and Number Serially from Beginning

Generally each unit will consist of an independent clause and any clause subordinate to it.

Exceptions:

If main clause contains a series of parallel verbs, each verb together with its modifying words, phrases, or clauses, and the conjunction (if any) that precedes it, will be counted as a separate unit.

*A probe here refers to a specific or leading question (e.g., "How do they feel?"), rather than to a non-leading remark, such as "Anything else?"

e.g., one unit: When Sally finished her homework, she went out to play.

one unit: When Sally finished her arithmetic and corrected her spelling test, she went out to play.

three units: When Sally finished her homework, she went out/ and played hopscotch/ and jumped rope.

If two or more parallel dependent clauses follow one main clause, the dependent clause immediately following the main clause will be counted together with the main clause as one unit, but all subsequent parallel dependent clauses will be counted as separate units.

e.g., four units: (four parallel dependent clauses following one main clause) She came home because she felt tired/ and was hungry/ and was sick of playing with Mary/ and wanted to tell her sister something.

one unit: (two non-parallel dependent clauses following one main clause) She decided that she would play outside when she had finished her homework.

This rule was designed to prevent the scoring of what amount to run-on sentences as single units.

Conjunctions will always count as part of the unit they precede.

Greetings, interjections, and non-substantive responses are not counted as separately-numbered units; they are grouped and numbered with the preceding unit, and the appropriate subscript--"G", "I", and "R", respectively, is added to that number.

e.g., one unnumbered "G" unit: Good-bye, Mr. Jones.

one "G" unit and one numbered unit: Good-bye, Mr. Jones;/ come back again soon.

one unnumbered "R" unit: No, Miss Hopkins.

one "R" unit and one numbered unit: No, Miss Hopkins,/ I didn't lose my workbook.

one unnumbered "I" unit: Hey Jack!

one "I" unit and one numbered unit: Hey Jack,/ want to come outside?

Asides are similarly numbered with the preceding unit, and the subscript "a" is added for the first aside, "b" for the second, etc.

The same unitizing procedure, and the same unit numbers are used for all doll play interview coding--Linguistic, Importation, Activities, and Interaction.

Linguistic Coding of Each Unit

If unit is a simple greeting, interjection, or response, record "G" (greeting), "I" (interjection), or "R" (response) in first column and ignore remaining columns.

For each unit, record "N" (narrative, "D" (dialogue), or "N,D" (combination of narrative and dialogue).

Record total number of words in unit: Names (Mrs. White, Nancy Roberts) count as one word. Contractions count as two words.

Record total number of words before main verb in unit. If there is no main verb but one is implied, code number of words before implied verb's position.

e.g., one word before verb: They sisters.
five words before verb: When they finish arithmetic, they in gym.

Record total number of nouns: Names count as one noun as in recording total words.

Record number of nominative or objective pronouns: Words such as "all," "one," "something," and "anybody" are pronouns.

Record number of Type I verbs. A Type I verb is any single word that expresses an act, occurrence, or state of being.

Record number of Type II verbs. A Type II verb is any group of words that expresses an act, occurrence, or state of being. Include as Type II verbs infinitives ("to run"), subjunctives, passive verbs, and all other verb forms involving more than one word. Also include all verbs which the child expresses in one word but which in proper English would be expressed in two words, e.g., (He) running.

Auxiliary verbs and their main verb will be counted as one Type II verb. Two verbs which are used together but can have independent meanings will be counted as two verbs.

e.g., one Type II verb: (He) could have been killed.
one Type I and one Type II verb: (She) tried to help.

Record number of articles.

Record number of possessive adjectives.

e.g., his, their, your, my, our, Tommy's, Mrs. Green's, etc.

Record number of descriptive adjectives (other than articles and possessives). Include gerunds (the girl running towards me) and any other words that modify nouns or pronouns.

Record number of adverbs. Include any words that modify verbs, adjectives, or pronouns, e.g., "Go home;" "He is over there." "Not"--used to negate the verb--(even when in contraction form) should be coded as an adverb.

Record number of conjunctions.

Record number of direct objects. Code only single words used as direct object (i.e., exclude phrases or clauses).

Record number of prepositional phrases.

Record number of subordinate clauses. In a unit consisting of both narrative and dialogue in which the quotation includes a verb, the quotation is counted as a clause, e.g., "Mrs. Smith called, 'Come in, children.'"

Importation Coding

An importation is any statement not related to the stimuli of the test situation. (Visible characteristics of the dolls, action of the dolls limited to the test situation, and ordinary actions of the dolls within the situation in which the child is instructed to imagine them [school] do not count as imports.) For each unit, record the number of each type of import which occurs. If the same import occurs several times within a story, code and record only its first occurrence.

Internal Imports

Anatomy - any mention of anatomical parts not visible on dolls e.g., heart, lungs.

Thought - specific statement of such: e.g., "He thought that . . ."

Motivation - A motive is the inner drive or impulse to achieve a desirable goal or emotional state that causes one to act. The motive (desire to achieve the goal), not the act itself, provides the reason for the action, and must be independent of the act itself.
For example, "He played outside because it was fun" is not an example of motivation, whereas "He played outside because he wanted to improve his health" is.
Motive may be stated in narrative ("He did it because. . .") or presented by one speaker to another ("If you do _____, then . . . ").

Emotion - specific statement of a feeling state
e.g., "He cried" could not be counted; whereas
"He cried because he was sad" could.
"He didn't like her to leave" is not counted, whereas
"He didn't like her because she left" and
"Her leaving made him unhappy" are.

Role/Character Imports

Include any role or character except mother, father, teacher, children (undifferentiated).

For example, include: all fictional characters; additional characters such as principal, police, patrol boys, etc.; relationships between characters not stated in interview instructions, such as sisters, twins, brothers, aunts, uncles; new roles assigned to characters such as leader, winner, loser, dunce, etc.

External Imports

Place - Include any place unconnected with usual school or home activities (e.g., "She went to the store;" "Daddy was at work") and any specifically named singular school-connected place (e.g., "the gym", "the principal's office", "the playground", "Room 212", "the stage", and "the second floor girls' washroom" would all count, whereas "the hall", "the washroom", and "the classroom" would not).

Event - Score as an event any related (usually by cause plus effect) group of units which (together) describe an incident.
e.g. "He hit her and she told the teacher. The teacher had to call his mother, Mother came to school and gave him a whipping," would be scored as one event, whereas "These all second grade. And these teach and this is a housewife. And they all go home to their mother. And the father comes home from work and the teacher goes home," would not be considered to contain an event.

Objects - Include as objects any tangible, single things or any plural nouns ("groceries", "money") which refer to a group of tangible, single things.
Exclude: all body parts; all non-specific nouns.
E.g., in "She made their lunch," lunch would not count as an object, but in "He took his lunch to school," lunch would be counted.

Animals - (non-human)

Originality Rating

This rating is assigned to the story as a whole rather than to each individual unit. Assign each child one numerical rating (1-5):

1 = Response is confined to information conveyed in the examiner's instructions; description of setting and materials (dolls, task-specific activities, etc.), without any theme or story.

2 = Camera-type recitation of everyday events with no unusual content or theme.

3 = Story goes beyond the enumerative recitation of code 2 but lack the originality of code 4.

4 = Story mentions any out-of-the-ordinary occurrence, e.g., a play at school, a policeman arresting someone.

5 = Story includes very unlikely or impossible events, e.g., father killing teacher, child sending teacher to Mars.

School Activities Coding of Each Unit

Coding of school activities focuses on the teacher as portrayed in the child's story and the kinds of demands and expectations she applies to her class as a group. Any activities undertaken by the class as a whole, or at least by major parts of the class, with the explicit or at least implicit approval of the teacher, are coded as "activities".

"Activities" are to be distinguished from "interactions", which are coded separately. "Interactions" occur between individuals, often concern cooperative play or conflict, and are not "activities" in the sense that they are shared by the entire class as a group acting under the leadership of the teacher. Interactions occur between individuals and may be initiated by anyone. Activities, on the other hand, are engaged in by the class as a unit and are initiated by the teacher, at least implicitly. Things done by the children without the teacher's knowledge or against her wishes, and interactions between the teacher and specific individual children which are not typical of the rest of the class (such as special punishments or rewards) are not coded as "activities."

The units used for the linguistic and importation coding provide reference points for coding school activities. Whenever an activity occurs, the appropriate number is recorded for the unit in which the activity was mentioned by the child. Many units--a majority in most cases--will not be coded for activities. In addition, it is possible for more than one activity to be coded in certain kinds of units; these, however, will be rare. All material up to the first substantive probe (which is noted clearly on the protocols and coding sheets) is eligible for coding for school activities. Each separate activity is coded as it occurs, and several examples of the same activity type may be coded on a given case.

Consecutive repetitions and general statements followed by delineation of the content (e.g., "It's arithmetic time--the children are doing their number tables") are coded as a single activity unit. However, repetitions of a previously coded activity may be coded again as additional units if other activities are interspersed. When a general statement is followed by delineation of specifics (The children did their work--they did spelling, arithmetic, and writing"), each of the specific activities is separately coded, and the general statement is not coded as a single unit. Examples of a specific activity given in dialogue (e.g., several questions and answers regarding arithmetic tables or several words given on a spelling test) are coded as a single unit of the activity involved, so long as the activity itself does not change. In general, the rule is to score separate activities separately. However, when the coder is unable to determine whether two units are separate activities or the same activity, they will be considered the same, and only one activity code will be recorded.

School Activities Codes

Blank = No activity in the unit
1 = Teaching and Learning

The teacher is teaching her class, or the class is learning. The emphasis for this category is on the learning of new things, rather than upon review or application of previous learning (see succeeding categories). Active teaching by the teacher is implied, as opposed to class supervision or testing of knowledge.

2 = Quiet Seat Work

Usually only vaguely described, activities include "doing their work", "doing their papers", reading, copying, and any other work done individually and in silence at the desks.

3 = Oral Work

Coded in this category are recitation or question-and-answer activity involving arithmetic, spelling, or other academic subject matter presumably learned previously. Emphasis on the latter point distinguishes this category from category 1. That is, the teaching of new material or class discussion having an exploratory character will be coded 1, while recitation or question-and-answer sequences concerning material presumably already learned or covered would be coded 3.

4 = Specific Subject Matter (type of activity vague)

The child refers to a specific subject area (arithmetic, spelling, etc.) but does not further describe the nature of the activity. Activity which is clearly seat work, however, is coded 2 even if the specific subject matter area is designated (e.g., "They copied their numbers").

5 = Homework

Any mention of homework is coded 5. In addition to ordinary homework, work finished at home because it was not finished at school or not done properly at school is also coded 5. Non-subject-area related punishments (e.g., writing "I must be a good boy") are not considered homework, however, and are not coded as school activities.

6 = Rituals and Procedures

Coded in this category are daily social or patriotic rituals (such as formal greetings and salutations carried out by the class as a group under the teacher's direction, pledge to the flag, prayers, singing of anthems or other patriotic songs, and singing of school songs) and procedural activities related to classroom or to school organization (e.g., forming lines, going to the washroom, rest periods with hands folded and head on desk, taking attendance, changing seating patterns). Activities described in connection with distribution and return of report cards, putting on and taking off clothing, sitting down, raising hands, interaction with patrol boys may be coded for procedure if the emphasis is on this aspect. However, mention of these things does not by itself require coding this category. For example, 6 would not be coded for a sequence in which the teacher passed out report cards and complimented or criticized the children for their achievement, but it would be coded for a sequence in which she passed out the report cards and dwelt upon the procedures for getting them signed and bringing them back.

7 = Play-Recess

Category 7 includes any mention of recess or of play periods involving the class as a group and approved, at least implicitly, by the teacher. Play by individual children, or even by the class as a whole, which is done against the teacher's expressed desires is not coded as play activity. Similarly, any play described outside of the school situation (after school or in the home) is not coded in this category. Birthday parties, holiday parties or celebrations, or other leisure-time activities engaged in by the class with the approval of the teacher are coded 7.

8 = Creative Activities

Class activities spent in art, music, drama, creative writing, dancing, or any other kind of creative activity are coded 8.

9 = Meals

The child describes breakfast or lunch taking place at the school or interrupts his story of the school day to describe going home for lunch and coming back. Snacks, special treats, or any other kind of eating indulged in by the class as a group would also be coded in this category.

10 = Gym Exercises

Included in this category is any mention of a class gym period, physical exercises, or other physical activities that would ordinarily be considered part of a physical education program. Group sports played on the playground during recess would be coded 7, Play-Recess, while group sports done in organized fashion during a specifically described gym period would be coded 10. Exercises and physical workouts are coded in this category whether or not they are carried out in a gym or exercise room.

11 = Library

The class as a group visits a library, either within the school building or outside the school premises.

12 = Tests

The class is given a test for their knowledge of academic subject matter. This category should be coded only for formal tests. Question and answer period on spelling or arithmetic, as well as the doing of "papers" which are to be turned into the teacher, are usually coded 3, Oral Work, or 2, Seat Work, respectively, rather than in this category. If such activities are labeled "test", however, 12 is coded.

Conventions

Reading: code 2 if silent, 3 if oral, 4 if not specified.
Teacher at board: code 1, unless otherwise explained.
The number of categories may be reduced by combining 1 and 11 (new learning); 2 through 5 with 12 ("words" or application of learning); and 8 and 10 (non-academic class activities).

APPENDIX J

ADMINISTERING AND SCORING THE CURIOSITY TASK

At both follow-up testing sessions, the children were readministered the experimental measure of curiosity motivation previously administered when they were four years old. The stimuli were eight pairs of simple and complex drawings, adapted from those used by Berlyne (1954, 1957, 1960) and Smock and Holt (1962). The viewing apparatus or "curiosity picture-box" was similar to that used in the Cantors' studies (Cantor & Cantor, 1964; Cantor, Cantor, & Ditrichs, 1963).

Procedure

Sixteen test pictures, preceded by two trial cards, were presented to the child one at a time in a large viewing box: each card was inserted inside the box at the rear, and the child was told to look through a viewing slot at the front of the box. The pressure of the child's head on a bar immediately above the viewing slot operated a light so that the interior of the box was illuminated and the picture could be seen only when the child was leaning his forehead against the bar, looking into the viewing slot. The same mechanism activated a clock. When the child sat back in his chair, moving his head away from the viewing slot, the light went off and the clock stopped. Viewing time was registered on the clock to .01 seconds.

Stimuli

Each of the eight pairs of drawings of common geometric figures, elements, and animals, is composed of a simple and a complex member, defined by the number of objectively observable elements or relationships represented. Each pair is characterized by one of four types of stimulus complexity: Complexity, Incongruity, Point Dispersion, Element Dispersion. The order of presentation of the 16 cards was counterbalanced for both presence and type of complexity.

Administration

The subject was seated in a child-sized chair, facing the picture-box which was placed on a low table. The examiner sat to the child's right and perpendicular to the child's line of vision.

The instructions given to the child by the examiner were aimed at accomplishing, in steps, the following:

1. the child understands how to make the light go on;
2. the child understands how to make the light go off and how to keep it on for some time;
3. the child explores the empty box to satiate any motivation toward that object;
4. the child demonstrates, in two trial items, his ability to turn on the light, focus his attention on the drawing inside the box, and turn the light off when he no longer wants to see that item.

Scoring

Two types of scores were obtained from the recorded total viewing time for each picture: total viewing scores, and proportion scores indicating relative preference for complex or simple items.

Total Viewing Time

The Total Viewing Time is the total number of seconds (to .01 seconds) for all sixteen cards; subscores for Total Viewing Time include the Total Complex Time or total number of seconds viewing the eight complex items, and Total Simple Time or the total time viewing the eight simple items.

Curiosity Proportion

Curiosity Proportion scores included, for each pair, the ratio of time viewing the complex member to the total time spent on both members of the pair (Complex / Complex + Simple); for each type of stimulus complexity, a mean proportion score was obtained by summing the proportion scores for the two pairs representing that type of complexity, and dividing by two (e.g., pair 2 proportion + pair 6 proportion, divided by 2, gives the average proportion score for Incongruity). Finally, an overall curiosity ratio score was obtained by dividing the Total Complex Time by Total Viewing Time. This score is again Complex / Complex + Simple, a summary statement across all 8 pairs without, however, giving equal weight to each pair: it is not the average of the 8 proportion scores.

APPENDIX K

BRIEF ANXIETY AND DEPRESSION QUESTIONNAIRE

The following anxiety and depression questionnaire, a subset of items from the Minnesota Multiphasic Personality Inventory (MMPI), was developed by W. G. Shipman (Shipman, 1963). This instrument was orally administered to the mothers at both the first and second follow-up testing sessions. The tester read each of the 44 items to the respondent and asked her to indicate "true" if the item was true or mostly true as applied to her, and "false" if the item was not usually true or not true at all as applied to her.

The 44 items, in order of administration, were:

1. My daily life is full of things that keep me interested.
2. I am easily awakened by noise.
3. I believe I am no more nervous than most others.
4. At times I feel like smashing things.
5. I work under a great deal of tension.
6. My judgment is better than it ever was.
7. I cannot keep my mind on one thing.
8. I am a good mixer.
9. I am more sensitive than most other people.
10. Everything is turning out just like the prophets in the Bible said it would.
11. I frequently find myself worrying about something.
12. I sometimes keep on at a thing until others lose their patience with me.
13. I am usually calm and not easily upset.
14. I sometimes tease animals.
15. I am happy most of the time.
16. I usually feel that life is worthwhile.
17. I have periods of such great restlessness that I cannot sit long in a chair.
18. I go to church almost every week.
19. I have sometimes felt that difficulties were piling up so high that I could not overcome them.
20. I believe in the second coming of Christ.
21. I certainly feel useless at times.
22. I do not worry about catching diseases.
23. I find it hard to keep my mind on a task or job.
24. Criticism or scolding hurts me terribly.

25. I am not unusually self-conscious.
26. I certainly feel useless at times.
27. I am inclined to take things hard.
28. At times I feel like picking a fist fight with someone.
29. I am a high strung person.
30. Sometimes, when I am embarrassed, I break out in a sweat which annoys me greatly.
31. Life is a strain for me much of the time.
32. I enjoy many different kinds of play and recreation.
33. At times I think I am no good at all.
34. I like to flirt.
35. I am certainly lacking in self confidence.
36. I brood a great deal.
37. I sometimes feel that I am about to go to pieces.
38. I sweat very easily even on cool days.
39. I shrink from facing a crisis or difficulty.
40. When I leave home I do not worry about whether the door is locked and the windows closed.
41. I do not blame a person for taking advantage of someone who lays himself open to it.
42. At times I am all full of energy.
43. Once in a while I laugh at a dirty joke.
44. I feel anxiety about something or someone almost all the time.

Separate anxiety and depression scores were derived from this questionnaire. The anxiety score was the sum of 1) "true" answers to items 5, 7, 9, 11, 17, 19, 21, 23, 27, 29, 31, 33, 35, 37, 39, and 44, and 2) "false" answers to items 3, 13, 15, 25. The depression score was the sum of 1) "true" answers to items 2, 24, 26, 36 and 2) "false" answers to items 1, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 28, 30, 32, 34, 38, 40, 41, 42, 43.

APPENDIX L

ROTTER INTERNALITY-EXTERNALITY SCALE

The Rotter Internality-Externality Scale, a measure of locus of control, was administered to the mothers at the second follow-up testing session. Locus of control is known to be related to social class, and may be expected to affect the kind of attitudes and values that mothers transmit to their children, and the kinds of expectations and demands they make upon them. Full information on the development of the Rotter I-E Scale can be found in Rotter, 1966.

The test, administered orally, contains 29 forced-choice items. Mothers were instructed to choose the one statement of each pair which she more strongly believed to be true. She was instructed not to choose the item she believed she should choose, or the one she would like to be true, but to choose the one she believed to be actually more true as far as she was concerned.

The 29 items are as follows:

1.a. Children get into trouble because their parents punish them too much.
  b. The trouble with most children nowadays is that their parents are too easy with them.

2.a. Many of the unhappy things in people's lives are partly due to bad luck.
  b. People's misfortunes result from the mistakes they make.

3.a. One of the major reasons why we have wars is because people don't take enough interest in politics.
  b. There will always be wars, no matter how hard people try to prevent them.

4.a. In the long run people get the respect they deserve in this world.
  b. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.

5.a. The idea that teachers are unfair to students is nonsense.
  b. Most students don't realize the extent to which their grades are influenced by accidental happenings.

6.a. Without the right breaks one cannot be an effective leader.
   b. Capable people who fail to become leaders have not taken advantage of their opportunities.

7.a. No matter how hard you try some people just don't like you.
   b. People who can't get others to like them don't understand how to get along with others.

8.a. Heredity plays the major role in determining one's personality.
   b. It is one's experiences in life which determine what they're like.

9.a. I have found that what is going to happen will happen.
   b. Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.

10.a. In the case of the well prepared student there is rarely if ever such a thing as an unfair test.
   b. Many times exam questions tend to be so unrelated to course work that studying is really useless.

11.a. Becoming a success is a matter of hard work, luck has little or nothing to do with it.
   b. Getting a good job depends mainly on being in the right place at the right time.

12.a. The average citizen can have an influence in government decisions.
   b. This world is run by the few people in power, and there is not much the little guy can do about it.

13.a. When I make plans, I am almost certain that I can make them work.
   b. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.

14.a. There are certain people who are just no good.
   b. There is some good in everybody.

15.a. In my case getting what I want has little or nothing to do with luck.
   b. Many times we might just as well decide what to do by flipping a coin.

16.a. Who gets to be the boss often depends on who was lucky enough to be in the right place first.
   b. Getting people to do the right thing depends upon ability, luck has little or nothing to do with it.

17.a. As far as world affairs are concerned, most of us are the victims of forces we can neither understand, nor control.
b. By taking an active part in political and social affairs the people can control world events.

18.a. Most people don't realize the extent to which their lives are controlled by accidental happenings.
b. There really is no such thing as "luck."

19.a. One should always be willing to admit mistakes.
b. It is usually best to cover up one's mistakes.

20.a. It is hard to know whether or not a person really likes you.
b. How many friends you have depends upon how nice a person you are.

21.a. In the long run the bad things that happen to us are balanced by the good ones.
b. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.

22.a. With enough effort we can wipe out political corruption.
b. It is difficult for people to have much control over the things politicians do in office.

23.a. Sometimes I can't understand how teachers arrive at the grades they give.
b. There is a direct connection between how hard I study and the grades I get.

24.a. A good leader expects people to decide for themselves what they should do.
b. A good leader makes it clear to everybody what their jobs are.

25.a. Many times I feel that I have little influence over the things that happen to me.
b. It is impossible for me to believe that chance or luck plays an important role in my life.

26.a. People are lonely because they don't try to be friendly.
b. There's not much use in trying too hard to please people, if they like you, they like you.

27.a. There is too much emphasis on athletics in high school.
b. Team sports are an excellent way to build character.

28.a. What happens to me is my own doing.
b. Sometimes I feel that I don't have enough control over the direction my life is taking.

29.a. Most of the time I can't understand why politicians behave they do.
b. In the long run the people are responsible for bad government on a national as well as on a local level.

Items 1, 8, 14, 19, 24, and 27 are filler items which are not scored. One point was given for "a" choices on items 2, 6, 7, 9, 16, 17, 18, 20, 21, 23, 25, and 29. One point was given for "b" choices on items 3, 4, 5, 10, 11, 12, 13, 15, 22, 26, and 28. The total score then represented the respondent's Externality Score.

APPENDIX M

THE JAMES-PHARES LOCUS OF CONTROL INVENTORY

The James-Phares Locus of Control Inventory, originally developed by Phares (1957) and James (1957), and expanded to the present 60 items as reported by Liverant & Scodel (1960), was administered to the mothers during the first follow-up testing session. The Rotter I-E Scale discussed in Appendix L is a further refinement and development of the James-Phares Locus of Control Inventory.

The odd-numbered items in the inventory are filler items and are not scored. The even-numbered, scored items follow:

2. Wars between countries seem inevitable despite efforts to prevent them.

4. It is usually true of successful people that their good breaks far outweighed their bad breaks.

6. Many times I feel that we might just as well make many of our decisions by flipping a coin.

8. The actions of other people toward me many times have me baffled.

10. Getting a good job seems to be largely a matter of being lucky enough to be in the right place at the right time.

12. A great deal that happens to me is probably just a matter of chance.

14. I feel that I have little influence over the way people behave.

16. Much of the time the future seems uncertain to me.

18. Some people seem born to fail while others seem born for success no matter what they do.

20. It is more difficult for ordinary people to have much control over what politicians do in office.

22. I feel that many people could be described as victims of circumstances beyond their control.

24. It seems many times that the grades one gets in school are more dependent on the teachers' whims than on what the student can really do.

26. It isn't wise to plan too far ahead because most things turn out to be a matter of good or bad fortune anyhow.

28. I can't understand how it is possible to predict other people's behavior.

30. When things are going well for me, I consider it due to a run of good luck.

32. There's not much use in trying to predict which questions a teacher is going to ask on an examination.

34. Most people don't realize the extent to which their lives are controlled by accidental happenings.

36. I have usually found that what is going to happen will happen, regardless of my actions.

38. Most of the disappointing things in my life have contained a large element of chance.

40. I don't believe that a person can really be a "master of his fate."

42. Success is mostly a matter of getting good breaks.

44. Events in the world seem to be beyond the control of most people.

46. I feel that most people can't really be held responsible for themselves since no one has much choice about where he was born or raised.

48. Many times the reactions of people seem haphazard to me.

50. There's not much use in worrying about things...what will be, will be.

52. Success in dealing with people seems to be more a matter of the other person's moods and feelings at the time rather than one's own actions.

54. I think that life is mostly a gamble.

56. Many times I feel that I have little influence over the things that happen to me.

58. Sometimes I feel that I don't have enough control over the direction my life is taking.

60. Life is too full of uncertainties.

Respondents were asked to "strongly agree," "agree," "disagree," or "strongly disagree" with each item as it was read to them. Three points were given for each scored item to which a response of "strongly agree" was given; two points for "agree," one point for "disagree" and no points for "strongly disagree." The total score represented the subject's Externality rating.

Sample filler items were: "I like to read editorials whether I agree with them or not"; "I believe the government should encourage more young people to make science a career"; "I disapprove of girls who smoke cigarettes in popular places"; "I enjoy reading a good book more than watching television"; "At one time I wanted to become a newspaper reporter"; "I believe the government has been taking over too many of the affairs of private industrial management"; "I get more ideas from talking about things than from reading about them"; "I rarely lose when playing card games"; "I sometimes stick to difficult things too long even when I know they are hopeless."

APPENDIX N

LOCUS OF CONTROL PICTURE TEST FOR CHILDREN

The Locus of Control Picture Test is an experimental instrument developed by Linda Willson (University of Chicago) with the help of Virginia C. Shipman, one of the authors of this study. The instrument consists of a series of 16 cartoons depicting academic or social situations; one character in each cartoon is shown asking the other a question about his success or failure in the situation. The child is asked to pick an explanation for the success or failure from a series of forced-choice responses ("tell me which one you think the boy--or girl--will say").

The 16 questions, and possible responses, are as follows:

1. Why do you think your marks went up this year?
_____ a. The teacher likes me.
_____ b. I tried harder this year.

2. Why don't you remember these words?
_____ a. I didn't learn them.
_____ b. The words are too hard.

3. How come you got 100 in the spelling test?
_____ a. I studied hard.
_____ b. The test was easy.

4. Why did the teacher move you out of our group?
_____ a. She doesn't like me.
_____ b. I didn't do my work right.

5. Why did the teacher say your work is very good?
_____ a. The teacher said it to be nice.
_____ b. Because I worked very hard.

6. Why couldn't you do the arithmetic problem?
_____ a. I didn't study.
_____ b. The problem was too hard.

7. Why did you get a star on your paper?
_____ a. Because I did a good job.
_____ b. Because the teacher likes me.

8. Why did the teacher say you didn't do very well today?
_____ a. Because the teacher was mad at me.
_____ b. My work was very sloppy.

9. Why couldn't you spell the word when the teacher called on you this morning?
_____ a. The word was too hard.
_____ b. I didn't do my homework.

10. How come you weren't invited to John's (Mary's) party?
_____ a. He (she) doesn't like me.
_____ b. I was mean to him (her).

11. Why don't you remember these words?
_____ a. I didn't learn them.
_____ b. The words are too hard for me.

12. How come you're captain of the team?
_____ a. Because I play verywell.
_____ b. The teacher just picked me.

13. Why did the teacher pick you to lead the line?
_____ a. I was good in class today.
_____ b. Because I'm tall.

14. Why is she (he) always mean to you?
_____ a. Because I'm not nice to him (her).
_____ b. Because he (she) doesn't like me.

15. Why did your group win the game?
_____ a. The other team was bad.
_____ b. We played very well.

16. Why couldn't you do the arithmetic problem?
_____ a. I didn't study.
_____ b. The problem was too hard for me.

The Internality Score ("Total Internalized Choices") was the sum of "a" responses to items 2, 3, 6, 7, 11, 12, 13, 14, 16 and of "b" responses to items 1, 4, 5, 8, 9, 10, 15. It will be noted that items 11 and 16 duplicate items 2 and 6; they were used to check the child's consistency.

REFERENCES

REFERENCES

Battle, Esther S., & Rotter, J. B. Children's feelings of personal control as related to social class and ethnic group. Journal of Personality, 1963, 31, 482-490.

Bear, R. M. Selective visual attention as a manifestation of curiosity motivation: Its measurement and susceptibility to reinforcement. Unpublished doctoral dissertation, University of Chicago, 1967.

Bloom, B. S. Stability and change in human characteristics. New York: Wiley, 1964.

Campbell, D., and Fiske, D. Convergent and discriminant validation by the multitrait-multimethod matrix. Psychological Bulletin, 1959, 56, 81-105.

Coop, Richard H. Learning and cognitive style: past, present and future. Draft of paper presented at American Educational Research Association Annual Meeting in Los Angeles, February, 1969.

Cooper, B. An analysis of the reading achievement of White and Negro pupils in certain public schools of Georgia. School Review, 1964, 72, 462-471.

Davis, A. Social class influences upon learning. Cambridge, Massachusetts: Harvard University Press, 1948.

Deutsch, M. , & Brown, B. Social influences in Negro-White intelligence differences. Journal of Social Issues, 1964, 20 (2) , 24-35.

DeVries, Rheta. Performance of bright, average, and retarded children on Piagetian concrete operation tasks. Unpublished monograph, University of Chicago, Early Education Research Center, in preparation.

Gray, S. W., & Klaus, R. A. The Early Training Project and its general rationale. In R. D. Hess & R. M. Bear (Eds.), Early education: Current theory, research, and action. Chicago: Aldine, 1968.

Fisher, R. Failure of the conceptual styles test to discriminate normal and highly impulsive children. Journal of Abnormal Psychology, 1966, 71, 429-431.

Flavell, John H. Developmental psychology of Jean Piaget. Princeton, New Jersey: Van Nostrand, 1963.

Freeberg, Norman E. & Payne, Donald T. Parental influence on cognitive development in early childhood: a review. Child Development, 1967, 38 (1), 65-89.

Hess, R. D. , & Shipman, V. C. Cognitive elements in maternal behavior. Minnesota Symposia on Child Psychology , Vol. 1. Minneapolis: University of Minnesota Press, 1967.

Inhelder, B. & Piaget, J. The growth of logical thinking from childhood to adolescence. New York: Basic Books, 1958.

James, W. H. Internal versus external control of reinforcement as a basic variable in learning theory. Unpublished doctoral dissertation, Ohio State University, 1957.

Kagan, J. Impulsive and reflective children: the significance of conceptual tempo. In J. Krumboltz (Ed.) , Learning and the Educational Process. Chicago: Rand McNally and Company, 1965a.

Kagan, J. Reflection - impulsivity and reading ability in primary grade children. Child Development, 1965b , 36 , 609-628.

Kagan, J., Pearson, L. & Welch, L. The modifiability of an impulsive tempo. Journal of Educational Psychology, 1966a , 57 , 359-365.

Kagan J. Reflection-impulsivity: the generality and dynamics of conceptual tempo. Journal of Abnormal Psychology, 1966b , 71 , 17-24.

Kagan, J. , Moss, H. A. , & Sigel, I. Psychological significance of styles of conceptualization. Society for Research in Child Development Monographs , 1963 , 28 (2, Serial No. 86) , 73-112.

Kagan, J. , Rosman, B. , Day, D. , Albert, J. , & Phillips, W. Information processing in the child: significance of analytic and reflective attitudes. Psychological Monographs , 1964 , 78 , No. 1 (Whole No. 578).

Kennedy, W. A., Van de Reit, V., & White, J. C., Jr. A normative sample of intelligence and achievement of Negro elementary school children in the southeastern United States. Monographs of the Society for Research in Child Development, 1963, 28, (6, Serial No. 90).

Kohlberg, L. Cognitive stages and preschool education. Human Development, 1966, 9, 5-19.

Kohlberg, L. Stages in children's conceptions of physical and social objects in the years 4 to 8 -- a study of developmental theory. Unpublished monograph, multigraphed (in preparation for publication).

Kohn, Nancy. The development of culturally disadvantaged and middle class negro children on Piagetian tests of concrete operational thought. Doctoral dissertation, University of Chicago, in preparation.

Liverant, S., & Scodel, A. Internal and external control as determinants of decision making under conditions of risk. Psychological Reports, 1960, 7, 59-67.

Loban, W. The language of elementary school children: A study of the use and control of language and the relations among speaking, reading, writing, and listening. Champaign, Ill.: National Council of Teachers of English, 1963. (NCTE Research Report, No. 1).

Lucco, Alfred. The curiosity behavior of four-year-old children: an exploratory study. Unpublished doctoral dissertation, The University of Chicago, 1964.

Maccoby, E. E. (Ed.). The development of sex differences. Stanford, California: Stanford University Press, 1966.

Maccoby, E. E., Dowley, E. M., Hagen, J. W., & Degerman, R. Activity level and intellectual functioning in normal preschool children. Child Development, 1965, 36, 761-770.

Maier, N. Frustration: The study of behavior without a goal. New York: McGraw-Hill, 1949.

Miller, S. M., Riessman, F., and Seagull, A. A. Poverty and self-indulgence: a critique of the non-deferred gratification pattern. In L. Ferman, et al (Eds.), Poverty in America. Ann Arbor: University of Michigan Press, 1965.

Minuchin, S., Montalvo, B., Guerney, B., Rosman, B., & Schumer, F. Families of the slums; an exploration of their structure and treatment. New York: Basic Books, 1967.

Mischel, W. Preferences for delayed reinforcement: an experimental study of cultural observation. Journal of Abnormal and Social Psychology, 1958, 56, 56-61.

Mischel, W. Preference for delayed reinforcement and social responsibility. Journal of Abnormal and Social Psychology, 1961a, 62, 1-7.

Mischel, W. Delay of gratification, in achievement and acquiescence. Journal of Abnormal and Social Psychology, 1961b, 62, 543-552.

Mischel, W. Father absence and delay of gratification: cross-cultural comparisons. Journal of Abnormal and Social Psychology, 1961c, 63, 116-124.

Mischel, W. & Metzner, R. Preference for delayed reward as a function of age, I.Q. and length of delay interval. Journal of Abnormal and Social Psychology, 1962, 64, 425-431.

Osborne, R. T. Racial differences in mental growth and school achievement: A longitudinal study. Psychological Reports, 1960, 7, 233-239.

Phares, E. J. Expectancy changes in skill and chance situations. Journal of Abnormal and Social Psychology, 1957, 54, 339-342.

Piaget, J. The origins of intelligence in children. New York: International University Press, 1952a.

Piaget, J. The child's conception of number. New York: Humanities Press, 1952b.

Piaget, J. The construction of reality in the child. New York: Basic Books, 1954.

Piaget, J. The child's conception of the world. Totawa, New Jersey: Littlefield Adams & Co., 1967. (Originally published by Harcourt Brace, 1929).

Piaget, J. Six psychological studies. New York: Vintage Books, 1968.

Piaget, J. & Inhelder, B. Les images mentales. In P. Fraisse and J. Piaget (Eds.), Traité de psychologie, Vol. VII. Paris: P.U.F., 1963.

Piaget, J. & Taponier, S. Recherches sur le developpement des perceptions. XXXII L'estimation des longueurs de deux droites horizontales et parallèles à extremités décalées. Arch. Psychol., Genève, 1955-56, 35, 369-400.

Rotter, Julian B. Generalized expectancies for internalized vs. externalized control of reinforcements. Psychological Monographs: General and Applied, 1966, 80(1), 1-28.

Shipman, W. G. A one-page scale of anxiety and depression. Psychological Reports, 1963, 13(1), 289-290.

Sigel, I. E. Sex and personality correlates of styles of categorization among young children. American Psychologist, 1963, 18, 350 (Abstract).

Sigel, I. E. The attainment of concepts. In M. L. Hoffman, & L. W. Hoffman (Eds.), Review of Child Development Research, Vol. I. Russell Sage Foundation, New York, 1964.

Sigel, I. E. Styles of categorization in elementary school children: The role of sex differences and anxiety level. Paper presented at the meeting of the Society for Research in Child Development, Minneapolis, Minnesota, March, 1965.

Sigel, I. E. Cognitive style in lower class children. Paper presented at the meetings of the American Educational Research Association, New York, New York, February, 1967.

Sigel, I. E., Jarman, P., & Hanesian, H. Styles of categorization and their intellectual and personality correlates in young children. Human Development, 1967, 10, 1-17.

Singer, J. Delayed gratification and ego development. Journal of Consulting Psychology, 1955, 19, 259-266.

Ward, W. Reflection-impulsivity in kindergarten children. Child Development, 1968, 39, 867-874.

White, R. W. Competence and the psychosexual stages of development. In M. R. Jones (Ed.), Nebraska Symposium on Motivation. Lincoln, Nebraska: University of Nebraska Press, 1960.

Yando, R. & Kagan, J. The effect of teacher tempo on the child. Child Development, 1968, 39, 27-34.