

AN INVESTIGATION AND ANALYSIS
OF
SIX NURSERY-KINDERGARTEN CHILDREN'S RESPONSES
TO
THE UNFINISHED SYMBOL ACTIVITY

by

Nancy Winder Karnen

A Thesis

Submitted in partial fulfillment
of the requirements for the degree of
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ABSTRACT





The intent of this study was to conduct a formal, indepth investigation and analysis of information collected from six English as a second language students' responses to the Unfinished Symbol activity. The study was designed to collect information from children in a natural setting in order assess growth and generate questions for further research. The task involved asking children to create a representation using each of four unfinished figures (, , , ) as a stimulus. Responses were analyzed on the basis of motor coordination (pencil control), cognitive development (approach to task, concepts represented, changes in representations, amount of detail), language development (gestures used in descriptions, utterance length, noun phrase complexity, types of words), and language use (categories and strategies of language use). Data was collected over a three month period through task completion activities, observations, and tape recordings. Each child was involved in one 30 minute session each month. The information was analyzed by frequency counts, Mean Length of Utterance, the Noun Phrase index, and Tough's language appraisal system. Results yielded an indication of the children's developmental levels, language complexity and competence, and reading readiness.

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Chapter 1

INTRODUCTION

The purpose of the study was to conduct a formal indepth investigation and analysis of the information collected from six ESL children's responses to the unfinished symbol. The ultimate goal was to generate hypotheses which then could be used for further research.

Development of the Study

For the past seven years the writer has taught nursery-kindergarten in an inner city school which has a large immigrant population. A division-wide screening program is an integral part of the kindergarten year. Two of the purposes of the program are (a) to identify the strengths and areas of difficulty children have when they enter school and (b) to provide programs to meet the needs of children. The program covers the following areas of development: gross motor, sensory (vision and hearing), social/emotional, language and school readiness. A standardized test, the Sprigle School Readiness Screening Test, is administered to indicate a child's readiness to handle learning demands in school. The test measures the following areas: verbal comprehension, awareness of size relationships, visual discrimination, reasoning ability, understanding of numbers, comprehension of analogies, information background and ability in spatial relationships.

As the test is based on an understanding of an ability to use English, the writer found that some of the children in her class whose first language was not English (hereafter referred to

as ESL children) had difficulty with the test. Therefore, an attempt was made to find a non-threatening activity which focused on the children's experiences, which could be completed in the classroom, and to which the children could respond graphically, linguistically or with gestures. Unlike standardized tests, which require specific answers to information which may or may not be within the child's experiences, the responses to the unfinished symbol are drawn from the child's breadth of experiences and are limited only by that knowledge.

There is a concern that standardized tests fail to give any evidence of the process involved as the child searches for the correct answer. The emphasis on process is found in Cocking and Copple's (1979) study of children's conceptual knowledge of objects and events as revealed by comments made during the drawing process. Information about children's conceptual knowledge can be gained from recording and analyzing what they say about their experiences as they are drawing.

The unfinished symbol focuses not only on the completed activity but also on the child's comments during the drawing process. Classroom observations of the completion process yielded some information about the child's verbal comprehension, awareness of size and spatial relationships and visual discrimination and reasoning abilities.

In addition to this information, the writer found that the

children's responses to the unfinished symbol could provide insights into (a) their fine motor abilities, (b) thought processes expressed non-verbally and through language and (c) the children's use of language.

The Problem

The purpose of the study was to conduct a formal indepth investigation and analysis of the information collected from six ESL children's responses to the unfinished symbol. The ultimate goal was to generate hypotheses which then could be used for further research.

The research environment affects how the child responds to the activity. Therefore the study was conducted in the children's classrooms where their responses were tempered by all of the influences of that setting.

Since motor, cognitive and language development and language use are areas examined by teachers and measured by other devices, the responses to the symbol were analyzed in terms of those factors.

An assessment of motor coordination is included in screening programs and is of concern to teachers. Since the unfinished symbol requires the child to use a pencil, some indication of fine motor coordination (with pencils) can be provided. Therefore pencil control, in terms of steadiness of lines and pressure used, was investigated.

Cognition is another area of concern to teachers. The aspect of cognitive development that is of particular interest in this

study, is the pattern of ideas or concepts a child has developed through past experiences which influences his or her perception of new information; in other words, the cognitive schema. Examining the child's approach to the task, concepts expressed, changes in representations and details within a symbol can provide insight into the child's cognitive schema whether that information is expressed verbally or nonverbally through drawings or gestures.

Carroll stated that "one characteristic of a language that can be used in general communication is that it provides words or linguistic forms sufficient to catalog or describe nearly all the experiences or classes of experiences that occur to the user of the language" (Carroll, 1964, p. 90).

As a classroom teacher, the writer is interested in the linguistic forms the child uses. The length of the child's utterance gives some indication of the child's linguistic complexity. Linguistic complexity is partially determined by the elaboration of noun and verb phrases and the use of anaphoric pronouns. Therefore the writer examined the complexity of noun phrases and the frequency with which pronouns, nouns and modifiers were used.

Joan Tough (1977) and Sigel and Cocking (1977) proposed that to succeed in the educational system, children need to have the ability to decenter; in other words, to be able to make associations between their experiences in the past and present to predict future experiences. By discovering new ways of using their language, children can learn to make these associations.

Therefore, the ways in which the children used their language were examined.

Based on the above concerns the writer examined the children's responses to the symbol to determine if, over a three month period, there was a change in the information about:

Motor Coordination

1. The ability to control the pencil.
2. The pressure used in producing the lines.

Cognitive Development

1. The approach to the task: response time; directionality; imitation, repetition, and closure of the symbol.
2. The amount of detail included in drawings by those children who responded immediately and those who delayed their responses to the symbol.
3. The number and kinds of changes from one representation to another within a single drawing. This would be determined verbally.
4. The number and kinds of concepts represented e.g. concrete, abstract.

Language Development

1. The move from gestures to words used in describing the drawing.
2. The length of utterance.
3. The type of words used to describe the drawing e.g. nouns, pronouns, descriptors, and relational terms.

Language Use

1. The use of language from self-maintaining, directing, reporting to predicting, reasoning, and projecting categories.

2. The strategies used within the categories of language use e.g. self-maintaining, directing, etc.

Definitions

Cognitive development refers to the development of the process whereby an organism becomes aware of or obtains knowledge about an object. It includes perceiving, recognizing, understanding, judging and reasoning.

Cognitive schema is a complex pattern of concepts, structured by past experiences, which combines with the properties of the presented object or idea to determine how the object or idea is perceived or conceptualized (English and English, 1958, p. 93).

Concept is defined as "the internal representation of a certain class of experiences, these experiences being either the direct response to aspects of the external environment, or responses to other experiences" (Carroll, 1964, p. 81).

ESL children are children whose native language is other than English. For the purposes of this study, ESL children are those who have lived in Canada for at least 2 years but were born elsewhere. It is assumed that children who have lived in Canada for 2 years have had exposure to English and have some ability to speak English.

Mediated learning refers to intervention in a child's activity by an adult for the purpose of stimulating, extending, expanding, and developing strategies within the child's thinking or language. The forms of intervention used in this study, are orienting, enabling and elaborating questions and comments.

Representation refers to the "act of re-presenting which is bringing previous thoughts, ideas, words, etc. back into awareness or consciousness" (Sigel and Cocking, 1977, p. 161; Cocking and Copple, 1979, p. 3). The representation can be expressed either internally, as ideas or thoughts, or externally, as drawings or words.

Thinking is a process of manipulating ideas which emerged as a result of previous sensory experiences that have been identified, interpreted and remembered. The process involves perception, imagery, conceptualization, the utilization of language symbols and subvocal speech (Gale, 1969, pp. 463-464).

The dot-line activity is a line connection task in which the child is required to connect dots which are placed on the paper by an adult. The dots are positioned in such a way as to provide the opportunity for line crossing with each connection after the third dot is placed.

The unfinished symbol activity is a figure completion task in which the child is presented with an unfinished figure and is asked to draw a picture incorporating the symbol. The symbols used in this study were

Significance of the Problem

Both Torrance and Feuerstein have found that standardized tests, particularly IQ and scholastic aptitude tests, did not give accurate information about their students' abilities. Torrance, in his work with culturally different students, found that tests which allowed learners to respond in terms of their past experiences,

gave much more accurate information regarding their creative abilities than did standardized tests.

Feuerstein found that retarded learners and culturally disadvantaged students failed to respond correctly to standardized tests. He found that there were serious flaws in their thinking or certain cognitive deficiencies which prevented them from approaching tasks appropriately (Chance, 1981, p. 65). Through mediated learning experiences, students learned how to interact with the environment and to increase their capacity to use efficiently and be affected by those experiences contained within that environment (Feuerstein, 1980, p. 16).

Tough, in her work with children's use of language, incorporated the mediated learning experience in the process. She believes adults can help children learn to use language in a variety of ways by asking questions which assist the children to extend their interpretations of information, and which direct their thinking toward a particular topic.

Day (1981) found that a relaxed, non-threatening atmosphere with few teacher demands, was conducive to eliciting language from ESL children who had previously been labeled "nonverbal".

The unfinished symbol activity is based on and incorporates the above findings:

1. It provides an opportunity for the teacher and child to come together to share information in a friendly atmosphere.
2. The response draws on the child's own experiences and provides information about the child's motor coordination, cognitive and language development and language use.

3. It is a mediated learning experience in which the adult helps to extend and expand a child's thinking through questions and comments.

The writer believes that the unfinished symbol activity is an alternate method for gathering information about children based on their own experiences.

Theoretical Background for the Study

Research from five areas of the literature provide the rationale for this study. They are (a) cognition and children's drawings (Goodnow, 1977; Kellogg, 1967), (b) unfinished symbols (Torrance, 1977; Winnicott as cited in Tizard, 1972), (c) mediated learning experiences (Feuerstein, 1980; Tough, 1976), (d) English as a second language research (Day, 1981; Gonzales and Hansen-Krening, 1981; Ireton, 1981; Tough, 1977), and (e) language development (Cazden, 1972; Dale, 1976; Sigel and Cocking, 1977).

Kellogg and Goodnow have studied children's drawings in terms of development. Kellogg (1967) identified four stages universally found in children's work. They range from scribbles occurring at 2-3 years to drawings which are clearly defined and recognized as objects and occur around 5-7 years.

Goodnow (1977) found children used specific strategies in constructing their pictures. She described these as attention to sequence, analysis of patterns and the development of understanding and use of equivalents. The use of these strategies in constructing representations involves "thrift, conservatism, organization and sequence which are features of problem-solving" (Goodnow, 1977, p. 145).

Winnicott and Torrance have used squiggles and incomplete figures as a means of establishing communication with and eliciting information from children.

Torrance (1977) used incomplete figures as a means of identifying and releasing creativity in the culturally different child. He developed the Torrance Tests of Creative Thinking in response to a finding that 70% of creative children remained unidentified when working with the highest 20% identified by IQ tests (Torrance, 1977, p. 13). The creativity tests are open-ended verbal and figural activities which allow children to respond at their own levels and in the context of their own experiences and culture (Torrance, 1970, p. 95).

Of the three figural tasks, the incomplete figure activity pertains to the present study. In completing the figure, which results in an external representation, the child draws on previous experiences to make sense out of a nonsense form. The process involves the child's use of flexibility, originality and elaboration which are features of divergent thinking.

According to Feuerstein (1980), processing patterns can be modified. He proposed that students could be helped to acquire more effective behavior patterns through mediated learning experiences.

According to both Feuerstein and Tough, adult intervention is a necessity in assisting children to acquire adaptive, problem-solving behaviors. Tough concluded that to succeed in school, it is necessary to develop an ability to recognize problems, make

comparisons and see events in context. She proposed that through conversations with adults, children can develop these abilities by learning to use language for predicting, making comparisons and making cause-effect statements.

Gonzales and Hansen-Krening (1981), in their work with ESL students, proposed that language learning must occur in a language rich, interaction-based environment where talk is used for problem solving, experimenting and hypothesizing.

Day and Ireton also have conducted research with ESL students. Day (1981) concluded that in order to facilitate language expression, children require a relaxed, informal, low-risk atmosphere in which they are encouraged to talk. Ireton (1981) found that, in addition to informal settings, peer interaction provided a high level of motivation for learning English.

Tough emphasized the importance of peer interaction in learning a second language. She found that prerequisites for children learning a second language were that "the child is settled in school, is able to join activities and that he should have established relationships with others in the classroom which ensure that there will be an impetus to communicate and learn English" (Tough, 1977, p. 106).

After children learn English, they must develop the ability to express themselves. Children need to learn to give complete verbal descriptions of objects and events so that others may understand and recognize what they are attempting convey.

The measures, that were used in this study, can provide an

indication of language growth over a period of time. The MLU has validity as an index of linguistic complexity. As the utterance length increases, the utterance complexity increases and specific grammatical features appear. The noun phrase is one of those features. The noun phrase index yields information about the complexity of the phrases used (Cazden, 1972; Dale, 1976). The number of descriptors is an indication of reading readiness. Sinclair-de-Zwart found an increased use of differentiated and relational terms by children who were able to conserve (Dale, 1976). An analysis of the child's language gives teachers information from which to build programs appropriate to the child.

Design and Procedures

In designing this study, there were several factors which needed to be considered. The writer investigated the symbol as a method of gathering information about children and was interested in the cognitive processes which allowed the completion of the symbol. Interaction between the adult and child, which is inherent in the activity, was crucial in understanding those processes. Since the researcher was a participant observer in the task and process information could only be gathered during the activity, observation and tape recordings were essential in obtaining that information. For the task to be an alternative method of gathering information about the child, the study had to be conducted in the classroom. The arrangements of the study necessarily affected the children's responses, therefore the classroom environment with the prevailing daily influences, was chosen as the setting for the activity.

Both Goodnow (1977) and Brittain (1979) concluded that studies should occur in the natural environment as it is easier to generalize if one is working with everyday behavior.

Guba, in a speech to the International Reading Council, contrasted the rationalist and naturalist research methods. He proposed that the method chosen should fit the requirements of the research. He concluded that the rationalist method, which breaks the world into variables in order to see relationships, is not appropriate for studying processes and interactions with the environment (Guba, 1982, p. 21).

Bogden and Biklen (1982) differentiated qualitative from quantitative research. Aspects of qualitative research which describe this study are: a small non-representative sample, participant observation, a focus on understanding and process, descriptive data gathered through observation, open ended interviewing and transcripts, and ongoing data analysis which resulted in some changes in procedure.

This study involved some quantitative aspects as well in terms of specific procedures, consideration of some variables and random selection of children.

Six nursery and kindergarten children, for whom English is a second language and who have lived in Canada for at least 2 years but were born elsewhere, were the subjects for this study. Since the majority of new immigrant families live within the Winnipeg School Division No. 1 boundaries, the children were selected from one school in that division.

The task involved both the dot-line and unfinished symbol activities and was conducted in the classroom where the child was familiar with the surroundings and was less inhibited about entering and completing the new activity. Four sessions were held with each child between February 26 and May 12, 1982. During each session the child was asked to complete the dot-line task and a series of four unfinished symbols. Drawings taken from sessions spaced over a 3 month period demonstrated growth and yielded more accurate insights into the cognitive processes than would have been available from a shorter period.

A tape recorder was used to record the conversations which occurred during the task. This allowed the child and writer to concentrate on the task and encouraged more spontaneous responses. Two observers were present to keep a running record of the child's behavior during the task. This information, in conjunction with the tape recording, gave added contextual information for use during the analysis of the responses.

Analysis of the Data

The responses were analyzed to determine if there were changes in:

1. Motor coordination--control of the pencil and pressure used.
2. Cognitive information--spatial patterns (involves representations, details), spatial relations, sequence, equivalents, concepts, fluency (changes in representations), elaboration (amount of detail), strategies in approaching the task.
3. Response time.

4. Language development--nonverbal/verbal responses, utterance length, linguistic complexity, parts of speech.

5. Language usage--self-maintaining, directing, reporting on past experiences, logical reasoning, predicting, projecting, imagining (Tough, 1976).

Observations were used to assess changes in motor coordination, spatial patterns and relations, sequence, elaboration, and strategies in approaching the task. A stop watch was used to determine response time. Utterance length and linguistic complexity were determined by the MLU and Noun Phrase Index respectively. A frequency count was taken for equivalents, concepts, changes in representations, nonverbal/verbal responses, parts of speech, and language use.

Permission to conduct the study was requested from and granted by the Winnipeg School Division No. 1.

This chapter has provided the reader with an overview of the study including the purpose, the significance of the research, the rationale, the literature supporting the rationale, and the design and procedure used. Chapter 2 contains a broader literature review which provided the basis for interpreting the results, justifying the conclusions and determining the implications.

Chapter 2

REVIEW OF THE LITERATURE

This study was designed to gain insight into children's cognitive processes through their responses to unfinished figures. To accomplish this it was necessary to look beyond the specific task, and the components within that activity, to various factors which influence children's responses.

Studies in ethnography show that human behavior is influenced by the setting in which it occurs. Therefore results from research which study behavior in a contrived context do not easily transfer to the natural environment since the results have been obtained from and influenced by an artificial setting (Wilson, 1977). Although the present study is not a true ethnography, it involves children's behavior in a classroom setting and necessarily involves ethnographic considerations.

Aside from the environmental influences, which include the setting for the study, adult/child relationships, peer influence, and the effects of child culture, there are also factors which are directly related to the child. Because the children in this study are from new immigrant families, there are cultural implications for their adjustment to school. The children in this study were attending nursery and kindergarten. In February, the nursery children ranged in age from 4:4 years to 5:1 years and the kindergarten children were 5:5 years to 6:1 years. Therefore the children's stages of cognitive and drawing development must be considered.

Since the study involves the above-mentioned factors, a

review of the literature pertinent to those aspects was organized in the following manner:

1. Ethnographic considerations--This section includes a rationale for ethnography, information about ethnography of speaking, and the value of viewing the child as interpreter of his environment.

2. Arrangements--This section includes information about: environments which facilitate the growth of trust, language, and creativity; second language considerations and their effect on the child; the effects of adults (teachers, researchers, observers) on the children's learning; and the effect of small groups/peers within the classroom.

3. Communicative task--This part includes a description of a method of eliciting verbalizations from children during a drawing task, incomplete figures task, and information about creativity and problem-solving.

4. Insights into cognitive development/processes--This section includes a description of the children's general stage of cognitive and drawing development; and insights into cognitive processes which can be gained from drawings and through language about those drawings.

Ethnographic Considerations

The rationale for ethnography rests on two premises:

1. Human behavior is profoundly influenced by the settings in which it occurs.

2. The meaning of behavior is derived not only from the act itself, but from interpretations of the act which are determined by the actions, feelings, and thoughts of the participants. (Guba, 1982; Leiter, 1980; Wilson, 1977)

Those interpretations vary according to the attitudes held by the culture or society in which the behavior occurs.

A society can be composed of several cultural groups which can have as a basis, among other factors, ethnic origin and age. According to Goodman (1969), children do have a culture. Through this culture children generate and interpret behavior which is then passed from one child to another throughout childhood. Because

children have a culture, the teacher needs to place herself in the position of an ethnographer to discover how the children see themselves operating. This is especially necessary in situations where there are ethnic, language, or class differences within the childhood culture.

Sitton addressed this issue in his article, "The Child as Informant; The Teacher as Ethnographer", in which he outlined factors which cause teachers to be insensitivity to children's culture.

They are:

1. Translation competence of children--this involves children's maintaining secrecy and telling her teacher that which they think she wants to hear.

2. The power of traditional role differences--the teacher operates as though she were a dispenser of knowledge and the children's role is that of listener.

3. The power of developmental model of childhood--the child passes through a series of developmental stages on his way to becoming a competent adult.

In writing of the third factor, Sitton states that children have a culture as well as a developmental dimension and that developmental model produces only a partial picture of the child and ignores his culture (Sitton, 1980, p. 543).

Teachers can counteract the forces which cause insensitivity by assuming the role of ethnographer and viewing the children as informed sources. By allowing the children to take the lead, teachers can develop a broader understanding of their children (Harrod, 1977; Minns, 1976; Sitton, 1980).

Sherzer addressed another issue which can cause misunderstanding of children. He wrote of the ethnography of speaking

which he defined as "the total organization of uses of language together with societal and individual attitudes toward language and speech" (Sherzer, 1977, p. 148). Factors such as the setting and the way in which the speakers view one another effect the approach to and content of the interaction held. These elements were in operation in the situations Minns described in her article.

In an attempt to learn more about her students, Minns (1976) investigated children's talk under two different conditions. The first setting was an interview between a child and herself. For the other, the children were left alone in a room with a guinea pig. Each session was recorded. From the recordings, she found that the children helped each other to clarify their understanding of events. She gained more information about the children's thinking when she withdrew than when she was in the dominant position. She concluded that we should be less concerned with extracting information from children and be more aware of what they want to learn.

Harrod found that teachers tend to use lessons to transmit information rather than to encourage thinking (Harrod, 1977, p. 100). The "richest" language was used by students when they were in groups by themselves or where the teacher was viewed as an enabler. Language in these situations tended to be used for exploration, discussion, problem-solving, and for verbalizing personal feelings.

Arrangements

The arrangements involve the following considerations:

1. Environment
2. Second language
3. Adult and peer influences.

Environmental Considerations

Regardless of whether children are learning a second language or practicing their first, settings which are most conducive to producing language used for a variety of purposes, are those which involve small groups of children who are engaged in a common activity where the adult is unobtrusive or not present (Cocking & Copple, 1979; Day, 1981; Harrod, 1977; Minns, 1976).

Depending on their purpose, teachers can elicit different responses from children by altering the classroom environment. Thomas and Berk (1981) studied the effects of environments on creativity. They found that the more abstract creative abilities (flexibility and originality) were most positively influenced by informal environments. A formal setting for boys and an intermediate situation for girls were most conducive to the growth of elaboration, a more concrete ability.

Informal environments, where children are engaged in activities, where conversations are based on those activities and adults are present as enablers, are crucial in fostering young children's language learning and growth (Cazden, 1981; Day, 1981; Gonzales & Hansen-Krening, 1981; Ireton, 1981; Tough, 1976).

Cazden outlined four points to be considered when structuring an environment for language learning. They are:

1. Environment refers not only to the school setting but also to individual children. There can be an informal environment in which some children, because of the mode of operation, have few contacts with the teacher.

2. Children enter school having learned patterns of conversation associated with certain settings and have developed their own way of relating either verbally or non-verbally. The

teacher is then responsible for exposing children to new ways of interacting.

3. Consistency and continuity in the adult-child relationship are important factors in broadening the conversational content between the two. Young children tend to assume that the speaker understands their referents. If they have common experiences, the conversation will be more meaningful and efficient.

4. Teachers must make a concerted effort to temper their responses to children's errors and structure the class to minimize time spent on control. (Cazden, 1981, pp. 10-12)

Cazden, Minns, Sitton, and Harrod state that one must take care not to let the teacher language in the environment overshadow the meaning children are attempting to convey. Although Cazden was referring to an environment for language learning, the guidelines are relevant for any classroom where the purpose is the establishment of a setting that will promote trust and communication.

Second Language Considerations

Establishing a trusting relationship with children is especially important when the children are of a minority culture and language group. As teachers become more aware of students as individuals, they increase their understanding of the students needs. Moskowitz expressed the belief that the basic principles of humanistic education are appropriate to second language classes and can, in addition to strengthening the relationship of the teachers and students, improve the students' attitudes toward the majority language, toward themselves and members of their group (Moskowitz, 1979).

Brown (1979), Garvie (1976), and Gonzales (1981) address the problem of assisting the ESL child to adjust to the new

environment while at the same time recognizing the child's culture.

Brown (1979) especially stressed the importance of using the child's mother tongue in his or her early school experiences. It is important for a child to communicate upon entrance into school and if he or she can communicate only in the mother tongue, then the school should provide an adult with whom the child can speak. The benefits of this are threefold:

1. It helps the child view the mother tongue positively.
2. It links the child's language with experiences from both cultures which can lessen the possibility of future difficulties between parents and children. (Brown, 1979, p. 33)
3. It demonstrates to the community that the school recognized the importance of the ESL child's mother tongue.

If schools do not provide this service, the communities could develop negative attitudes towards the schools, thus increasing social distance and making second language learning more difficult (Schumann, 1976).

Garvie (1976), in her approach to second language teaching, proposed that the learning environment must contain elements which highlight similarities between the child's culture and the dominant one. Garvie, like Moskowitz, believes that programs based on the students' immediate needs and interests promote the most effective learning. Garvie joins Tough (1976), Cazden (1981) and others in suggesting that a component of the program should be teachers conversing with children about activities in which the children are involved. If done in small groups, this can be a vehicle for strengthening new information.

Adult Influence

Adults not only can influence children's responses by structuring the learning environment and preparing programs for success, but can do so by modifying their own behavior.

Gonzales (1981) delineated guidelines for teacher behavior which promote wholesome language learning environments. The goal of the behavior is to help non-English speaking children become risk-takers who are willing to use and practice their new language in educational settings. Children become more confident when their language attempts are accepted and their meaning is understood. Teachers play a critical role in assisting children to continue and to extend their language attempts. Adults need to realize that children will talk more willingly about topics that are of interest to or initiated by them than about those of concern to adults.

Mattick suggested several strategies teachers can use to improve their interactions with children. Making the topic relevant to the child, using thought provoking questions and language that is geared to the child's understanding, responding with non-moralistic comments, and reducing the number of unfinished sentences used will enhance the adult/child interactions (Mattick, 1981).

Freer interaction between adults and students can be encouraged by establishing a relationship of mutual trust and respect where adults are viewed as a resource and support who provide help when necessary. This can be achieved by (a) engaging

in activities with children, (b) listening to that which is important to the child, and (c) extending the child's reasoning (Brown, 1979; Dare, 1981; deFreitos & Adkins, 1981; Gonzales, 1981; Mattick, 1981; Tough, 1976).

By constantly reviewing their actions in terms of the criteria outlined by Cazden and Mattick, teachers can promote trusting relationships with their students. Those relationships are constantly evolving as the teachers and children learn more about each other.

Introducing unfamiliar personnel to the classroom, whether they are from within or outside the school, alters the classroom dynamics and the subsequent behavior of the students. When Brittain (1979) and his colleagues collected the data on children's art, the researchers spent several hours in the classroom in an attempt to establish rapport and reduce the artificiality produced by their presence. The accuracy of test results can also be improved by having someone familiar to the children, administer the tests.

Peer Influence

Adults are not the only ones who affect the students' performance. Classmates have an effect that teachers and other adults can use to enhance the students' learning. Minns found that children talked more when left with each other and helped to clarify each other's thinking. Peer interaction is also important in second language learning either for tutoring, as suggested by Brown (1979) and Gonzales (1981), or for providing

an opportunity for practicing English and for learning new information as suggested in the Indochinese Refugee Education Guide (1975), Day (1981), Ireton (1981), and Tough (1977).

Cocking and Copple (1979) found that peer interaction affected children's verbalizations when they were drawing. They were studying alternative methods of eliciting valid speech samples which could be used to provide insights into children's conceptualizations, representational thinking, and competence. Since children comment on the content of each other's drawings, small groups were used as a medium for eliciting language. It was assumed that such situations would yield more valid representative linguistic samples than individual or free speech samplings. They found children employed a wider diversity of language use when in small groups than when they were alone.

The drawing activity developed by Cocking and Copple is based on successful communication and is an example of a task which is efficient in eliciting language to give insights into children's cognitive processes.

McDermott suggests successful communication is the key ingredient for a successful classroom. He states that when "two or more people are able to construct a world with enough shared meaning, with enough common sense, then mutual definitions of a task to be done and mutual goals for doing it will be achieved easily and the essential behavior will be performed" (McDermott, 1977, p. 156).

In this section the literature reviewed has given an

indication of the kind of environment which fosters interaction, creativity, and language growth; factors to be considered when establishing environments and programs for ESL children; and the influence of adults and peers on individual children's learning and language.

Communicative Task

The communicative task refers to activities which: engage children in drawing tasks; generate conversations between children and children and adults; stimulate creativity and promote problem-solving strategies.

Carolyn Burke, in a comment on child informant studies in the past decade, reported that researchers suggest that the role of those studying child language is the development of tools which will encourage children to present their intuitive language for examination (Burke, 1980, p. 487).

As was previously stated, Cocking and Copple (1979) devised a method for generating child language in order to study children's conceptual knowledge. Since children's representations are affected by the restraints of memory, serial order, and frame of reference, Cocking and Copple designed their research to counteract those restraints. Verbalizations between children counteract the effects of poor memory retrieval by highlighting important parts of the drawing that otherwise might have been forgotten. Therefore, children were placed in groups of three or four and were asked to draw a picture about a common experience. The children's conversations about the objects and events they drew

were recorded and analyzed. The analysis of the conversations during the activities provided information about an aspect of cognitive functioning--the children's representational thought. The authors concluded that valuable insight into the children's thought processes is lost if the analysis involves only descriptions of the completed products.

Verbalizations recorded during the activity were coded according to the following criteria: (a) naming, (b) descriptions of appearance or location, (c) planning, (d) evaluation of peer pictures, and (e) evaluation of their own pictures. Both the younger (3:5 to 4:1 years) and older (4:3 to 4:10 years) children demonstrated the ability to label and describe their drawings. However, the older children demonstrated significant levels of planning, self-evaluative, and peer-evaluative comments. Planning and sequencing statements emerged as children became more reflective.

Cocking and Copple propose that this research has established a cognitive-linguistic link and state "the cognitive model of representational thinking posits that language can aid the child by providing a bridge with the graphic domain when peer influence and a meaningful task are provided which elicit the linguistic behaviors" (Cocking & Copple, 1979, p. 12).

The above study, although investigating representational thought, provides an alternative method to standardized measures for gathering data which can be used as an indication of linguistic competence. The children in the study were not ESL children. However, since the stimulus for the drawings was a common experience, the ESL child could respond with whatever representational ability

and verbal competence he had.

Shea (1981) used the beautiful book method as a means of establishing contact with and noting progress of an ESL child in her kindergarten. The result was a progression from drawing, speaking, and writing to reading. Although Shea didn't use the language for analysis, she did use the drawings to establish a relationship with the child, to gain insight into the child's learning, and to note language progress.

Cocking and Copple's study and Shea's experience with the ESL child demonstrate alternatives for generating linguistic samples which can be used to provide insights into children's thought processes.

Although language was not the focus of Lansing's research, he was concerned with the effect drawing had on the development, growth and retention of mental representations. Lansing (1981) found that: (a) the act of drawing a perceived figure produced more growth in the mental representation of that item than did observing or tracing the figure, (b) the act of drawing an item was more beneficial in producing a different figure accurately than were tracing or observing the object, and (c) the act of drawing produced longer lasting effects on the representations than did other methods. He concluded that drawing is an effective method for helping children learn and remember visual attributes of the objects they produce. He proposed that as the details within and the number of representations increase, children should become more inventive in combining representations. Consequently,

there should be growth in the creative behaviors of fluency, originality, and flexibility (Lansing, 1981).

The above-mentioned creative behaviors were investigated by Torrance. As was mentioned in Chapter One, Torrance used children's drawing responses to the incomplete figure task as a way of identifying and releasing creativity. In responding to the incomplete figure, the child is required to use originality, flexibility, and elaboration. Culturally different children are not penalized by the tests since the responses are based on their own experiences and don't have to conform to predetermined standards.

Cocking and Copple found more planning and sequencing statements among the more reflective students. Torrance found that children who were unable to resist closing the figure tended to produce common-place drawings.

The tasks investigated by Cocking and Copple, Torrance, and the present study involve problem identification, solving, and testing. Torrance states creativity is a "process of sensing problems or gaps in information, forming ideas or hypotheses, testing and modifying these hypotheses, and communicating the results (Torrance, 1963, p. 4).

Creativity

A child's manipulation and exploration of and experimentation with objects is the beginning of creative thinking. Creative imagination, a step toward creative thinking, peaks around the ages of four to four and a half and drops when children enter school around the age of five. Creative thinking ability rises

during the first through third years in school but drops after that. There are indications that the drop in creative imagination and thinking are due to environmental influence.

Many creative children exhibit behaviors which are considered disruptive. Torrance suggested that these children can be viewed in a more positive light once teachers develop a better understanding of creative behavior (Torrance, 1963).

Lasky and Mukerji (1980) discussed four steps in the creative process which are common to young children. They are:

1. Exploring is a step during which the child discovers, through manipulation, the possibilities and limitations of various materials. Before the age of four, children often begin and end with the exploration step.
2. Focusing is the next step in which the child consciously settles on one possibility and follows it through.
3. Producing requires problem-solving, imagination and analysis as the child carries out the idea formulated in the focusing step. Four and five year old children seem to progress through this step intuitively whereas children at the stage of symbolic representation are more purposeful in their actions.
4. Stopping can be combined with evaluating/reworking and occurs when children are pleased with what they produce. This phase leaves them open to others' criticism. (Lasky & Jukerji, 1980, pp. 18-23)

Creativity is fostered in the type of environment described in the arrangement section. Such an environment promotes trust between the children and adult where children are accepted and confidence grows to the point that a child will voluntarily complete a task and not fear possible criticism.

The ability to reflect was identified as a factor in the verbal strategies used during the drawing task (Cocking & Copple, 1979) and in influencing the degree of originality in the figure

completion tasks (Torrance, 1969). Gimenez, in her discussion of imagination, differentiated reflection, as a vehicle for imagination, from remembering. Both involve anticipation but reflection centers on "anticipation of the possible" whereas remembering refers to "anticipation of the known or working toward locating that which is known" (Gimenez, 1980, p. 51). Imagination changes the known into possibilities.

Brearly proposed that the lack of imagination found in children is due to limited experiences, few materials, and inadequate opportunities for creative activity (Brearly, 1970).

Problem Solving

The research, which is applicable to the study, ranges from cognitive modifiability as an underlying principle to problem solving (Chance, 1981; Elkind, 1981; Feuerstein, 1980) to strategies children use in problem solving e.g., private speech (Ehlinger, 1975; Goodman, 1981; Ives, 1980; Whimbey, 1980) and logic (Haake, Somerville, & Wellman, 1980) to the effect of irrelevant information on problem solving (Turner & Bentley, 1982).

Feuerstein's research has centered on mentally retarded and culturally disadvantaged adolescents. He found that, in addition to being impulsive, the students failed to recognize problems, viewed events and objects in isolation from the other, failed to make comparisons, and had inadequate spatial orientation (Chance, 1981, p. 65).

Feuerstein termed these characteristics as cognitive deficiencies. He promotes the idea of cognitive modifiability;

that is, the human organism is an open system that is receptive to change and modification (Feuerstein, 1980, p. 2). Therefore cognitive deficiencies can be overcome through mediated learning experiences. During these experiences, adults help children acquire behavior patterns and learning sets which become important ingredients in their capacity to become modified (Feuerstein, 1980, p. 16). In these experiences adults don't provide the knowledge and skill to be learned but are part of the child's adaptive activity (Elkind, 1981, p. 7). They play a major role in assisting children to develop new problem-solving strategies.

In the Feuerstein research, adults assisted children to talk through their problem-solving strategies. Whimbey (1980) discovered that one difficulty in helping children become more efficient problem solvers was understanding their thinking. He reported on the value of having groups of children work on a problem together with each explaining their strategies to the others. By verbalizing their thinking, students assisted each other in identifying and correcting omissions in their strategies.

A strategy used by preschoolers in attacking problems is private speech. The incident of preschool speech during problem solving was studied by Ehlinger (1975) and Goodman (1982). Ehlinger investigated the relationship between task performance, the spontaneous production of task-relevant speech and the effects of instructions to encourage or discourage speech. Children were 3:3 to 4:5 years and 4:6 to 5:4 years old. The younger group's performance on a difficult task benefited if more task-relevant speech occurred during the activity whereas the older children's

performance did not seem to be affected by the incident of speech.

The design of this study determined the opportunity for task-relevant speech. In Goddman's research, however, the variables under study were the child's spontaneous speech in relation to motor behavior. Unlike the Cocking and Copple study, the children in this study were alone with the experimenter who did not interact with them during the task. Goodman found that the children who solved puzzles in a shorter time were those who had high rates of motor behavior and verbalizations of plans or thoughts and emotional expletives. Verbalizations of plans or thoughts, questions to self, word play, and emotional expletives increased as motoric behavior increased. Over seventy-five percent of the verbalizations occurred during the motor acts while task-relevant speech usually occurred during pauses in activity. Verbalizations of descriptions and plans or thoughts usually occurred during pauses and after immediate successes. Children asked questions of themselves during trial-and-error successes and failures due to placement errors.

As Ehlinger had, Goodman found that children's verbalizations, especially task-relevant speech during pauses, increased with the difficulty of the task. These verbalizations were: questions/ comments to the examiner, labelling, describing the ongoing or preceding activity, analyzing the situation, giving feedback to self, and planning actions. The latter private speech was seen as a cognitive self-guiding behavior. These verbalizations did not, however, lead to greater success.

Another factor influencing problem-solving behavior/ proficiency is that of irrelevant information. Turner and Bentley

(1982), in their literature review, reported on a study by Greenberg, Marvin, and Mossler (1977) who discovered that 4 year old children could identify irrelevant information as unhelpful in solving problems. Using social situations as the setting for the problems, Turner and Bentley studied the effects of ambiguity (irrelevant information) on children's problem-solving abilities. Results for the non-model group indicated that all ages (five through nine) could solve problems when sufficient, positively presented information was given but five year olds had difficulty when faced with problems containing irrelevant information. Using a model, three year olds were able to solve problems when presented with sufficient positive information.

Turner and Bentley discussed their results in terms of Piagetian developmental stages. The preoperational child focuses on one aspect of a problem and is unable to take other features into account. This approach is effective with problems containing either superfluous or sufficient information but is ineffective when confronted with irrelevant content. Children in the concrete operations stage (six to eleven years) are "able to consider more than one aspect of a problem, to cope with logical subtraction and to understand the nature of class inclusion" (Turner & Bentley, 1982, p. 46).

Conclusions

The research in this section leads to several conclusions:

1. Drawing tasks have been effective as a tool for eliciting language which, upon analysis, can provide insights into children's cognitive processes.

2. By working in small groups of three or four, children can overcome the effects of poor memory retrieval and other restraints by reminding each other of facts or thoughts which otherwise might have been forgotten.

3. Drawing tasks can be helpful with ESL children as the activity builds on their experiences and can yield satisfactory results regardless of the children's representational ability or verbal competence.

4. The incomplete figures tasks are used to identify and release creativity. The process draws upon the creative features of originality, flexibility, and elaboration. The task is appropriate for ESL children as well.

5. Children can overcome cognitive deficiencies by learning efficient problem-solving strategies through reorganizing their thought processes. Interaction with adults is a critical feature of the process of cognitive modification.

6. The speech elicited by drawing tasks can be used to discover the differences in the thought processes and problem-solving capabilities of children of different ages.

Insights into Cognitive Development/Processes

Before reviewing the literature in art and language which provide insights into the child's cognitive processes, an overview of the cognitive processes is presented which includes a brief review of Piaget's general principles and the stages of development that are pertinent to the children in this study.

An Overview of Cognitive Development

Underlying the developmental stages outlined by Piaget are the principles of equilibrium, structure and scheme. Equilibrium is associated with each stage of the structural aspects which are components of a particular stage. When faced with new information, the desire to achieve integration and stability causes the child to undergo cognitive restructuring, thus modifying his perceptions as he incorporates the new information in terms of his

previous experiences. Within each stage, the child moves from lesser to greater equilibrium.

The cognitive structure, which is based on organization and adaptation is that which allows the child to effectively process new information. Two components of adaptation are:

1. Assimilation--referring to the restructuring of an object or event to coincide with the child's existing intellectual organization and
2. Accomodation--referring to adapting to outside influence.

A schema is a consistent overt behavior which can be generalized to similar classes of behaviors. (Hardiman & Zernick, 1980, pp. 13-14)

The above principles provide the basis for and are associated with each developmental stage. Hardiman defines stage as "forms of behavior which tend to appear at approximately the same point in the development of children" (Hardiman & Zernick, 1980, p. 17).

Several researchers have studied children's cognitive processes from the point of view of cognitive developmental levels and the corresponding drawing stages. Developmental goals as outlined by Sigel and Cocking (1977) and the drawing stages associated with the various stages of cognitive development as discussed by Brittain (1979), Brearley (1970), Eisner (1979), Francks (1979), Hardiman and Zernick (1980), Hargreaves (1978), Kolls (1980), and Lasky and Mukeiji (1980) are presented. Cazden (1972), Dale (1976), and Sigel and Cocking (1977) discuss the corresponding characteristics of language development.

The two groups of children involved in this study were between the ages of 4:4 years to 5:1 years and 5:5 years to 6:1 years. The younger group was in transition between the precon-

ceptual or symbolic thought phase and the intuitive substage within the preoperational developmental stage, while the older children demonstrated characteristics of the intuitive thought period.

Behavior characteristics of the preoperational and early concrete operation stages as well as those associated with the corresponding drawing and language levels are discussed.

Preoperational developmental level. This stage is composed of two substages--the preconceptual or symbolic thought period, which generally is applicable to children between the ages of 2 and 4 and the intuitive phase which encompasses 4 to 7 year olds.

During this stage children begin to build a concept of reality. Several factors influence the development of this concept. All of the children's understanding is symbolic since the interpretation and subsequent symbols for experiences are based on the perceptual aspects of the events. Representational mental activities occur but are based on concrete experiences and are oriented to the action upon and reaction of the stimulus.

The symbolic thought or preconceptual phase is applicable to children between the ages of 2 and 4. They are egocentric which means they are unable to view information from any perspective other than their own. They are unable to take another person's view since they have not yet learned that other people's perspectives may not coincide with their own.

The development of figurative knowledge about objects, experiences and events is evident during this time. Figurative knowledge is that which is gleaned from the concrete, perceptual, and descriptive attributes of a stimulus. Reliance on perception

is basic to concept formation during this time. Children use physical attributes to organize, classify, and form concepts but that information is gained through focussing on one aspect or attribute of a situation. They are unable, at this point, to consider more than one attribute of a stimulus at one time. They engage in transductive thought by which they relate a particular aspect of one object (situation) to a specific attribute of another assuming that likeness between objects in one respect indicates they are the same in all other ways. Transductive thought and the inability to focus on more than one attribute cause children to group items according to their perceptions, not necessarily according to the inherent relationship among the objects. The emphasis on the concrete ties the children to the present and affects their perception of time which is restricted to the current situation.

During the intuitive phase, children continue to be action-oriented and tied to the present. They continue to categorize objects according to one characteristic but near the age of 5 to 6 do so in terms of similarities in function or use. Thus they now demonstrate the ability to think in terms of classes of objects, establish relationships, and contend with numerical concepts (Sigel & Cocking, 1977, p. 48). They engage in representational thinking which is based on an understanding that one item is equivalent to another. With this information they can then portray their experiences in another form.

These changes are indicative of shifts in functioning which surface at this time. The children move from imitation in the

immediate context to an ability to reenact past events. These deferred imitations reflect the children's perception of the post event. Related to deferred imitation is that which Bandura termed observational learning which he defines as "instances in which a child observes a model doing something and reiterates that action either in the presence of the model or at some later time" (Sigel & Cocking, 1977, p. 50).

Another shift is decentration or a move from egocentrism to an ability to recognize other views. Sigel and Cocking define decentration as "shifting away from a single perspective of an object or event to an awareness of alternative perspectives" (Sigel & Cocking, 1977, p. 54). Decentration is related to physical abstraction, which is an ability to organize an array of elements by separating one from the group and using it as a basis for organization and reflective abstraction which refers to a child's mental representation of an item and an ability to use that information in relating and combining objects.

The third shift is a move from figurative to operational knowledge. Operational knowledge involves the use of rules to monitor thought.

The trend toward decentration and operative knowledge enables the child to begin to understand the use of objects, establish relationships among objects and determine classes of objects. These abilities involve principles of conservation which are basic to the conceptual development of time, space, numbers and relations.

Although preoperational children continue to operate on

"what is seen, is", those in the intuitive phase do engage in logical thought. However, they are not consistent and don't have the understanding which allows them to perform the operations found in the concrete operations stage (Sigel & Cocking, 1977).

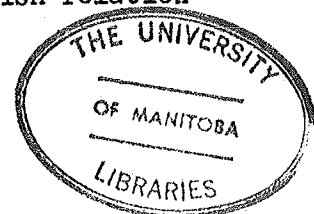
Graphic representations in the preoperational development stage. Children proceed through several stages of graphic representations during the preoperational period. As with cognitive development, the ages given for each stage are approximate. The age at which children enter and leave a period varies with the individual. From 2 to 4 years children are in the scribbling stage, during which they experiment with motions, and later, with marks on paper. Kellogg (1967) refers to this as the placement stage which occurs between 2 and 3 years. The children then discover that their scribbles have meaning (Luquet's fortuitous realism or Kellogg's implied shape stage). From 3 to 7 years children are within the intellectual realism stage. During the early period (3 to 4 years), which Kellogg named the outlined shape stage, children make and name pictorial symbols. However these drawings may not be recognizable to adults. Around the age of 4, the symbols that are drawn now have specific referents and are related to the concrete forms they represent. The child has now begun representational drawing. Even though the child has specific referents, he tends to draw what he knows is contained in the object as opposed to what he sees. This relates to deferred imitation where the child produces his perceptions of a past event. About this time children enter Kellogg's design stage during which they begin drawing shapes inside familiar shapes. Kellogg believes the formation of abstract ideas is helped by this

process (Francks, 1979).

From 4 to 7 years children are in the intuitive thought stage as well as in what Lowenfeld defines as the preschematic stage (Luquet's failed realism stage). Kellogg's early pictorial stage, which occurs between 4 and 5 years, is the name applied to those structural designs which adults can identify as specific objects. Although the child in the intuitive phase is beginning to form classes, his drawings reflect the inability to understand overlapping relationships as he draws one object in relation to another instead of integrating the parts to form a whole.

Hardiman and Zernick (1980) outline some general characteristics which are found in drawings made by children in the pre-operations stage. Buildings, animals and plant life also appear. The human evolves from scribbles to a circular shape, which encloses facial features, to which straight lines are added to form the front view of the human figure. The child's immediate environment is represented by geometric shapes which can then be ordered in a space-time sequence. These shapes are not in proportion. An inconsistent use of a baseline indicates an attempt at spatial organization. Color is not over-emphasized, but near the end of this period, it is used to make drawings appear more realistic (Hardiman & Zernick, 1980, pp. 14-15).

Children's thinking during this period is representational but is based on their perception of current concrete, action-based experiences. The children are egocentric, categorize object according to one characteristic and lack the ability to establish relationships among a group of objects.



Drawings in the intellectual realism stage reflect the above characteristics by containing features which the child knows exist but which can't be seen. When drawing objects or pictures, juxtaposition of parts occurs because the child does not understand relationships and is unable to coordinate all aspects to form an integrated representation.

Language also reflects the cognitive level. Sigel and Cocking warn adults against assuming that a child has a complete understanding of a concept simply because he uses the word. Children at this age respond to questions with explanations which are based on actions. For example, the child answers "Tomorrow is when we go to the park" in response to "when is tomorrow?" The answer does not reflect a true understanding of the concept.

Language development and preoperation stage. Many authors have studied children's linguistic development. Among them are Black (1980), Cazden, (1972, 1981), Dale (1976), Mahoney (1979), Sigel and Cocking (1977), and Woolum (1976).

The period of linguistic development, which Sigel and Cocking associate with preoperational thought, spans the ages of 18 to 36 months and is considered the second stage in language development. During this time children produce active sentences based on the agent-action-object model. This demonstrates an initial understanding of syntactic relations and reflects the children's action-based thought processes.

Nonreversible sentences are most easily understood. Children have difficulty in understanding that the semantics can remain constant when an active sentence is transformed to a passive construction.

They are unable to conserve sentence meaning. One deterrent to understanding the transformation is the child's transductive thinking. He assumes that since the agent-action-object rule applies in one case it should apply to all cases. Another obstacle is the child's inability to decenter due to his inadequate understanding of relationships, relative location and the position of someone else in relation to him. Once attained, the understanding will enable him to interpret the sentence correctly. Until then he obtains clues to the relationships, the location and the position of elements from the context of the situation. Therefore his speech is referent-and context-bound.

Language development and intuitive thought. The third stage of language development begins around 3 years of age and extends into the period of concrete operations. At this time children broaden their understanding of grammar. Sigel and Cocking (1977) describe Menyuk's (1963) generative model for grammar as composed of three levels:

1. Phrase level during which children use simple, active, declarative sentences
2. Morphological level during which children acquire rules for constructing inflections, and
3. The transformational level where children learn and employ the operational and obligatory rules for producing complex sentences. (p. 142)

Children learn to apply the rules of inflections simultaneously to all three elements in their sentences (agent-action-object) and they begin to coordinate the rules to produce transformational grammar.

According to a study by Menyuk (1963), children in nursery and kindergarten are aware of all of the morphological rules. However, Menyuk discovered a developmental sequence for incorporating

the rules in the sentence constructions. Omissions appear to be the earliest and most frequent error (e.g., the auxiliary for "ing" inflections, "s" for subject/verb agreement). Substitutions, the application of alternate rules, emerge later with redundant expressions following. Redundancy, the simultaneous application of new accurate and old inaccurate rules, occurs when the child includes an unnecessary inflection or word in an attempt to make the meaning clearer.

Within sentence production Menyuk (1969) found a developmental sequence across the grammar model levels. Children first combine sentence parts, then they develop and elaborate the subject and predicate, expand the verb phrase, embed clauses within the sentence and rearrange the parts within the sentence (Sigel & Cocking, 1977, p. 146). The first grade children in Menyuk's study did not produce sentences at all of the levels.

Between the ages of 3 and 7, several features appear within the child's grammatical development. Sigel and Cocking identify them as:

1. An expansion of base structures.
2. More diverse structure and increased frequency with which those structures are used.
3. A decrease in the approximations of correct structures as the uses of correct forms increases.
4. More frequent conformity to the obligatory rules for the selected linguistic expressions.
5. Application of the operations of addition, subtraction and permutation when forming new linguistic constructions (Sigel & Cocking, 1977).

The last feature, that of transformation, occurs between the ages of 4 and 7. Children continue to have difficulty employing two

rules simultaneously. For example, "What this is?" occurs when children focus on adding new elements to a sentence without changing the surface structure.

Causal relations create difficulty at this stage and continue to do so throughout elementary school. Children describe causality in terms of consecutive actions. First grade children interpret the relational term because in the context of temporal relationships due to their sequential understanding of causality. This finding appeared in a study by Katz and Brent (1968) when they were investigating the use and understanding of the relational words, because, then, therefore, but, although, except, and unless (Sigel & Cocking, 1977).

The cognitive operations which affect the development of the grammatical features described are inability to consider two points of view simultaneously, transductive thinking, accommodation and a move toward decentration. Through transductive reasoning the child generalizes grammatical rules. The rules employed are an interpretation of those found in the child's linguistic environment. Redundancy is an example of the child's inclination toward decentration. It is a strategy used to increase the clarity of the structure and is based on the recognition that other's thought is not identical to his or her own.

Concrete operations. Children between the ages of 7 and 12 generally functioning in the level of concrete operations. Although at the end of this study the oldest children were 6 years to 6:4 years, some characteristics of concrete operations were apparent, thus proving the merit in reviewing the early levels of that

developmental stage.

Concrete operations refer to the logical operations of reversibility, classification, and seriation. Reversibility is the ability to return to a starting point in thought. For example, a child can reverse if he understands that the category of people can be subdivided into male and female and then can be recombined to form the larger category of people. Reversibility is basic to understanding concepts, decentering, classifying, seriating and understanding transivity--the ability to separate attributes, attend to the critical one, and draw conclusions from that information.

Classification refers to organizing items into a hierarchy of classes. Class inclusion is a component of classification and refers to the knowledge that subgroups exist within large groups. By classifying, children can make decisions about items on the basis of class membership instead of considering each specific item.

Seriation, the third operation, involves ordering objects in terms of an increasing or decreasing size. Understanding seriation enables the child to solve arithmetic problems (Sigel & Cocking, 1977).

Children in the concrete operations stage are able to think in terms of the above operations but can do so only when they have objects to work with whose properties they can perceive. They understand reversibility, numerical equivalence and number conservation. Conservation of substance, weight, volume and space depends on the child's understanding of equivalence, reversibility and an ability to engage in reflection abstractions. Donaldson (1978) in her book Children's Minds, found that children before the age of 7 could

conserve if the tasks were based on the children's experiences and employed familiar objects.

Children, later in this period, are able to change their perspective of an object by combining classes of objects and using other criteria to recategorize them. The recategorization is based on an ability to segregate the relevant aspect of the object from others. Seven and eight year old children use perceptual or concrete aspects of objects to categorize them. However, combining classes is dependent upon the attributes of objects being visible (Sigel & Cocking, 1977).

Graphic representations in the concrete operations stage.

Children early in this developmental stage are beginning to understand reversibility and can identify relevant aspects of objects to be used for reclassification. However this is accomplished only when attributes are apparent through concrete or perceptual stimuli. Hardiman and Zernick (1980) have studied the characteristics of children's drawings in terms of the cognitive stages.

Concurrent with the early concrete operations is the schematic drawing stage which occurs between the ages of 7 and 9. It's a transitional stage where children attempt to draw what is seen but continue to include unrealistic features in their drawings which reflects some egocentric thinking. Spatial organization is achieved by the consistent use of ground lines, skies or elevated baselines. Awareness of proportions becomes apparent in the size relationships found among objects on the baseline. This is an indication of concern with producing realistic drawings and an interest in composition. Children include more detail in their

drawings and demonstrate some awareness of proportion within objects. This is reflected in the representations of people which are drawn in more proportion and where sex and role differences appear.

The use of proportion within objects and on the ground-line and the organization of their drawings reflect the children's growing ability to see relationships between objects and to classify. The ability to correct first visual impressions and to think about that information before drawing results in more realistic representations which reflect an expanding capacity to decenter.

Language development and concrete operations. Around the age of 8, children have developed an understanding of semantics, syntax and phonology and produce utterances similar to those found in adult language. However, there remain linguistic areas in which children continue to develop. Based on a study by Templin in 1957, Sigel and Cocking report that although 7 and 8 year old children understand phonological rules and produce sound utterances, they are not cognizant of the relationship between those sounds and their meaning. They are unable to separate the phoneme from the word. This can result in the omission of sounds in utterances.

Children also have difficulty with syntactic rules. Between 3 and 5 years children show evidence of syntactic understanding. In addition, children demonstrate further understanding between kindergarten and first grade, and between the fifth and sixth grade. Children utilize more grammatical structures and those infrequently used appear more often. For example, during the last two periods children demonstrate more appropriate use of is and so. Children up to the age of 9 continue to show an increased understanding of and

ability to use reversibles and passive sentences (Sigel & Cocking, 1977).

The use and understanding of relational concepts also changes. Initially words which are used to delineate cause and effect describe temporal relations. Eventually they are appropriately used to designate causality.

Major changes occur in the child's semantic development between the ages of 5 to 8 and 10 to 13. During this time children learn to make subtle semantic differentiations. Until the age of 10 - 12 years children define words in concrete and functional terms. Asch and Nerlove (1960) and Palermo and Malfese (1972) found this particularly applicable to words which have both physical and psychological connotations (e.g., sour, cold, straight). Five and six year olds use the double-function words to describe physical attributes. However as children grow older and begin to understand dual relationships, the words are used to describe psychological states (Sigel & Cocking, 1977).

Sigel and Cocking differentiate between the development of thought and language. They are interrelated systems. Therefore language can be used to understand the thought processes. They state that representational thinking "is the structural system which allows language to become prepositional and to organize thought into a system of logical relations" (Sigel & Cocking, 1977, p. 160).

According to Sigel and Cocking, representational thinking involves the mental activity of recalling to consciousness previous experiences, integrating them with the new stimuli, and presenting the product in another form (Sigel & Cocking, 1977). Re-presentation

is the term the authors apply to the process of recalling. Representations are the alternate forms and can either be internal, in the form of new ideas, or external as in language or drawing. The content and interpretation of the representation is influenced by the culture involved.

Not only do children create external representations but they respond to them as well; thus providing others with insights into their thinking.

Cognitive Processes and Graphic Representation

Kolls, in a discussion of representational thought, stated that "drawing and language are developing symbol systems rooted deeply in the child's ability to organize experience." She further stated that "drawing development does not begin until the child makes a mark on paper with the intention of representing an idea or object" (Kolls, 180b, p. 3). When that occurs, the child has learned that his graphic actions can produce images which can represent other phenomena.

Williats (1981) studied children's drawings in terms of transformational and denotational rule systems. He proposed that, instead of imitating others' actions, children use these systems to draw objects. Transformational systems are those which allow the spatial arrangements between features to apply to the organization of marks. Denotational rules apply to the relationship between the marks and the specific features in the drawing. From analyzing children's representations of perceived familiar and unfamiliar objects, he discovered a developmental sequence in the use of rules.

Younger children used under-developed denotational systems. The older children gradually coordinated the marks with the perceived features to produce accurate representations.

A similar trend was found by Brittain and Chien (1980) when they investigated the influences of various media on preschool children's human representations. The children were required to draw a person, and construct a person using precut body parts, geometric shapes and clay. Although there was some differences in the ability to shape clay and geometric components into the human form, the difference was not significant. The determining factor in success was the child's ability to understand that one mark could represent multiple objects (e.g., a line equals a line, leg or road). Children around 3 or 4 years of age begin to develop that understanding.

Bernbaum, Goodnow and Lehman (1974), Brittain (1979) and Gardner (1980) have conducted studies of children's copying and tracing strategies. Bernbaum et al. investigated the children's approach to tracing, copying or pointing to the beginning of a shape in terms of (a) the starting point (top, bottom, left, right), and (b) the use of a continuous line. Copying elicited the highest incidence of left side starting behavior with females demonstrating the most consistency in that behavior. Beginning at the top of the figure was predominate in all three tasks. Consistency in choosing a specific starting point increased with age.

Brittain suggests that copying ability may be influenced more by cognitive development than by perceptual skills or motor control. The basis for this statement is that the ability to copy certain shapes appears at specific ages (Brittain, 1979).

Goodnow (1977) discussed the benefit that children derive from copying forms. She believes that copying helps develop an understanding of the connection between perceiving an object and reproducing it. Teachers can obtain information regarding the effect of the child's experiences and his or her ability to apply knowledge in one area to another by noting how children copy objects.

As we noted in Chapter 1, Goodnow analyzed children's drawings in terms of spatial patterns, sequential organization and representational equivalence. When considering spatial patterns, Goodnow's interest is in how children organize elements of patterns around reference points, in particular horizontal or vertical lines. This was also a concern of Wilson and Wilson (1982) when they investigated children's application of the perpendicular principle.

In addition to reference points, omissions from drawings occur as a result of spatial organization. Omissions are determined by the use of continuous lines and concerns for overlapping space (e.g., each object has its own defined space and boundary).

Sequence involves problem-solving and understanding that actions have consequences. Goodnow identified top to bottom, paired and radial, and left to right sequences in children's representations. She demonstrates how children contend with these in free and constrained drawings.

Equivalence refers to the concept that one figure can represent another. Drawings are equivalents which reflect children's perceptions of the attributes of the referent. The drawings are achieved through the extensions of rules rather than being based on imitations of others (Goodnow, 1977, p. 16).

Gardner (1980) also discussed equivalents. One of the factors which assists children in understanding equivalence is the ability to enclose figures. By closing a figure, the child discovers that the shapes have limits and boundaries just as do familiar objects in the environment. Therefore the shapes can be equivalents or representations of objects.

Goodnow's generation of new equivalents is similar to that of Sigel and Cocking's idea of re-presentation and the modification of previous information. Through the use of graphic representation, the child displays the new equivalent which allows others to see it.

Cognitive Processes and Language

The degree to which children can re-present experiences and consequently engage in representational thinking is influenced by their experiences. One method of increasing their ability to engage in representational thinking and respond to external stimuli is by talking with children while they are actively involved with concrete objects. The talk, which is initially based on the activity, can be used to assist the child to think about non-observable phenomena related to the task. This forces the child to become separated from the ongoing situation. Drawing connections between the related phenomena and the activity requires the child to form new representation. Sigel and Cocking refer to these strategies as distancing behaviors (Sigel & Cocking, 1977, pp. 174-175).

Adults play a critical role in helping children to achieve representational competence. Sigel and Cocking discuss several strategies teachers/adults can employ to create a distance between

the child and his immediate situation. Guided inquiry and open-ended inquiry are techniques by which the teacher extends the child's abilities to include labeling, describing, demonstrating, sequencing, reproducing, comparing, proposing alternatives, combining, evaluating, inferring, resolving conflict, generalizing, transforming, planning, and concluding (Sigel & Cocking, 1977, pp. 179-181). Guided inquiry involves the use of questions focused on the ongoing activity to create a pool of information. Open-ended inquiry refers to those comments which require the child to re-present his experiences. Based on the information that the child already has, the teacher chooses the strategies which will provide experiences that will extend the child's knowledge.

Donovan (Sigel & Cocking, 1977) conducted a study in 1974 in which she found that children with low representational competence had little opportunity to make decisions and had mothers whose talk involved discipline and the immediate situation.

Tough (1974, 1976, 1977) made a similar discovery. She found that children who demonstrated a limited use of language had mothers who focused on the present and used language for directions and discipline.

As was mentioned in Chapter 1, Tough believes that to succeed in school, children need to develop an ability to recognize problems, make comparisons, see events in context, and form associations between past and present experiences to predict future events. By discovering new ways of using their language, children can learn to make these associations. Therefore Tough developed an appraisal system which parallels Sigel and Cocking's distancing behaviors.

Children's reasons for using language are analyzed according to the following purposes: self-maintaining, directing, reporting on past and present experiences, logical reasoning, predicting, projecting and imagining, (Tough, 1976, p. 80). There is a hierarchy of strategies within each usage. Through utilization of fostering techniques, adults assist children to develop new strategies by which their utterances and thinking become less context bound. The fostering techniques involve orienting, enabling, informing, sustaining and concluding.

The intent of both of the systems developed by Tough and by Sigel and Cocking is to raise the children's level of representational competence by helping them to become disembedded from the ongoing situation. The ability to distance oneself is partially based on the cognitive functions of decentration, reflective abstractions, and understanding equivalence.

Elaborated descriptions of objects is one target behavior that is included in both of the systems described above. Verbal descriptions can also indicate an ability to conserve. Sinclair de-Zwart found that children who conserved used relational terms more/less, differentiated terms long/short and coordinated descriptions "This doll is taller and fatter; the other is short and thin" (Dale, 1976, p. 263). Children first acquire the ability to use differentiated terms, then relational terms and later coordinated descriptions. Sinclair de-Zwart concluded that age is not as accurate a predictor of conservation as are descriptive patterns.

Conservation had also been researched in connection with

role taking ability and language use (Layton, 1975) and drawing and spontaneous language (Kolls, 1980a, 1980b).

Layton found that those children who were able to adopt another perspective and who could conserve quantity had higher levels of language (MLU) than the other children. High language levels were also noted in role takers who could not conserve. There was no significant difference in MLU between conservers and non-conservers. The majority of the 5 and 6 year old subjects were unable to assume another's role.

Kolls (1980), in her study of spontaneous speech, conservation and drawing which accompanied problem-solving, found that children of approximately the same cognitive developmental level displayed similar language usages. Questions for clarification, statements for explanations and actions to be taken were the pre-dominate strategies used by conservers. She concluded that:

1. There is a direct relationship between drawing development and logical thought processes. Children who thought logically produced more realistic drawings which illustrated and understanding of relationship.

2. Non-conservers were unable to integrate components to form a complete figure.

3. Language strategies used to solve problems differed as children become more logical and the strategies were related to developmental levels. (Kolls, 1980a, p. 4969A)

In a later report, Kolls described the drawing characteristics for conservers, non-conservers and those in transition. Conservers (age 7:9) produced more realistic and detailed drawings. Proportion and size were considered. An awareness of spatial relations was demonstrated through the use of multiple groundlines and size proportions which were used to convey perspective. Language

strategies were for predicting actions and defining the task.

Children who were described as transitional conservers (6:2 years) used a single groundline below figures which were placed one beside the other, drew objects in relation to the groundline, and used transparencies.

Non-conserving children (5:9 years) did not attach their objects to a groundline and often used symbols peculiar to themselves as equivalents for objects. An inability to construct complete figures was demonstrated by some because they were unable to integrate the components of the figure (Kolls, 1980b, p. 5). From these drawing characteristics, Kolls composed a list of factors to consider when deciding whether or not a child is ready for reading.

Conclusion

The literature in this section leads to several conclusions:

1. Representations from graphics and language provide a means of gaining access to children's cognitive processing through drawing strategies and spontaneous or elicited explanations of the representation or elaborations.
2. Graphic representations are influenced by the materials used and the rules and strategies employed to produce them.
3. Recording language as it occurs during activities provides more accurate insights into cognitive functioning than analyzing only language describing the product.
4. Representations through language provide information about children's cognitive functioning. They give insights into the child's ability to distance himself or herself from the existing situation and the ability to conserve.
5. Adults can help children to increase their representational competence by employing strategies which assist children in distancing themselves from existing situations.
6. When ESL children are involved, verbal explanations are not always feasible. Then graphic representations can provide information about the child's development.

Chapter 3

DESIGN AND PROCEDURES

In this chapter a description of the subjects, the arrangement of the sessions, and the procedure for collecting the data is presented.

Subjects

The morning and afternoon classes of the nursery and one kindergarten room, in a Winnipeg inner city school, were the site for the study. The sample was drawn from a population comprised of those children who had (a) English as a second language, (b) lived in Canada for at least 2 years but were born elsewhere, and (c) had no previous contact with symbol and dot-line activities. Three nursery and three kindergarten children were randomly selected from the defined population. The nursery children ranged in age from 4:4 to 5:1 years while the kindergarten children were from 5:5 to 6:1 years of age. Two girls and one boy were selected from each room. In two classes, only one child in each was included in the sample. This was important as it affected their approach to the task.

The children selected for the study were:

T. was a 4:4 year old born in Vietnam to Chinese parents who spoke no English at home. However, he had friends with whom he could speak English.

T.P. was a 4:10 year old child who was born in Vietnam to Chinese parents and spoke no English at home.

N.A. was a 5:1 year old who was born in Vietnam to Chinese parents and spoke no English at home.

H. was a 5:5 year old who was born in Vietnam to Chinese parents and spoke no English at home.

M. was a 5:6 year old who was born in Cambodia to Laotian parents and spoke no English at home.

A., the oldest child (6:1 years) in the study, was born in Czechoslovakia and spoke both Czechoslovakian and English at home.

The primary contact T.P., N.A., H., and M. had with English occurred in the classroom.

Arrangements

The study was conducted in the nursery and kindergarten classrooms from which the sample was drawn. The writer, two observers, the child in the sample and occasionally, a friend selected by the child, were seated at a table where paper, pencils, a Sony B172902 tape recorder, and a Texas Instrument TI 562-10 stopwatch were available. The location of the table depended on the organization of the classrooms. The location was selected to minimize sound interference from the ongoing activities while allowing other children free access to the room and the special activity. Because the research task occurred during the self-chosen activity time, other children moved in and out of the situation and offered comments at will.

Procedure

After selecting the sample but prior to the data collection, the writer spent 5 hours in each classroom. This allowed the children to become accustomed to her and provided her with the opportunity to establish a relationship with those in the sample and to understand the children's relationships with their classmates. On two

prompts such as, "What else can you make?" or "What else can you put in your picture?" were asked to encourage the child to add more detail to his or her drawing. After the drawing was completed, the child was asked to describe the representation. This often led to further elaboration of the drawing as well as the story.

Since the purpose of the symbol activity, which involved interaction with the child, was to develop a better understanding of the child's interest and thought processes, the child's responses influenced the writer's questions and comments before, during, and after the activity.

The observers for the study were students in the Early Childhood-Special Education program at the University of Manitoba. The writer and the observers worked as a team in the university nursery where, for part of the course requirement, they completed observation forms on the children. Observer reliability was established on those forms during the four months prior to the beginning of the present study.

Observation forms for this study were adapted from one devised by McIntire and were developed for these activities to provide contextual and nonverbal information. A form for recording verbal and nonverbal behavior was developed for each activity. While completing the dot-line and symbol activities with the children in the university nursery, the writer and observers began and continued to conduct observations for this study until reliability reached .80. Tape recordings of the sessions were used to gather dialogues between the participants and provide information about the children's thought processes expressed through their language.

occasions the observers visited the classrooms before the study commenced.





Letters of permission were written in Vietnamese and English. They were then sent to the appropriate families; all were returned.

There were four sessions with each child which lasted approximately 20 to 30 minutes each. The sessions were held on February 26, March 24, April 28, and May 12, 1982. Sessions for those absent on the above dates were March 3 and April 16, 1982. The dot-line and unfinished symbol activities, which were developed by Imogene McIntire (unpublished paper, 1981), were the devices used during each session to gather information about the children's cognitive processes.

The dot-line activity was used in each session as a warm-up task. This activity provided the writer with information as to how the child used his pencil and how comfortable he or she was with the situation. It gave the child an opportunity to feel comfortable in the setting and to become aware of the expectations placed upon him or her.

The activity has rules governing its completion which result in providing a structure that reduces the child's anxiety. The activity consists of the child connecting one dot to another; the dots are placed on the paper by the adult participant. One pencil is used between the child and adult to reduce the opportunity for the child to continue drawing after the connection is completed. To begin the activity, the writer placed two dots on a piece of paper and asked the child to connect the dots or to draw a line from the first to the second dot (gestures were used when necessary).

After the initial line was drawn, the writer placed a third dot on the paper, handed the pencil to the child and asked the child to draw a line from the last dot to the new dot. The next dot, and those following, were placed in such a position as to provide the child with the opportunity to cross the previously made line. Placement and connection continued until seven to eight dots had been joined. A 21.1 x 27.6 cm paper was used for this activity.

The unfinished symbol activity is a figure completion task similar to that used by Torrance. This activity is based on scribbles which are a part of a child's natural art development. The shapes used were , , , , and are among the 20 types of scribbles that Kellogg found all children use between the ages of 2 and 3 years. The activity, which was completed during each of the four sessions, involved drawing a picture incorporating each symbol as it was presented. A pen and pencil were used to better differentiate between the symbol and the child's response. To increase interest in the activity and provide the children with some choice, two different sizes of paper were used. The sizes were 13.8 x 21.1 cm and 10.6 x 13.8cm.

In each session, the writer presented the child with the two sizes of paper and asked the child to choose the size that he or she wished to use. The first symbol was then drawn on the designated paper and given to the child. He or she was instructed to turn the paper around and look at it from all sides. Then, depending on the child's reaction, the writer asked such questions as: "What can you do with this?" or "What can you make out of this?" During the activity, if the child paused or looked at the writer,

The recordings also provided another means of cross checking the information recorded on the observation forms. A stopwatch was used to time the interval that occurred between the presentation of the symbol and the child's first drawing response. Each child was timed for each symbol and dot-line activity.

Analysis

Frequency counts and percentages were computed to analyze verbal and nonverbal responses to the symbols. Cognitive information in terms of spatial patterns, sequence, equivalence, concepts, fluency of ideas, and strategies in approaching the task were described for each child. The MLU and NP indices were computed to determine linguistic complexity. Tough's categories of language use were used to describe linguistic competence.

The results are discussed in chapter 4.

Chapter 4

RESULTS

Extensive information was obtained from the responses elicited by the dot-line and symbol activities. Therefore, to facilitate the organization and understanding of the information, data gathered on each child was reported under the categories of responses to the dot-line activity and symbol results. Within the broader categories the information was subdivided into specific areas included in the study. To provide context for the data included under the broader topics, the report on each child began with background information and the specific arrangements developed for each session.

Although the dot-line activity was used as a warmup exercise, the results provided information about the children's motor and cognitive approaches. Data included in this section was divided into information about: response time, attention to task and pencil control, body movement, and verbalizations about the task. Also noted was any additional information which became evident.

The data obtained from the symbol responses was extensive. In addition to information about response time, pencil control, and attention to task, the data was discussed as it pertained to graphic representations (approach to the task, spatial patterns, sequence, equivalents/representations, changes in representations, and elaborations) and verbalizations (the use of gestures, language complexity, concepts used, and language use).

Child 1: A.

A. was a 6:1 year old child who came to Canada in December of 1979 from Czechoslovakia. His family speaks both English and Czechoslovakian at home. Data was collected during sessions held on March 3, April 16, April 28, and May 12, 1982.

On March 3, A. invited a friend to sit with him as he completed the task. On April 16 and April 28, A. and his friend alternated completing the dot-line and symbol activities--two symbols for A. and one for his friend. The symbols given to his friend were not the same as those included in the study although observations were taken and given to the teacher. During the last session, one child, not chosen by A., watched as A. completed the tasks.

Dot-line Activity

Response time, defined as the span of time occurring between giving the directions and the child's initial pencil use, decreased for both the dot-line and symbol activities over the three month period. Dot-line response time fluctuated by 1-2 seconds. On April 16, when A. was alternating activities with his friend, response time to the dot-line was 3 seconds. During that session and the one on April 28, A. needed to be reminded to focus on the dots. His friend was with him during both of those sessions.

A. had good control of his pencil, holding it between his

thumb and first two fingers. He held the pencil firmly and generally made dark, heavy lines. He looked at the task during completion and stopped at the dots 39% of the time, stopped beside the dots 29% of the connections and, for 21% of the connections, stopped after going through the dot. He crossed the lines immediately when connecting the dots.

A. moved his legs, feet and body fairly often when completing the dot-line activity and occasionally leaned his head in the direction of the pencil's movement toward the dot. A. indicated that he was finished by folding his hands and putting them in his lap.

During the first two sessions, A. commented on the shape the lines were forming and asked questions as to the direction he should take when connecting the dots. He asked to see his friend's paper to get assistance in making a "5". He made no comments during the last two sessions.

A. had difficulty making a "5" but decided where he could obtain help and proceeded to ask. He had no difficulty knowing which number followed the previous one and during the May session was able to follow the lines to determine the sequence in which the dots had been connected.

Symbol Results

As was stated, response time decreased over the three month period for both the dot-line and symbols with the exception of Session 2 when the response time for both the dot-line and Symbols 3 and 4 increased. During that session A. took 4 seconds longer to respond to Symbol 4 than in the previous session. In Session 2 he

closed the upper portion of the symbol, then crossed the line to close a portion of the right half of the symbol.

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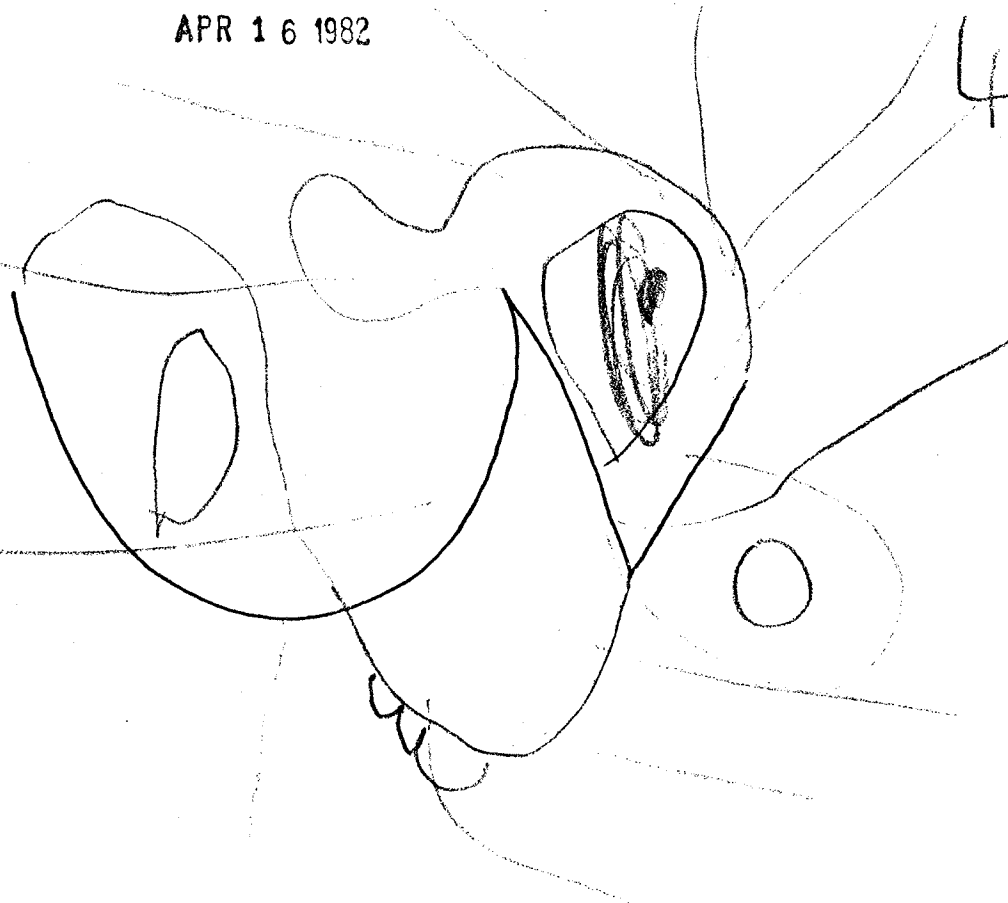


Figure 1: Session 2 Symbol 4

During all of the symbol activities, A. attended well to the task once he had responded. He indicated his readiness to stop during the first session by smiling when asked about paper size. He responded after he was told it was the last symbol.

With the exception of the May session, he alternated paper size choosing each 50% of the time. However, for the individual

symbols, large paper was used for the third and fourth symbols 75% of the time. Symbol 2 was drawn on small paper 75% of time.

A. held the pencil firmly with his thumb and first two fingers using steady dark and heavy lines during the March, April 28 and May sessions. On April 16, he combined light and dark lines.

Approach to the task. A. closed all symbols and 75% of the time did so in a left-right direction. He printed his name starting at the left. During Session 2, A. repeated the first symbol in a right-left direction then closed in a left-right direction. During Session 3, A. initially crossed the line for Symbol 2 and then closed each side. His response time for that symbol increased by 6 seconds. In one instance during the closing process, A. repeated (copied) Symbols 1, 2, and 3.

Spatial patterns. All of A.'s responses involved objects placed in an ordered arrangement. Each drawing involved closed units which were generally placed in relation to a ground line whether one was visible or not. One exception to this occurred when A. was drawing a house on a mountain. "This house is crooked," said A. when describing the house which was perpendicular to the mountain side.

A. generally placed objects in such a manner as to avoid overlapping spaces. Two instances where this was not observed were (a) on A1:2 when he drew the sun on the roof of the house with the rays extending beyond the roof and (b) on A2:3 when he drew hair extending beyond the person's arms and the side of the boat.

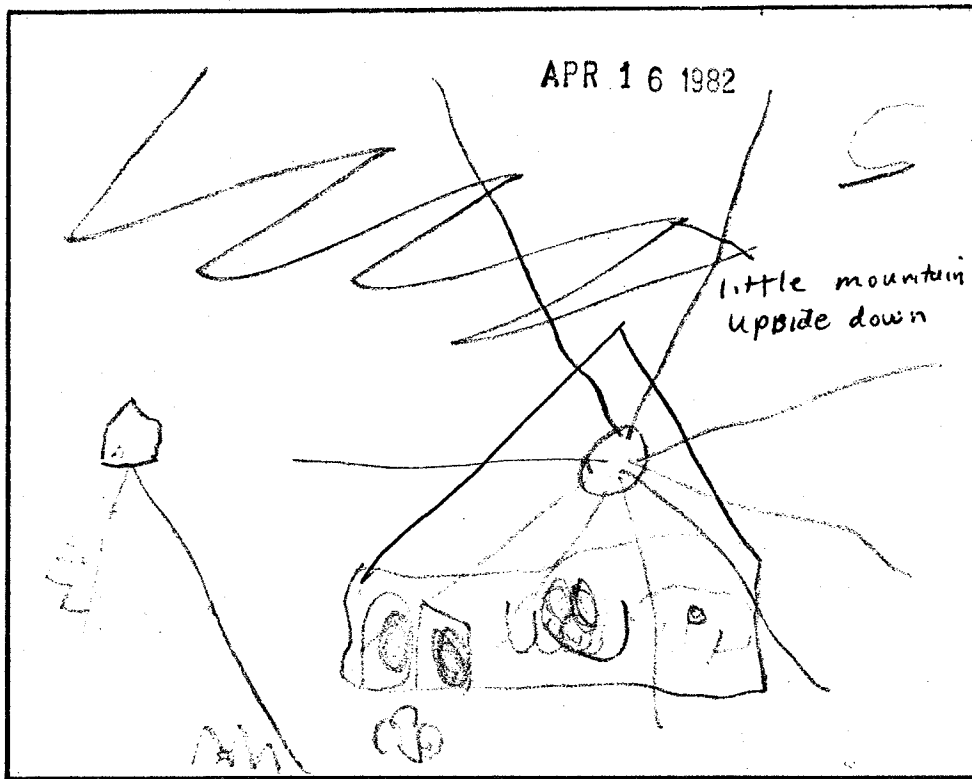


Figure 2: Session 2 Symbol 2

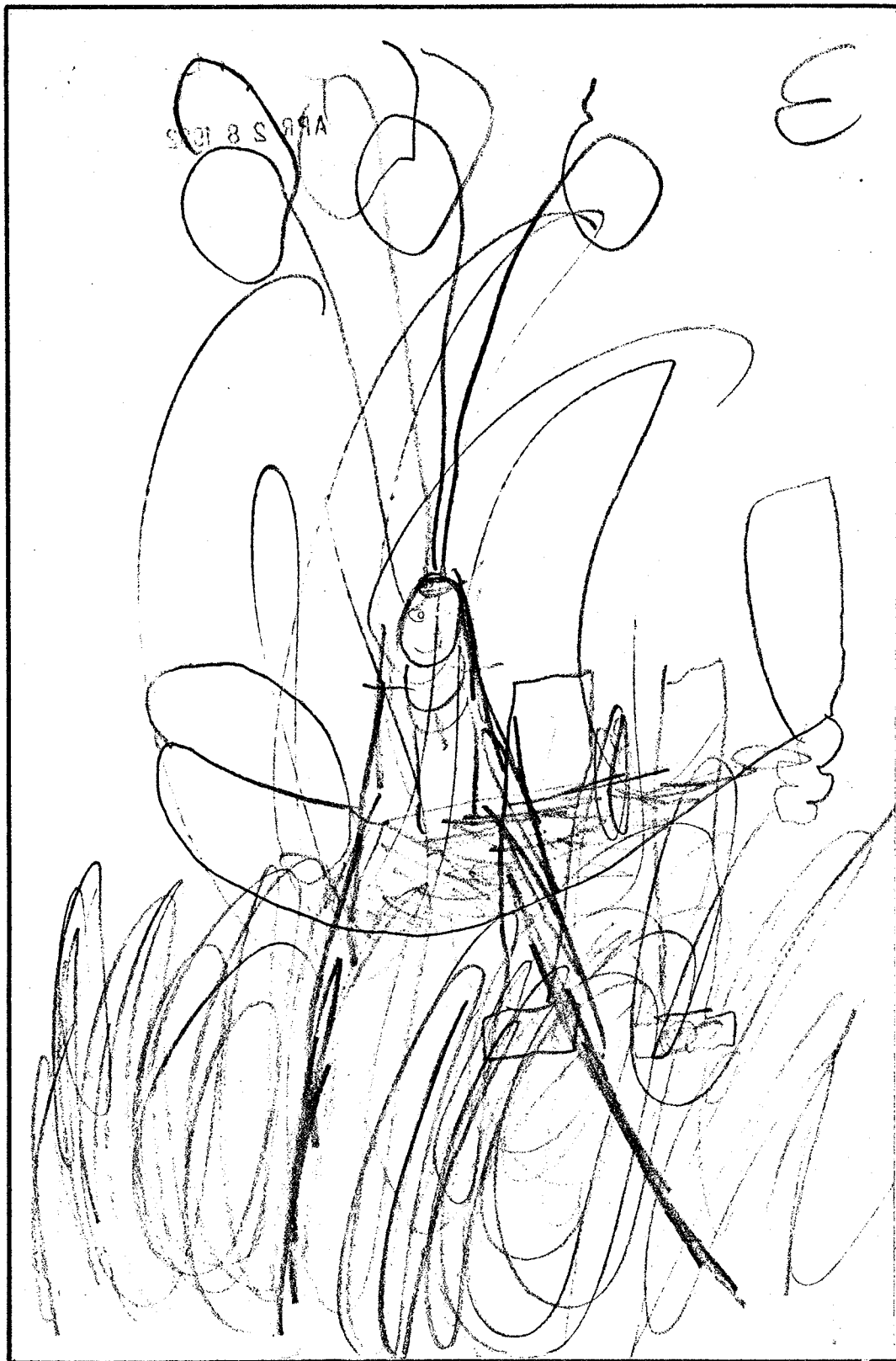


Figure 3: Session 3 Symbol 3

Sequence. The symbol is semi-constrained drawing in that there is a stimulus line placed on the paper by someone other than the child. As was previously mentioned, 75% of the closures A. made were in a left-right direction. However, when adding appendages to the core figure, whether human or an inanimate object, several times A. made additions to the right side first, then the left side. He made no radial additions. Paired additions were usually made from the top to the bottom of the drawing with the exception of A2:1 when A. made the eyes, eyelashes, nose, mouth and then added the eyebrows. Some completions did not involve paired appendages or units.

Equivalents/representations. A. demonstrated an understanding that one line can represent an object or a portion of that object. In his drawings, straight lines were used for rays of the sun, hair, ears, stalactites, and eyelashes. Ears were represented by several different lines within the same and in other drawings. Circular enclosures were eyes, pupils, windows, noses, suns, and balls. Rectangular enclosures were used for the bottoms of houses, buildings, the bodies of bats. T.V.s and tents. Curved non-circular enclosures were used for mazes, ears, hearts, arms, butterflies and designs.

During the first and last sessions, A. responded to the symbols with single labels. During the last session however, A. used more detail in completing his drawings and referred to the first symbol as a referent for those following (see Figure 4). In Session 2 (A1), A. began with a single representation to which he added many details (see Figure 5). During the third session (A2),

A. labeled part of his total representation without referring to the overall picture.

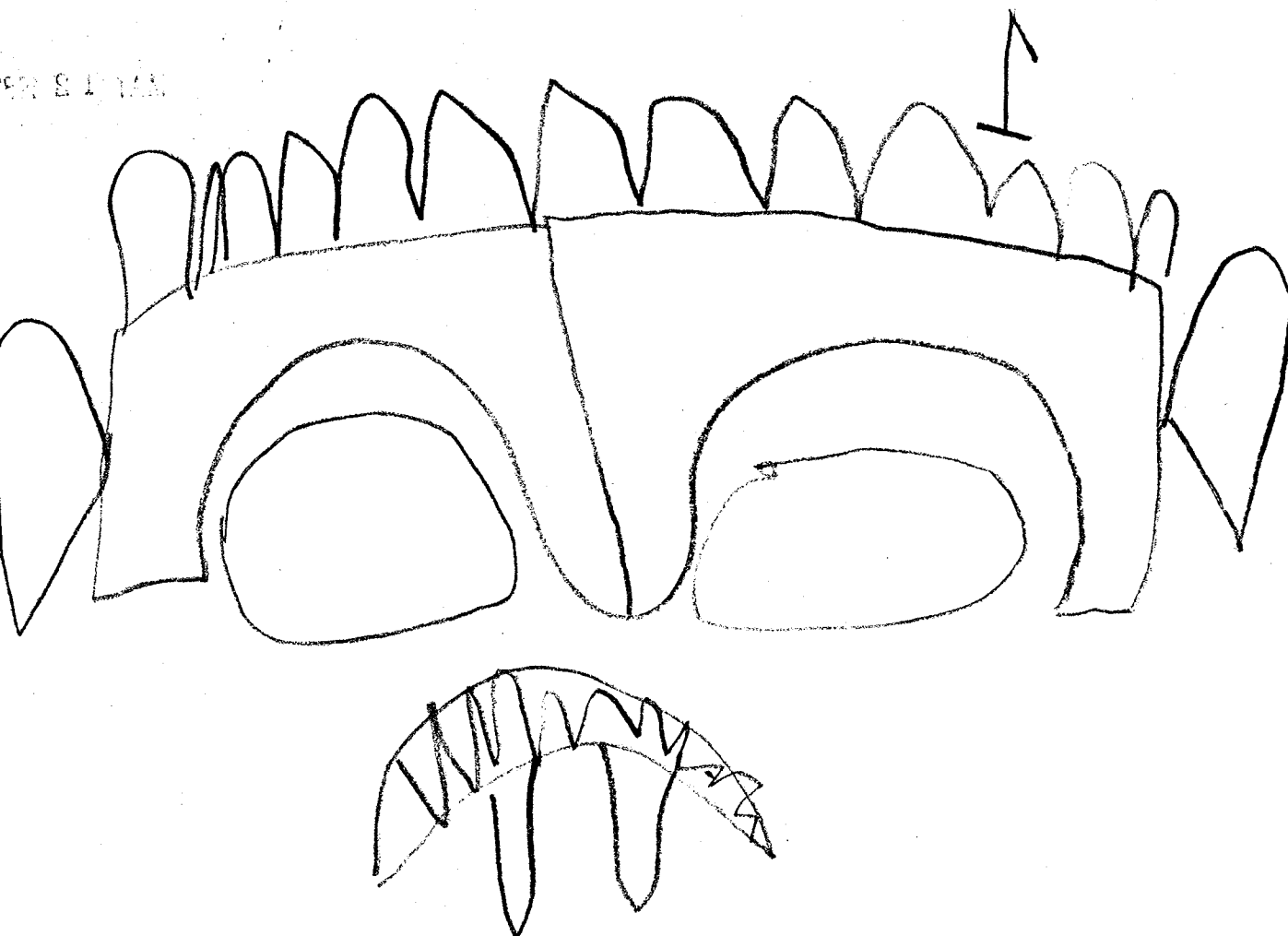


Figure 4: Session 4 Symbol 1

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EG

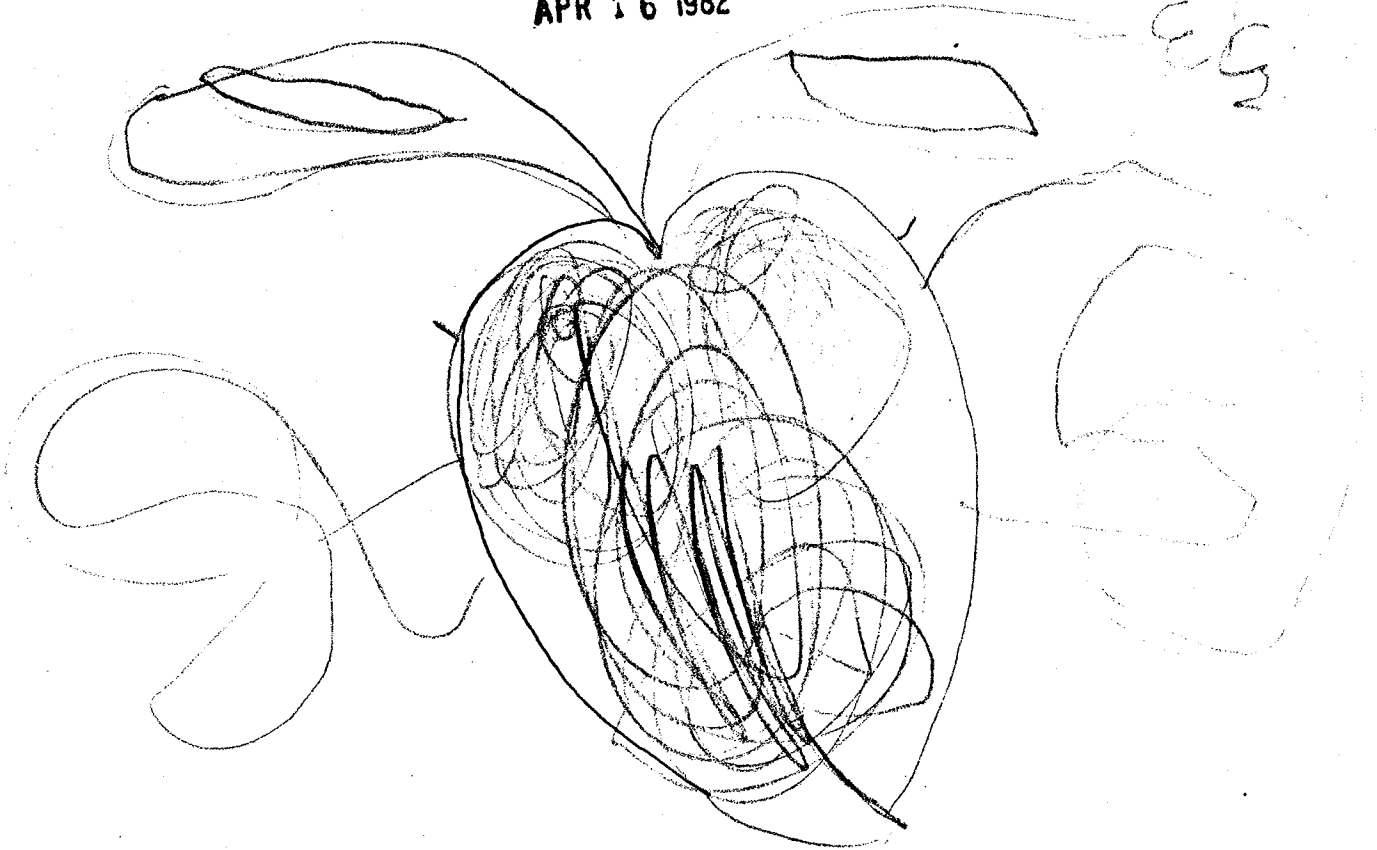


Figure 5: Session 2 Symbol 3

Changes in representations. Another aspect observed was the change in representations elicited by one symbol. This gave some indication on fluency of ideas. Symbol 1 (w) in Session 3 changed from a head to a T.V. with legs to hold it, and during Session 4 changed from a face to a monster. During Session 1, the curved portion of Symbol 4 (w) changed from a circle to a big red ball to a sun. In Session 2, the symbol originally labelled a bird was

given the more specific designation of duck.

Elaborations. Coinciding with changes in representations was the tendency to elaborate those drawings he had started. During Session 1, verbalized elaborations were made in response to the writer's questions about location, possible outcomes, etc.. Details to the house (M:4) were added in response to the writer's questions but were not verbalized. After A. began telling about the sun, details were verbalized more freely through the use of sequence and cause-effect statements.

Questions by the writer and comments made by A.'s friend prompted the additions of details to A.'s drawings during Session 2. The additions of details to Symbol 2 were made after questions were asked by the writer but not as a result of them. A.'s verbalized elaborations demonstrated an understanding of spatial relations.

Elaborations of Symbol 3 (A1:3) were elicited by the writer's questions and by comments made by other children.

N. Ok, what can he do with those big teeth?

Ne. Eat everything.

N. What does he do with that big nose?

A. Smell everything.

N. What kinds of things does he smell?

A. Carrot and uh.....

Ne. Whole bunch of lillies.

A. used double modifiers in verbalizing his elaborations. In response to Symbol 4, A. included many details before verbalizing them. However these were in response to comments made by the

writer. Verbalizations which occurred later in the session were about but removed from the immediate situation.

A. responded to the first symbol of Session 3 (A2) by closing each section of the symbol and volunteering information about it without being prompted. Later prompts were answered with short labels. In response to the writer's questions, elaborations were made but were removed from the symbol.

N. Ok, what else do you need for your body, for your face?

A. Legs.

N. Well, now look. Your body is inside your head. How can that be?

A. I don't have a head.

N. Well, what's this square thing?

A. T.V.

Interactions between A.'s friend and himself produced spontaneous elaborations of Symbol 3. The writer's comments were ignored or elicited justifications for A.'s previous comments. Gestures and accompanying vocalizations were used when adding to the drawing. Word play occurred during the Symbol 4 completion but pertained to conversations which developed during A.'s reaction to Symbol 3.

Symbol 4 elaborations occurred without prompts and, before the writer made many comments, A. reacted to a previous situation by stating that he was not going to make the same drawing as he had made before. Interactions with his friend produced verbalizations about and elaborations to the symbol. Justification statements and verbal elaborations were elicited by the writer's comments. A. used

gestures to illustrate his statements.

During Session 4 (My) elaborations were added to the symbol prior to the verbalization of need or intent. All details were made to the symbol itself as opposed to incorporating the symbol into a larger representation. Symbol 2 was an extension and further development of symbol 1. Symbols 1, 2, and 3 were all monsters. Attempts to distance A. from the symbol were met with "I don't know" or "Yes" and "No" answers. It should be remembered that A. was not with his friend during this session but was being watched by another classmate.

A. developed Symbol 4 (My:4) into cities. He included elaborations to the symbol and also added another figure to the page. Additions of a sun and people were made in response to the writer's comments. Elaborations to the symbol and the other figures were made without comment and before A. described his drawing.

Gestures. Gestures appeared only during the third session. A. made sounds representing splashing water as he made marks indicating water moved by oars. A. emitted other vocalizations as he printed his name and made arms on a figure.

Verbal aspects. A. had an average MLU of 2.93 over the four sessions. His highest MLUs occurred during the second session at 3.1 and the third session at 3.05. These sessions were those when his friend alternated the symbol completion tasks with him. A.'s NP index followed a similar pattern to the MLU. It was highest during the second session (2.57) and dropped to a low point (1.72) for the last session when he was no longer with his friend. The total number of modifiers used decreased from the second session. However, the high NP index during the second and third sessions was

indicative of a higher degree of complexity in the way the decreased number of modifiers was used (e.g., double modifiers in conjunction with plural nouns). Modifiers used during the first session demonstrated an understanding of size, determiners, number, states, possession, direction, exclusion, and plurality. In the second session, in addition to the former uses, modifiers indicated one dimensions size, totality and location. Modifiers used for comparisons and sequence characterized the third session. In addition to the previous uses, modifiers connoting emotion appeared during the fourth session.

Over the sessions the number of nouns decreased as the number of pronouns used increased. Pronoun types used were: personal, exophoric (no referent within the sentence or the preceding one), and anaphoric (referent is included within the sentence, the preceding sentence or used by another person).

During the first session A. used more exophoric than anaphoric or personal pronouns. A decline in the number of anaphoric pronouns, a rise in the exophoric and a slight increase in the personal pronouns marked the second session. The third session was characterized by a sharp rise in personal pronouns and a drop in exophoric and anaphoric pronouns. The rise in personal pronouns was due to a word play exchange between A. and his friend. Characteristics of the last session were a sharp decline in the personal pronouns coinciding with a sharp rise in anaphoric and a lesser rise in exophoric pronouns used. The NP index remained high during the second and third sessions at 2.57 and 2.00 respectively.

Concepts. Through the descriptions of his drawings, A.

demonstrated an understanding of certain concepts. The concepts used fall within the Form-Class categories outlined by Carroll (1964). Within the nominal class, A. indicated an understanding of the concepts of: body parts, family relations, geometric figures, objects, plurality, time, and relationships between class members. The adjectival class included concepts of amount, comparisons/similarities, determiners, possession, size, specific number, and states (characteristics, colour, feelings, time, position and weather). Verbals indicated an understanding of the past, present, and future. Adverbials demonstrated a knowledge of amount, condition, direction, and sequence. Prepositionals showed an understanding of spatial and temporal relations and logical positions between members. Comparisons, relations among class members, and sequence marked concepts included in the conjunctive class.

During the time covered by the study, A. demonstrated an understanding of 955 concepts. However, A. used most concepts included in each class more than once and in different ways. He used a total of 255 different concepts with 43% in the nominal class, 23% as adjectivals, 43% verbals, 23% adverbials, 5% prepositionals and 3% as conjunctives. The number of new concepts for each session were: 46 for Session 1, 91 for Session 2, 71 for Session 3, and 18 for Session 4.

Beside classifying concepts according to form-class categories, they can be viewed in terms of the developmental aspect. In later development, children use concepts to refer to topology, location (including direction, location and temporal

concerns), future, past and causality. In Session 1 concepts demonstrating an understanding of topology, direction, location, sequence, causality and the past appeared. In Session 2 those dealing with time periods and the future appeared. Sessions 3 and 4 showed a continued use of concepts within these categories.

Concepts included within the form-class categories can be described in terms of concreteness and abstraction. Concrete concepts are those which refer to objects or ideas evident in the representation, those which are drawn after being identified and those which are evident from actions accompanying the verbalization of the concept. Abstract concepts are those which refer to information not evident in the drawing. Some of the concepts A. used fall within both categories.

A. increased in his use of abstractions from the first session to the last. During Session 1, 62% of the concepts were concrete and 38% abstract as opposed to 56% concrete and 44% abstract in Session 4. The degree of abstraction varied from symbol to symbol within each session.

Responses tabulated for the three month period indicate that Symbol 4 elicited the highest percentage of abstract concepts with a NP index of 2.05, 2.11, 2, and 1.75 respectively. It is interesting to note that Symbol 2 elicited an overall abstraction percentage of 16% but was the stimulus for the highest NP index throughout the first three sessions (2.33, 3.00, 2.25, and 1.4).

Language uses. One of the reasons for studying language use is to determine children's ability to distance themselves from the ongoing situation. A.'s use of language demonstrated an increasing

ability to distance himself from the concrete situation. In computing the percentage of each use, phrases indicating agreement or negation were not included unless they were used to collaborate with others or to protect or justify the child's position.

A. increased the number of language usages and the strategies within each use from the first session to the last session and within each session. Session 1 was characterized by self-maintaining, directing, reporting, predicting and reasoning uses. Reporting strategies used referred to labels, details of those objects labelled, and incidents for Symbol 2 and included sequencing strategies for Symbol 4. Predicting uses appeared in Symbol 3 and reasoning uses, in the form of the process strategy, appeared in Symbol 4.

The percentage of utterances used for predicting increased from 7% in Session 1 to 19% in Session 2. Strategies which characterized this session were: collaborating under directing; reporting on comparisons between and related aspects of objects; predicting consequences and sequences of events; and reasoning through cause/effect and justification statements.

Reasoning statements increased to 7% in Session 3 and projecting uses appeared. Strategies for reasoning included reflecting on events and drawing conclusions and viewing problems and discovering solutions. A. employed the sequencing strategy of reporting and that of projecting into others' experiences.

Although the total number of statements decreased from 135 in Session 3 to 57 in Session 4 there was an increase in utterances used for predicting and projecting. New strategies for projecting were for describing others' feelings.

Conclusion

As can be seen from the above results, A.'s response time to the dot-line was influenced by the presence of his friend. Response time increased and his attention needed to be drawn to the task. Response time to the symbol was influenced by whether or not A. crossed the lines when completing the figure. This was evident in Symbol 4 of Session 2 and Symbol 2 of Session 3.

A. closed all of the figures and did so in a left-right direction for 75% of the closures. His representations involved closed units drawn in relation to a ground line with each occupying its own space. Additions to the core figure were paired from top to bottom. It was noted that some pairings occurred in a right-left direction.

A.'s representations demonstrated an understanding that one line was equivalent for an object or a portion of that object. On three occasions there were changes in the representation before the symbol completion. Elaborations to the symbols resulted from comments by other children or the writer. Since A. demonstrated a well developed vocabulary, gestures were used to emphasize portions of his representation but not as substitutions for vocabulary. A. demonstrated the highest MLU and NP indexes when he alternated symbol completion with his friend.

During the three month period of the study, A. increased his use of anaphoric pronouns, abstract concepts, and language for predicting, reasoning and projecting. Those increases in addition to the closure of symbols and understanding equivalence demonstrated a developing ability to distance himself from the concrete situation.

Child 2: T.

When the study began in February 1982, T. was 4:4 years old and was attending nursery in an inner city school. T. came to Canada in December 1978 from Vietnam. He and his family speak Chinese and Vietnamese at home. However, T. has friends and younger relatives with whom he can speak English.

T. completed the dot-line and symbol activities during sessions held on February 26, March 24, April 28, and May 12, 1982. T. willingly completed the activity during the first session but was reluctant to enter the activity on subsequent visits. Consequently, on March 24 his teacher sat with him while he completed the activities. After watching his friend respond to the symbols, T. decided to take part in the third session. In May T. agreed to complete the activity in the kindergarten room. It should be noted that T., like A., was the only child in his room involved in the study.

Dot-line Activity

The dot-line activity was used as a warmup activity for all sessions except May 12, 1982. Nonverbal and verbal information were recorded.

T.'s response time decreased by one second for each successive session. In February he responded after 6 seconds and decreased to 4 seconds in April.

During all sessions, T. held his pencil firmly between his thumb and first two fingers. He connected the dots with dark, heavy lines except during the February session when he used long circular

lines in order to avoid crossing lines. The beginning of the lines were dark but became lighter as he neared the dot to be joined. After February, T. crossed the lines at the first opportunity.

T. exhibited on-task behavior throughout the study. He looked at the dots while making the connections. He started the line at the dot 88% of the time during the first session and for 33% of the connections during the February through April sessions. Throughout the study, he demonstrated the ability to plan his movements to stop at the dots for 75%, 40%, and 50% of the connections made during each of the sessions. For the remaining connections, T. stopped beside the dot.

During the first two sessions, T. used his mouth and lips while completing the task. He leaned back and put his pencil down to indicate that he was finished. He was more physically active during the April session when he moved the lower part of his body, his mouth and tongue, and followed the pencil movement with his head.

T. verbalized very little while completing the dot-line task. In April he made an inference from the shape of his lines when he labelled the completed form a star. Other verbalizations indicated an understanding of one to one correspondence as he numbered the consecutive dots. When physically numbering the dots, T. made some reversals which appeared throughout the study.

Symbol Results

T.'s response time to symbols decreased from February to April and then increased slightly for the May session. Symbol 3 elicited the most dramatic fluctuations in response time. In

February T. responded to the symbol after 23 seconds then decreased his response time to 5 seconds in April and increased it to 14 seconds in May when he dropped his pencil. Response time for Symbol 4 showed the least fluctuation for the first two sessions when T. responded after 12 seconds and 11 seconds for Sessions 1 and 2 respectively. In both instances, the initial drawing response was an extension to the side of the symbol rather than incorporating the symbol in the representation.

Once T. settled to the task, he attended well to the activity. T.'s body movements were fairly constant over the study period. Symbol 1 in Session 1 elicited movements which indicated direction planning. During the April and May sessions while completing his representation, T. moved his head in the same direction as the lines he made.

T. preferred large paper to small paper using large paper for 64% of the symbols. Symbol 2 was the only figure for which he chose small paper 67% of the time. During Session 2, the writer chose the paper size for T. for the first two symbols to encourage him to respond.

T.'s overall pencil control was good during the study. He used dark, heavy firm lines during the first three sessions. In May, T. combined dark and light lines which became less firm as the session continued.

Approach to the task. T. closed the figures for 87.5% of the symbols. In two instances (February and March), he extended the sides of Symbol 4. In March T. then closed the extension but not the symbol. The direction T. used for closing the figures

varied with the session and symbol. He used a left-right direction for 75% of the closures. However Symbol 1 and 4 elicited right-left directions for 25% and 50% of the closures respectively. Symbol 1 was the only symbol repeated and T. did so for half of the responses. T. printed his name in a right-left direction throughout the study except in three instances when he printed from left to right in February for the dot-line and April for the dot-line and Symbol 1.

Spatial patterns. During the first session T.'s responses consisted of curved, straight, squiggly lines, and some enclosures. These were juxtaposed to one another as opposed to a ground line. However, the sun and rain were in the upper portion of the drawing. In responding to Symbol 1 (F:1) T. closed the symbol by repeating the shape above the original figure. His representation was not based on the symbol. This was true of the first and second symbols in this session. In the April and May sessions, all elaborations were made to the enclosed symbol. The patterns were ordered with each line or enclosure related to the other within the enclosed symbol.

The use of overlapping space was evident in the first session (F:1 and F:4) and Symbol 2 in Session 2 (see Figure 6 and 7). Representations from the last two sessions demonstrated the principle of objects each to its own space.

26/2/82



Figure 6: Session 1 Symbol 4

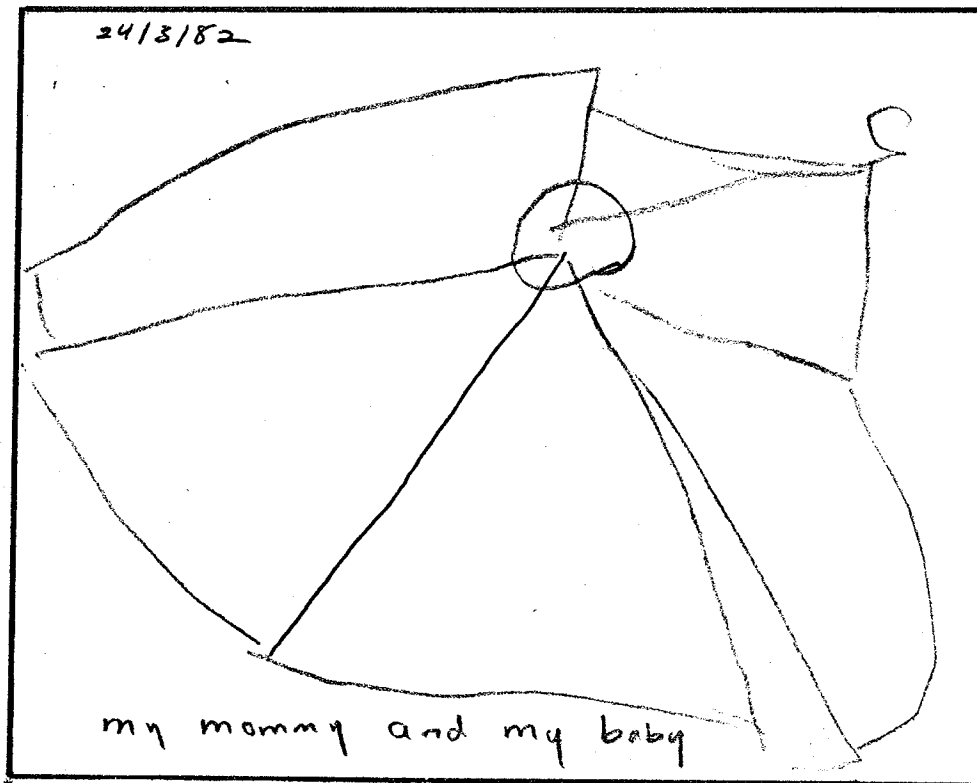


Figure 7: Session 2 Symbol 2

Sequence. Although the symbol is a semi-constrained drawing, T. demonstrated behaviors associated with free drawings. This was especially so in February (Symbol 1 and 4) and March (Symbol 4) when T. completed his representations without incorporating the total symbol into the drawing. During the April and May sessions, he was working under constraints as he elaborated only the space within the enclosed symbol.

As was previously stated, except for Symbol 1 (A:1) and 4 (M, A. My:4) T. initially responded to the figures with left-right closures. Drawings from the first session (F:1,2) showed no agreement between units except for the placement of the sun and lines




indicating rain which were found in the upper portion of the paper. Symbols from March, April, and May sessions elicited agreement of units and organization in elaboration of the figure. In March, T. first used the top to bottom sequence for elaborating the symbol. In two instances (M:2 and My:1) T. made top to bottom to middle additions. When making elaborations within the symbol, T. used paired units. Although the direction for paired additions within the symbol was not recorded, in two cases (M:4 and A:2) additions to the outside of the symbol were made in a right-left direction. There was no evidence of paired appendages in these drawings as T. made only faces. Radial additions occurred in February (F:1) and March (M:2) sessions as rays to the sun and divisions for a house respectively. Agreement of units along a vertical axis appeared in April (A:3) when T. added a nose and mouth to a profile.

Equivalents/representations. T. demonstrated an understanding that a line can represent an object or a portion of an object. At the beginning of the study, T. had some difficulty labelling his marks. However, by May he was able to label the components of his drawings.

In his drawings, T. used straight lines for rays of the sun and sides of enclosures. Straight diagonal lines represented rain. Angular lines represented hats; an enclosed angular shape was a face. Wavy lines stood for water. Circular enclosures were eyes, noses, faces, a sun, a mouth, a portion of a triangle house, circles, and a square. Semicircles were ears, mouths (for happy and sad emotions), a fish tail, and portions of a heart, valentine, and face. Enclosed semicircles were mouths, moons, and monsters. Rectangular enclosures

were sandwiches and rectangles. Triangular shapes were triangles, divisions within a house, portions of a sandwich, the letter A, and a monster's eyes.

During the first session, T. responded to the symbols and his drawings with labels and elaborations of those labels. In the last three sessions, T. reduced his responses to single labels and made elaborations within the symbol as opposed to incorporating the symbol within a larger representation.

Changes in representations. The ability to interpret a figure in several ways is an indication of fluency of ideas. There were four occasions in which T. made changes in his response to the symbols. Symbol 3 () changed from a heart to a ghost to a monster in February (F:3) and from a heart to a face in May (My:3). In May Symbol 1 () changed from a face to a "funny abbit". In February (F:1) additions to the drawing surrounding the symbol, changed the time from night to day. Symbol 2 () changed from a triangle to a triangle house in March (M:2) and from a single triangle which was subdivided into two then four small triangles (My:2).

Elaborations. With the exception of Symbol 3, elaborations made to the symbols during Session 1 resulted from questions and comments by the writer. When completing Symbol 3 (F:3), T. spontaneously added details and labelled his additions. Elaborations were not in response to the comments or questions asked by the writer as is demonstrated by the following conversation:

- N. Is it a monster now or a ghost?
T. Mouth (as he drew a mouth).

In responding to Symbol 1, T. didn't incorporate the symbol in the

drawing but added details to other portions of the representation. With Symbols 3 and 4, his responses became more abstract as he predicted what might happen.

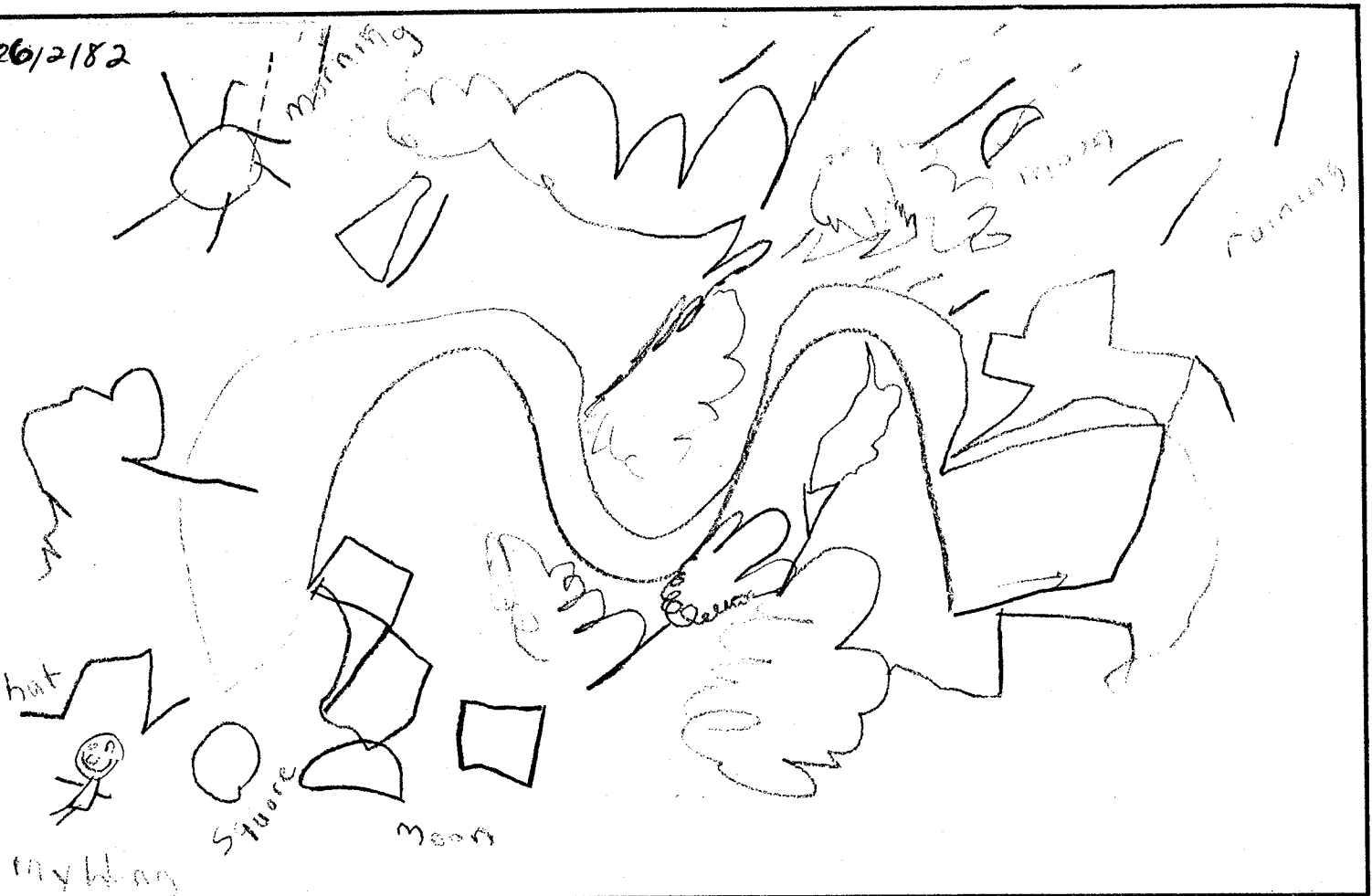


Figure 8: Session 1 Symbol 1

The symbols in Session 2 elicited few verbalizations. Elaborations were made to the symbols only, with the exception of Symbol 2 (M:2) which was incorporated into the drawing. T. responded to Symbol 4 by closing an extension to the left side of the figure thereby ignoring the actual symbol. Verbalizations were given in response to questions asked by the writer and were in the form of

single labels.

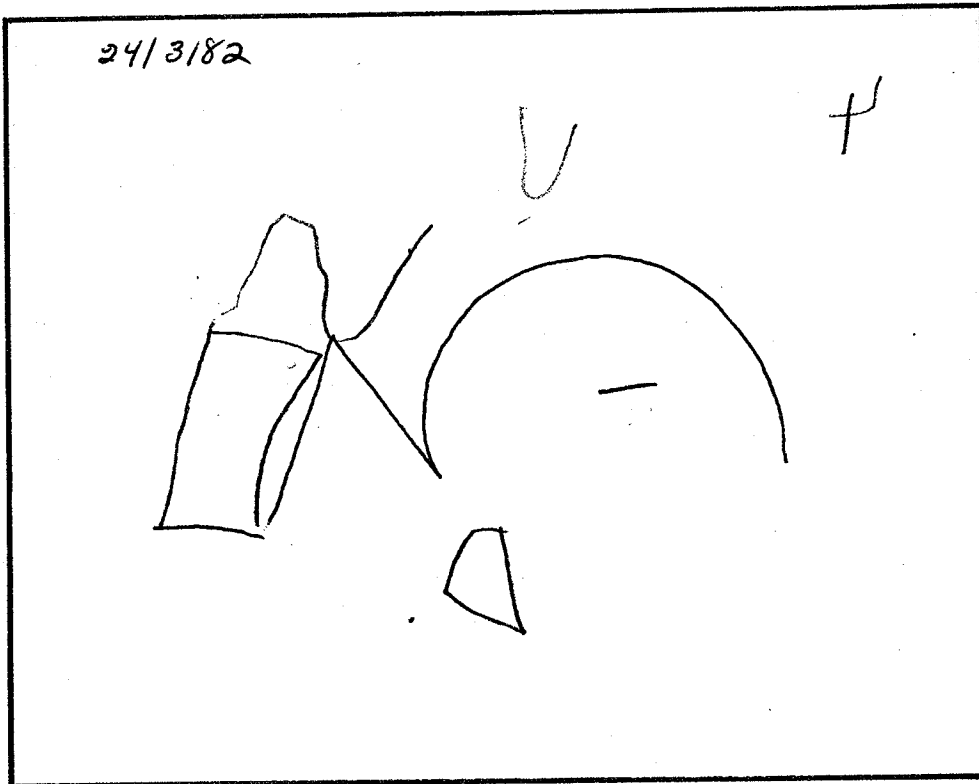


Figure 9: Session 2 Symbol 4

Again in Session 3, T. elaborated only the symbols. Focussing and extending statements made by the researcher were ignored or elicited "Can't do" or "nothing". With Symbol 2 direct questions elicited phrases and "I wonder" comments made by the writer during Symbol 3 prompted clarifying statements and drawing responses. During this session, T. spontaneously commented on the effects of carbon paper on the copy. He also began asking the writer for information and about reasons for decisions.

Responses to the symbols in Session 4 were more spontaneous. The details added remained within the symbols except in the case of Symbol 4 for which T. made a wavy line that represented water. For Symbols 1 and 2, T. added more details in response to the writer's questions and comments. Expressed emotion first appeared as a spontaneous elaboration in response to Symbol 3. Symbols 3 and 4 elicited responses which were not evident in the representation.

Gestures. The only use of gestures evident in the study occurred in Session 1 (F:1) when T. made diagonal lines to support his verbal description raining.

Verbal aspects. T. had an average MLU of 1.82 and a NP index of 1.4. His highest MLU occurred during the February session at 2.1, dropped to 1.5 in March, rose to 2.0 in April and dropped again in May. Unlike his MLU, T.'s NP index began at 1.4 in February, dropped to 1.3 in March and rose during the last two sessions to 1.5. The discrepancy between the two indices indicated a rise in the complexity of the noun phrases used in the last sessions while the sentence length reflected a fluctuating use of other parts of speech. The low March MLU was indicative of T.'s unwillingness to complete the activity.

As the NP index indicated, T.'s use of modifiers increased in complexity over the period of the study. During Session 1, through his modifiers, T. demonstrated an understanding of size and comparisons of sizes, possession, determiners, location, and number. Modifiers in Session 2 were used for geometric shape, completion, exclusion, states, and repetition. In addition to the above, the modifiers in Session 3 were used to express comparisons

of attributes other than size. In the May session, modifiers expressing emotion appeared.

Over the sessions the parts of speech used fluctuated greatly. Nouns, although the most frequently used form, fluctuated from 41% of all words in the first session to a low of 28% in Session 3 to a high of 52% in May. With the exception of adjectives, the other parts of speech used dropped in frequency in May.

The highest evidence of pronouns appeared in Session 3 when the percentage of nouns was lowest. Personal pronouns were the most frequently used form for Sessions 1 through 3. However in Session 4, all pronouns were exophoric; those which did not have a referent in the same sentence or the preceding one. Anaphoric pronouns (referent within the sentence) were most evident in Session 1 and 4 when the percentage of nouns was low. Exophoric pronouns remained the second most frequently used form of pronoun throughout the study.

Concepts. Concepts of which T. demonstrated an understanding can be categorized within the Form-Class categories outlined by Carroll (1964). Within the nominal class, T. indicated an understanding of the concepts of: activities, body parts, family relations, geometric shapes, numbers, objects, plurality, time and relationships between class members. Concepts in the adjectival class included: amount, comparisons/similarities, determiners, possession, size, specific number, and states (characteristics, colour, exclusion, and feelings). Verbals indicated an understanding of the present and future. Adverbials described amount, condition, location, negation and sequence. Prepositionals showed an understanding of

spatial relations and logical position among members. Relations among class members were found in the conjunctive class.

During the time covered by the study, T. demonstrated an understanding of 351 concepts. Most concepts were used more than once and in different ways. The symbols elicited a total of 147 different concepts and of those 33% were nominals, 22% adjectivals, 16% verbals, 5% adverbials, 3% prepositionals and 1% were conjunctives. When considering all of the concepts used, the percentage of those in the nominal and prepositional classes increased while the percentage of the adjectivals and verbals decreased. Proportionally there were more different kinds of concepts used as adjectives and verbs than there were as nominals and prepositionals. Session 1 elicited a total of 70 different concepts. In addition 22 appeared as a result of Session 2, 31 in Session 3, and 24 in the May session.

When considering the developmental aspect of concepts in terms of spatial relations, children use those referring to topology first, then those referring to locative concerns (direction, location, and temporality), the future, past, and causality (in terms of physical acts). Concepts referring to topology, location, time periods, and the past were evident during the February session. In addition to those, concepts referring to the future appeared in Session 2. Concepts found in Session 3 and 4 came within the above categories. In May T. used terms which expressed emotion as a result of situational factors.

Another means of classifying concepts is in terms of concreteness and abstraction. As was previously mentioned, concrete concepts are those which refer to items contained in the represent-

ation, those which were drawn after being identified, or actions which accompany verbalizations of the concepts. Concepts categorized as abstract refer to information not contained in the drawing. T. used concepts which were included in both categories.

The percentage of abstract concepts used during the three month period was 40% while 60% of the concepts depicted within the representation. The degree of abstraction used by T. varied with the session and symbol. The highest degree of abstraction (51%) occurred in Session 2, the session when T. was the least interested in entering the activity. He responded frequently with "nothing" and "I don't know/want". The percentage of abstraction for the other sessions were: 33% for February, 40% for April, and 42% for May.

The symbols which elicited the highest percentage of abstraction varied with the session. Symbol 4 (F:4) in Session 1, Symbol 1 in March (M:1), and Symbol 3 in April (A:3) and May (My:3) produced 40%, 67%, 49%, and 59% abstraction respectively. In May, Symbol 3, which elicited the highest degree of abstraction, also produced the highest NP index for the session. This was not the case with the other symbols mentioned above.

Language uses. Children's ability to become abstract in their thinking is partially determined by the degree of abstraction reflected by the concepts used. The reasons for which children use their language reflect their ability to distance themselves from the current situation.

Throughout the study, T. used his language for self-maintaining, directing, reporting, and predicting purposes. In May

he employed the logical reasoning strategy of cause/effect and projected into the feelings of others. In Session 1 strategies used for self-maintaining purposes were expression on needs and justification of actions. Predicting strategies were forecasting events and details associated with those events. Reporting strategies were labelling, reporting on details of objects labelled, relating incidents and a sequence of events, and making comparisons.

In March 33% of the language uses were for self-maintaining purposes in the form of expressing needs, protecting interests, and justifying behaviour. For Symbol 2 and 4 T. used the reporting strategies of labelling and referring to details. Symbol 3 elicited a comparison strategy. In addition to forecasting events and details, anticipating a sequences of events appeared in Symbol 4 responses.

In Session 3 (April), 26% of the utterances were used for directing. During this session T. emphasized his actions with "There" which partially accounts for the increase in the directing usage. T. also used the directing strategies of collaborating with others and directing others' actions. Reporting on incidents and comparisons between objects emerged at this time.

Projecting and reasoning usages appeared during the May session. Reporting and predicting strategies accounted for 36% of the utterances. Predicting problems and solutions occurred as a response to Symbol 3 as did projecting into others' feelings and the reasoning cause/effect strategy.

Although the number of utterances decreased from the first to the last session, the usages and strategies within each increased. The appearance of predicting, projecting, and reasoning usages all

indicated T.'s increased ability to distance himself from the ongoing situation.

Conclusion

Results from the dot-line activity indicate that T. had good pencil control and, that although he had the ability to concentrate on the task, his tendency to stop and start at the dots decreased as the study continued. He demonstrated an understanding of one-to-one correspondence during the activity. There was evidence of number reversals.

Symbol results indicated a decrease in response time throughout the study with a slight increase in May. It is interesting to note that during the February and May sessions, the response time to Symbol 3 increased as did the number of changes in representation the symbol elicited. T. closed the symbols for 87.5% of the initial responses and used the left-right direction for 75% of the closures. He demonstrated an understanding of equivalence and, when completing his representations, juxtaposed the components of the drawing. However, in April, he placed units in agreement along a vertical axis. Representations ranged from ignoring the symbol in February (F:1 and F:4) and incorporating the symbol in the drawing (February and March) to elaborating only the symbol in the April and May sessions. Spontaneous elaborations to the symbols varied according to the session and symbol.

During the research period, the noun phrases became more complex even though the utterance length fluctuated. There was also a greater proportion of different concepts used which were

within the Form-class categories of adjectivals and verbals than were in the nominals and prepositional categories. Although most concepts used reflected the immediate situation, there was an increase in the percentage of abstraction over the three month period.

The increase in abstract concepts and the appearance of language used for predicting, reasoning, and projecting reflected T.'s growing ability to distance himself from the ongoing situation.

Child 3: T.P.

T.P. was a 4:10 year old child who was born in Vietnam to Chinese parents. She came to Canada in January of 1980 and speaks no English at home.

Data was collected on February 26, March 24, April 28, and May 12, 1982. T.P. willingly completed the activities for the first and second sessions. However, in April she was involved in painting when the writer arrived and did not want to be interrupted. Consequently her teacher and a friend sat with her while she completed the activity. Symbols were alternated with her friend who responded to figures not included in the study. It was interesting to note that although T.P. and her friend alternated symbols, her friend adjusted her responses to match those of T.P. (e.g., she began repeating the symbol after she had elaborated previous ones). During the last session (My) T.P.'s friend sat with her but completed no symbols.

Dot-line Activity

T.P. responded quickly to the dot-line activity. The interval between directions and her first pencil response ranged from 4 seconds in February to 2 seconds in May with a 3 second lapse in April.

During the first two sessions, T.P. held her pencil firmly between her thumb and first two fingers and made dark and heavy lines as she connected the dots. In the last two sessions, she used her thumb and first three fingers to hold her pencil and combined dark and light lines while completing the activity.

T.P. attended well to the task. Her ability to plan her movements to stop at the dots was evident as the percentage of those connections increased from 56% in February to 83% in May.

During the first session, T.P. did not cross the lines until forced to do so. In March, she crossed voluntarily but not at the first opportunity. Immediate line crossing appeared in April and May.

T.P.'s body movements increased during the last two sessions in which she not only moved her upper torso, legs, feet, and mouth, but also moved her head in the direction of her pencil. In May she made an inference about the product by identifying the shape.

It is interesting to note that when numbering the dots in February and April, T.P. used the letters in her name in place of the numerals. However, she did demonstrate an understanding of one-to-one correspondence when labelling the dots. In May she attempted and could occasionally isolate a particular line in order to trace it to find the next dot in the sequence.

Symbol Results

T.P.'s response time to the symbols varied with the symbol and session. No interval was longer than 6 seconds. With the exception of Symbol 2, the response time for all symbols in Session 1 was between 3 and 4 seconds. All symbols were repeated; none were closed. In Session 2 the response time decreased for Symbols 1 and 3 but increased for Symbols 2 and 4. After completing Symbols 1 and 3, T.P. started to leave the area and was told there were more symbols to complete. Response time for all symbols increased in

Session 4 with the exception of Symbol 4. Although elaborations were made, this was the only symbol in this session which T.P. did not close.

Once involved in the activity, T.P. attended well to the task. However, at the end of Symbol 3 in March, T.P. had to be reminded of the task as she and her friend were engaged in conversation. As with the dot-line activity, she held her pencil firmly between her thumb and first two fingers for the first two sessions and with her thumb and first three fingers during Session 3 and 4. There was variation in the darkness and steadiness of the lines at this time. April and May sessions elicited an increase in body movements which included using her mouth and moving her head in the direction of the pencil.

T.P. chose large paper for 56% of the symbols. Symbol 2 was the only figure for which she chose large paper for 75% of the responses.

Approach to the task. With the exception of Symbol 3, T.P. responded to all symbols in a left-right direction. In May (My:2), T.P. initially responded in a top to bottom direction when transforming the figure into a triangle. The only incidence of imitation occurred in April (A:2) when T.P. traced the symbol from bottom to top in a left-right direction.

Although T.P. attached labels to her drawings, Session 1 elicited no symbol closures. All labels were geometric shapes, the topic the children were studying at the time. The incidence of closure increased from one to three symbols per session as the study progressed. In May, Symbol 4 was the only non-closed form. However,

T.P. did extend the sides and close a repetition of the left side.



Figure 10: Session 4 Symbol 4

Spatial patterns. Representations from the session indicated a progression in the use of lines from repetition to vertical and horizontal extensions and eventual closure of the figure (see Figures 11-12). A ground line is visible in one representation from Session 2 (M:4). In other drawings the parts are juxtaposed (A:3, M:4). Generally T.P. followed the principle of each object to its own space when positioning elements in her representations. However

for the second symbol in May (My:2), T.P. closed the symbol but did not include it in the drawing.

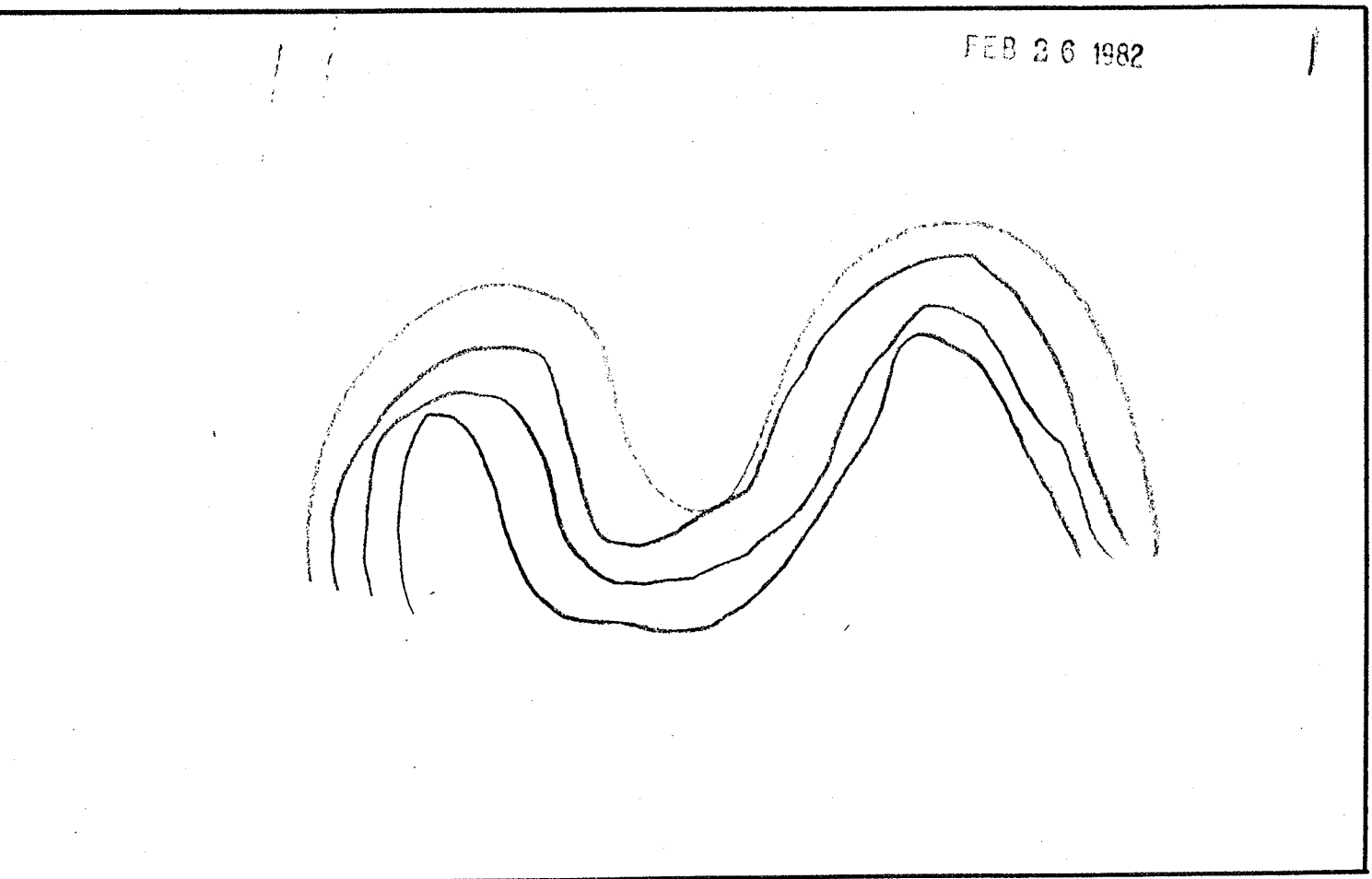


Figure 11: Session 1 Symbol 1

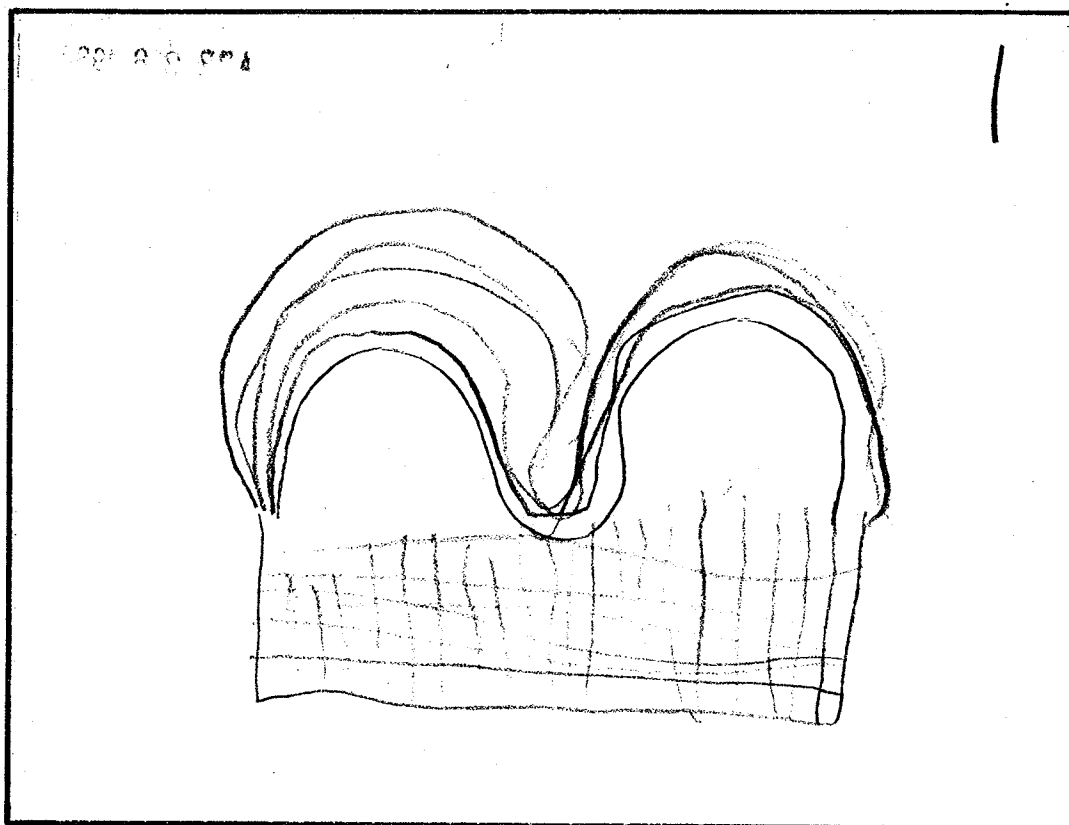


Figure 12: Session 3 Symbol 1

Sequence: As was previously mentioned, T.P. employed a left-right sequence when responding to the figures. She alternated top to bottom additions and in elaborating some symbols used a top to bottom to middle sequence. She moved from the core to accessories when making elaborations and in May (My:1) returned to the core to add nostrils to her drawing. In constrained situations, as with the first symbol in March, April, and May and the fourth symbol in April, T.P. placed units in agreement with each other when elaborating the closed figure.

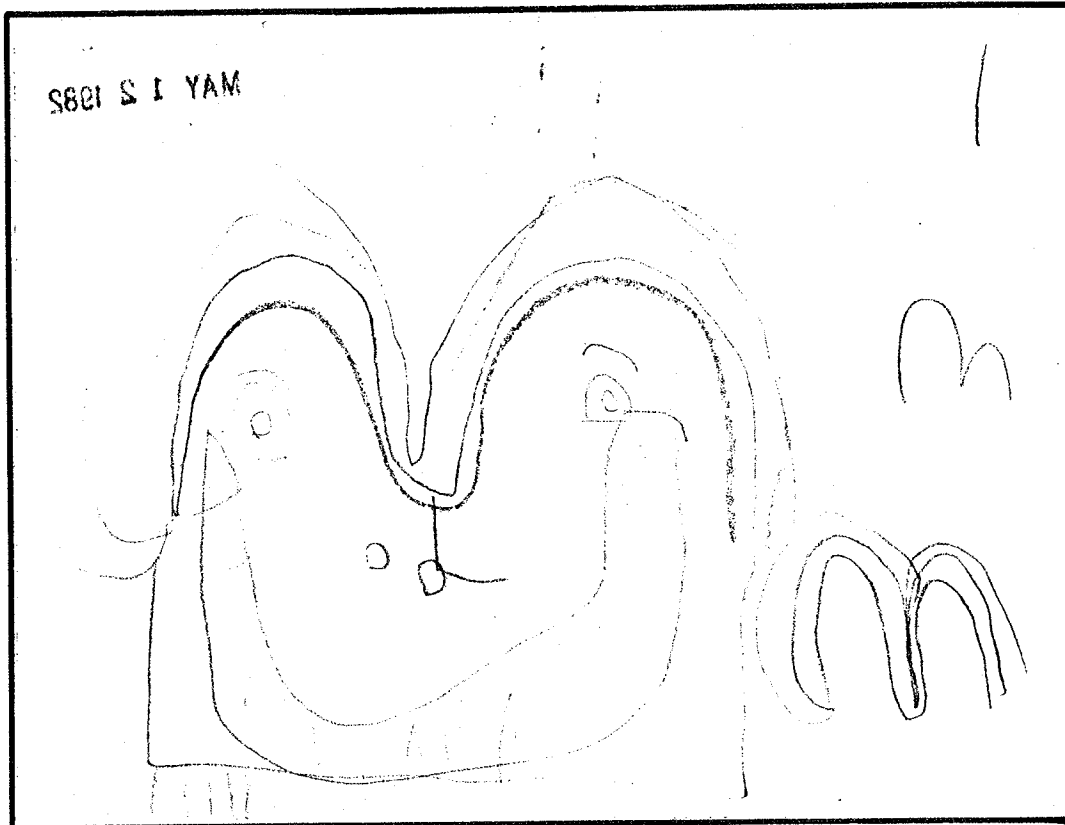


Figure 13: Session 4 Symbol 1

Equivalents/representations. After the first session, T.P. verbally demonstrated an understanding that one line could represent many objects. This was evident in Symbol 1 (M:1), Symbol 4 (A:4), and all symbols in the May session. Straight lines represented grass, circles (M:2), lines, beds, feet, and teeth. Circular enclosures were circles, eyes, nostrils, a mouth, and a face. A repeated circular enclosure was a big nose. Semicircles were mouths

and eyebrows. A closed semicircle represented a grin. Rectangles stood for a hat, body, and arms. Water was portrayed by a wavy line and noses were circles or angled lines.

Changes in representations. Only one change in representation occurred during the research period. In May (My:4) a flower and eye became a flower eye.

Elaborations. During Session 1 the only response to the figures was repetition of the symbol. All elaborations made to the symbols were in the form of drawing responses. Symbol 1 in the second session elicited the first closure and was in response to the writer's prompts. Repetitions of Symbols 2 and 3 followed external prompts. T.P. made the first symbol under Symbol 4 in this session when requested to do something under the figure.

Session 3 was characterized by spontaneous repetitions to the symbols. A rectangular enclosure containing vertical and horizontal lines was added to Symbol 1 in response to prompts from the writer. T.P. crossed the diagonal line in Symbol 2 in response to a friend's suggestion. She then continued to repeat the lines. Symbol 3 brought five additions as a reaction to the writer's comments. Probes such as "I wonder.." were unsuccessful in eliciting responses. Direct questions evoked labels of details in the representation. Symbol 4 was not elaborated until T.P. was prompted to do so. Arms were added in response to "Where are his arms?"

Characteristic of the May session were elaborations in the form of large penciled areas. The figures were incorporated into the representations of Symbols 1, 3, and 4. However, Symbol 2 was ignored in the completed drawing.

Gestures. T.P. employed gestures on three occasions to clarify her meaning. In April (A:4) she emphasized the term cold by wrapping her arms around her body. Symbol 3 in May (My:3) elicited dots and hitting the paper with the pencil to indicate biting. In response to the writer's question about paper size needed for Symbol 4 (My:4), T.P. drew a large rectangle on the table with her finger.

Verbal aspects. For the research period, T.P. had an average MLU of 1.61 and a NP index of 1.45. Both the MLU and NP index increased over the three month period. In May the MLU was 1.9 and the NP index was 1.58.

T.P. used complete sentences on four occasions. The earliest use appeared during the May session in response to Symbol 2. The March session elicited the largest percentage of modifiers. The modifiers used decreased from 50% in March to 33% and 34% in April and May respectively. In describing symbols in the May session, T.P. used double modifiers and modifiers with plural nouns. This partially explains the relatively high NP index occurring simultaneously with low percentage of modifiers.

Modifiers used during the first session demonstrated an understanding of two dimensional size. In addition to size, the second session elicited those acting as determiners. States, negation, and comparisons characterized Session 3 in addition to those used before. Modifiers indicating possession appeared in the fourth session.

The predominate form of speech used by T.P. were nouns. Nouns accounted for 70% of the words used in February, fell to 50%

in March, rose to 61% in April and decreased to 45% in May. Verbs appeared in May for 9% of the words used and pronouns and adverbs were evident in April at 3% and rose to 9% and 5% respectively in May.

Exophoric pronouns (i.e., those with no referent within the sentence) were the only form used in April when pronouns first appeared. In May 40% of the pronouns used were within the anaphoric and personal categories.

Concepts. Throughout the study, T.P. displayed an understanding of certain concepts. They can be classed according to Carroll's Form-class categories of nominals, adjectivals, verbals, adverbials, prepositionals, and conjunctives. Concepts used within the nominal class were for: body parts, community members, geometric shapes, location, objects, plurality, and relations between class members. Adjectivals were: comparisons, determiners, possession, size, and states. Verbals indicated an understanding of the present. Conjunctives formed relationships between class members while prepositionals indicated spatial and logical position between class members.

During the study, T.P. demonstrated an understanding of 120 concepts. Many were used more than once and could be classed within more than one of the above-mentioned categories. The 120 concepts were comprised of 56 different concepts used more than once. Of the 56 concepts 64% were nominals, 28% adjectivals, 5% verbals, 2% prepositionals, and 2% were conjunctives. Adverbials indicated agreement or disagreement and therefore were not included in the total.

In addition to the form-class categories, concepts can be viewed in terms of development. Children use concepts to express directives and referential and spatial relations among objects. T.P. used the directive "Give to me" in May with Symbol 2. The referential relationship indicating causality was expressed by T.P.'s description of the person in her drawing as cold because he had no jacket.

Concepts can also be classed according to the qualities of concreteness and abstraction. Of the 120 concepts, 88% were concrete and 12% abstract. All of the concepts in Sessions 1 and 2 were directly related to the representations. Abstractions appeared in April at 17% and 11% in May. The symbols which elicited the highest percentage of abstract concepts were Symbol 4 in April and Symbol 3 in May.

Language use. Analyzing the uses of language is one way to determine a child's ability to distance him or herself from an existing situation. T.P. increased in the number of reporting statements used throughout the sessions. The largest percentage of statements were used for reporting purposes. Strategies employed which were within the reporting use were: labelling, referring to detail, making comparisons (My:3), and relating incidents. In addition to predicting statements, there was one instance of projecting into others' feelings and justifying as a strategy of logical reasoning. Directing others appeared in May for Symbols 2 and 3. Although the majority of statements were for reporting use, the widest variety of strategies within that category appeared in May and the most varied uses were evident in April and May.

Conclusion

From the above information, it is evident that T.P. operates from a concrete viewpoint. However, her representations demonstrate a growth in the use of lines and organization of the components included in the drawings. Elaborated symbols elicited the arrangement of parts in agreement with each other. Throughout the study elaborations of the representations became more detailed. Verbal descriptions became more complete and varied.

T.P.'s language complexity increased throughout the sessions as is evident from the higher MLU and NP indices. Modifiers became more complex and anaphoric pronouns appeared in May. Abstraction through concepts occurred in April and May. There was also a growth in T.P.'s use of language. April and May responses demonstrated a developing ability to become distanced from the existing situation as projecting and reasoning uses appeared.

Although T.P.'s responses were linked with the ongoing situation, there was evidence from the development in graphic representations, complexity of language, appearance of abstraction, and variations in language use that she was learning to distance herself from the existing situation.

Child 4: N.A.

N.A. was a 5:1 year old child who was born in Vietnam to Chinese parents. She came to Canada in January of 1980 and spoke no English at home.

Data was collected on March 3, March 24, April 28, and May 12, 1982. Since N.A. was absent on the first day of data collection, she was the only child to engage in the symbol activities on March 3, 1982. Therefore, T.P. invited her to join her in completing the tasks. As N.A. was hesitant in responding to the symbols, T.P. completed one as an example for N.A. During the March 24 and April sessions, N.A. willingly completed the activities after T.P. invited her to come and, in April, after another friend completed a symbol first. In May, a friend sat with her while she completed the activities.

Dot-line Activity

N.A. responded quickly to the dot-line activity. The interval between directions and after her first pencil response ranged from 2 seconds in February to 1 second in May with a 4 second lapse in April.

During all of the sessions, N.A. held her pencil firmly between her thumb and first two fingers. Her pencil control improved from dark, shaky lines to dark and heavy lines as she connected the dots.

N.A. attended well to the task. Her ability to plan her movements to stop at the dots was evident as the percentage of those connections increased from 33% in February to 100% in May. N.A. crossed lines immediately throughout the study.

N.A.'s body movements became more pronounced during the second session and increased during the last two sessions in which she not only moved her upper torso, fingers, legs, feet, and mouth, but also moved her head in the direction of her pencil. She indicated that she was finished by placing her hands in her lap. Verbalizations, which appeared in late March and continued throughout the research period, concerned labelling the dots.

In March N.A. had difficulty making the numerals when numbering the dots at the conclusion of the task. The writer numbered the dots at the end of the dot-line task in the second session. In the last two sessions, number reversals appeared. N.A. demonstrated an understanding of one-to-one correspondence as she labelled the dots. When completing the task, N.A. was able to identify the dot from which to draw the line even though her friend identified the incorrect one.

Symbol Results

N.A.'s response time to the symbols varied with the symbol and session. Symbols 1 and 2 in Session 1 elicited the longest interval between presentation of the figure and the first drawing response at 75 and 106 seconds respectively. The time noted represents the combined lapses for the first and second presentations of the two symbols. After the first presentation of Symbols 1 and 2, the writer asked T.P. to complete a symbol in the presence of N.A. in order to prompt a response. The second presentation to N.A. elicited 3 seconds intervals for each symbol. In the second session the response time was 3 seconds for Symbol 1 and 6 seconds for

Symbol 2. With the exception of the first session, the other symbols which elicited the most variation in response time were Symbol 2 and 3. Response time for Symbol 2 rose to 11 seconds in April and dropped to 7 seconds in May. As opposed to repeating and enclosing the symbol in the first two sessions, in Session 3, N.A. crossed the diagonal line as indicated by her friend and, in May, transformed the line into a triangle. The time interval for Symbol 3 increased from 4 seconds in the first session to 12 seconds in the second session then dropped to a low of 3 seconds in May. In Session 1 N.A. enclosed the symbol after repeating it; repetition to the left of the symbol was evident in the second session.


Once involved in the activity, N.A. attended well to the task. As with the dot-line activity, she held her pencil firmly between her thumb and first two fingers and used dark, heavy to complete the symbols. However, in April there was variation in the darkness and steadiness of the lines. As during the dot-line activity, N.A. became more physically active during the second session; the behaviours continued throughout the research period.

During each session, N.A. chose each paper size twice. Large paper was chosen 100% of the time for Symbol 2 and 75% of the time for Symbol 4. The same percentages occurred for the use of small paper for Symbol 3 and 1.

Approach to the task. The direction used in responding to the symbols became more consistent as the study progressed. In Session 1, 50% of the initial responses were in a right-left direction. In Session 2 and 3 only Symbol 3 elicited a right-left response. During the last session all initial responses were in a left-right

direction. After the first session, N.A. printed her name from left to right.

Imitation occurred with all symbols in the first session and only with Symbols 3 and 4 in Session 2. To some extent repetition was evident throughout the study. However, it was nonexistent with Symbols 3 and 4 (My:3, 4) in the last session when closure occurred. N.A. enclosed all symbols in the first session. This practice was not evident in the second session but appeared in Session 3 with Symbol 4 and with Symbol 1 in the last session (My:1). Closed figures were the only ones which were elaborated.

It is interesting to note that labels applied to enclosed and repeated figures reflected inferences made about the shapes (e.g., Symbol 1, , was a five, number three, an S, and McDonald's). No labels were attached to Symbol 4 which seemed to be the least familiar shape.

Spatial patterns. Representations from the sessions indicated a progression in the use of lines from repetition and enclosure (rotation around a specific point) to closure of the figure (see Figures 14 - 15). Although no axis was visible the elaborated symbols seem to be organized along a vertical axis.

Problem solving was evident in N.A.'s reaction to positioning components of her drawing. Symbol 2 of the last session (My:2) followed the principle of each to its own space. However, the use of overlapping space is evident in Symbol 3 as the hair covers the ears of the figure (My:3).

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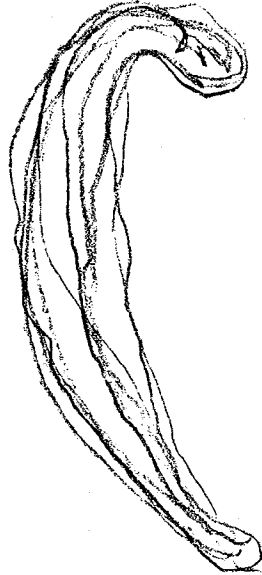


Figure 14: Session 1 Symbol 3

SSQI S I YAM

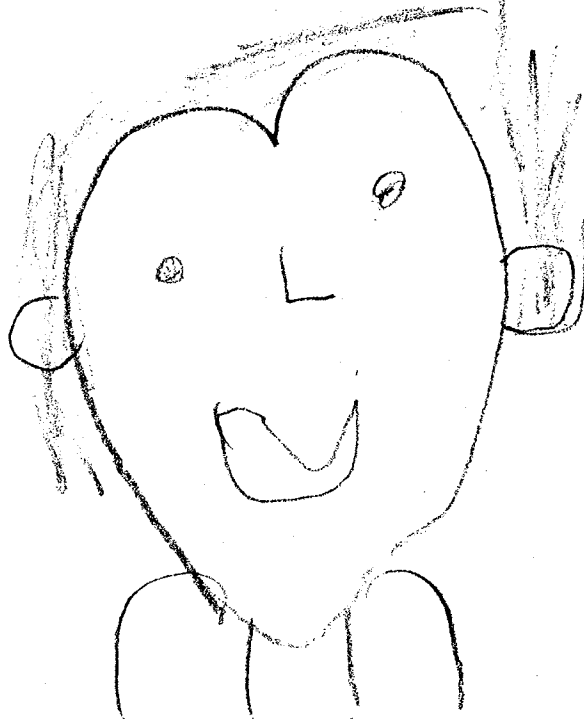


Figure 15: Session 4 Symbol 3

Sequence. As was previously mentioned, a left-right sequence developed over the research period. Closed symbols were elaborated from bottom to top (My:2) and with a top to bottom to top sequence (My:3). N.A. worked from the core to accessories when adding the hair, ears, and neck to her figure using paired elaborations when appropriate. When making additions within the closed figure, the facial features were placed in agreement with each other.

Equivalents/representations. Even with repeated and enclosed figures, N.A. demonstrated an understanding that one shape could represent more than one object. Her labels reflected present and past information and, for Session 3, her friend's comments. After she had made a triangle (My:2) it remained a triangle even though there was a flower growing out of it. Straight lines represented the neck, hair, and the stem of a flower. An angular line was a nose. Wavy lines stood for McDonald's, an S, a three, and a five while curved lines were shoulders. Circles were eyes, pupils, and the center of a flower. Curved enclosures represented a face, a flower, and a mouth.

Changes in representations. No changes in representations occurred during the research period.

Elaborations. During Session 1 the only response to the symbols was repetition and enclosure of the figures. Session 2 elicited repetition of the symbols. Session 3 was characterized by repetition and enclosures. No elaboration of symbols was evident until the May session when N.A. closed the second and third figure. Both symbols became an integral component of the representation. Additions to Symbol 2 were made in response to the writer's comments.

After closing Symbol 3, N.A. spontaneously elaborated the upper portion. Further additions were in response to prompts. Verbal elaborations occurred in this session in response to questions about McDonalds (My:1).

Gestures. N.A. employed gestures during the last session to clarify her meaning. She had made a paired straight line addition to her drawing and indicated that was a neck by pointing to her own neck.

Verbal aspects. For the research period, N.A. had an average MLU of 1.28 and a NP index of 1.23. There was a slight decrease in NP index over the three month period while the MLU rose slightly. In March the MLU was 1.3 and the NP index was 1.5. May responses were computed to an MLU of 1.41 with a NP index of 1.26. N.A. used fewer elaborated noun phrases in proportion to the single word responses to describe her representations in the May session.

The first session elicited the largest percentage of modifiers. The modifiers used decreased from 60% on March 3 to 21% in May. Symbol 1 (MY:1) elicited the highest symbol NP index at 1.4 when N.A. used plural nouns as descriptors. The modifiers in Sessions 1 and 2 described size and comparisons of sizes. In addition to reference to size, those in the third session were determiners. Size, number, and exclusion characterized the May session.

The predominate forms of speech used by N.A. were nouns and adjectives. Nouns accounted for 40% of the words used on March 3, fell to 33% on March 24, rose to 50% in April, and peaked at 79% in May. On the other hand, the percentage of adjectives

decreased from 60 to 21% during the research period. There was incidence of verbs or adverbs throughout the study. Exophoric pronouns (those with no referent within the sentence) accounted for 13% of the words used for the second session, the only session in which pronouns appeared.

Concepts. Throughout the study, N.A. displayed an understanding of 46 concepts. They can be classed according to Carroll's Form-class categories of nominals and adjectivals. The nominal class included concepts of: body parts, classmates, food, geometric shapes, location, number, objects, and plurality. N.A.'s use of gestures indicated a knowledge of neck, although she didn't know the label. Adjectivals were: comparisons, determiners, exclusion, and size.

Since some of the 46 concepts were used more than once, the total number of different concepts was tabulated at 26. Of the 26, 69% were nominals as opposed to 31% adjectivals. When the proportion of nominals was tabulated for the total number of concepts used, the percentage fell to 59%. This was an indication that proportion of concepts within the nominal category was higher than those classed as adjectivals. The number of new concepts which appeared for each session was: 3 on March 3, 8 for March 24, 4 during April, and 11 for May.

In addition to the form-class categories, concepts can be viewed in terms of development. Children use concepts to express directives and referential and spatial relations among objects. Concepts of body parts can be classed within the referential category in terms of space.

Concepts can also be classed according to the qualities of

concreteness and abstraction. Of the 46 concepts, 87% were concrete and 13% abstract. All of the concepts in Sessions 1 and 3 were directly related to the representations. However, in Session 2, 27% of the concepts used were abstract as were 11% in the May session. The symbols which elicited the highest percentage of abstract concepts were Symbol 4 on March 24 and Symbol 1 in May.

Language use. Analyzing the uses of language is one way to determine a child's ability to distance him or herself from an existing situation. The number of self-maintaining statements used by N.A. decreased from 75% in Session 1 to 44% in Session 4. Reporting usages decreased from 25% in the first session to 17% in Session 2 and increased to 22% for the last two sessions. Predicting usages which first appeared in Session 2 rose from 25% at that time to 33% for the last two sessions.

The largest percentage of statements were used for expressing needs and justifying behaviour. Reporting strategies were for labelling. Strategies within the predicting category were forecasting events and details. Predicting usages first appeared on March 24 in response to Symbol 2. However, Symbol 3 elicited the most varied strategies and usages. Although self-maintaining utterances predominated, there was an increase in the percentage of reporting and predicting statements over the three month period.

Conclusion

From the above information, it is evident that N.A. operated from a concrete standpoint. However, her representations demonstrated a growth in the use of lines and the organization of the components

included in the drawings. Closed and elaborated symbols appeared in May. Only the closed figures were elaborated and elicited the arrangement of parts in agreement with each other. Components seemed to be arranged along a vertical axis.

N.A.'s language complexity varied throughout the research period. There was a slight increase in the MLU while a slight decrease in the NP index occurred. The last session elicited few elaborated nouns in proportion to single word responses. Abstraction, as expressed through concepts, was also inconsistent as abstraction appeared in the second and fourth sessions. There was growth evident in N.A.'s language use. Even though the largest percentage of statements expressed needs (self-maintaining usage), there was an increase in the use of statements for predicting events and details which was apparent throughout the study.

Although N.A. functioned from the concrete situation, consistent growth was evident through her graphic representations. Her apparent level of verbal complexity varied with the session. The increased incidence of language used for predicting was the only consistent indication of a developing ability to become distanced from the concrete situation.

Child 5: H.

H. was a 5:5 year old child who was born in Vietnam to Chinese parents. She came to Canada in November of 1979 and spoke no English at home.

H. completed the dot-line and symbol activities during sessions held on February 26, March 24, April 28, and May 12, 1982. H. willingly completed the activity during the first session but was reluctant to enter the activity in March as she and a friend were engaged in completing a puzzle. She asked her friend to join her while she responded to the symbols. On April 28, H. and her friend alternated responding to the symbols. Both came willingly after they had been outside while M. had completed the task. Again in May, H. asked a friend to take turns responding to the symbols.

Dot-line Activity

H. responded quickly to the dot-line task. The time intervals fluctuated between .5 seconds in February and 2 seconds in May.

During the first two sessions, H. held her pencil firmly between her thumb and first two fingers. During the April and May sessions she used her thumb and first three fingers. Her grip did not affect the steadiness of her pencil as she connected the dots with dark, heavy lines for all the sessions. She crossed the lines immediately when the opportunity arose.

H. exhibited on-task behavior throughout the study. She looked at the dots during the activity and stopped directly at the dots for the following percentages of the possible connections:

29% in February, 40% in March, 43% in April, and 33% in May. In the last two sessions, H. demonstrated her ability to plan her movements as she stopped beside the dot and then corrected the motion thereby increasing the percentage of exact connections to 71% and 67% in April and May respectively.

H. displayed very little body movement during the first session. She became more active during the last three sessions as she moved her upper torso, legs, feet, and chewed on her lips. In April and May, she followed the pencil movement with her head.

H. verbalized very little while completing the dot-line task. In March, she labelled the numbers and asked for confirmation on the sequence of dots. Other verbalizations indicated an understanding of one-to-one correspondence as she numbered the consecutive dots. In May, she was able to extract from and ignore extraneous stimuli when locating the line which led to a specified dot.

Symbol Results

H.'s response time to symbols decreased dramatically after the February session. Response time during the last three sessions ranged between 1 to 4 seconds. Symbols 1 and 4 elicited the longest time interval between the figure presentation and an obvious non-response. There was a 124 second lapse before the writer decided to dispense with the symbol. The time noted represented the combined intervals which occurred with the first and second presentations of the figure at 78 and 46 seconds respectively. In the second session, H. responded to the figure after 4 seconds. H. responded to Symbol 4 (F:4) after 41 seconds during which she received assurance that her

indicated response was acceptable. She then closed both sides of the figure in a left-right direction for the left portion and a right-left motion for the right side.

H. exhibited on-task behaviour over the three month period. She was physically quiet during February but became more active as the study progressed. In March H.'s physical movements increased as she talked but decreased when she was drawing. During the last two sessions there was increased movement of her legs and mouth. Symbol 4 in May elicited slight head movement in the direction of the pencil.

During each session, H. chose both paper sizes twice. She alternated paper size for Symbols 1 and 4 selecting each for 50% of the representations. Symbol 2 was completed on small paper 75% of the time while the reverse was the case for Symbol 3.

As with the dot-line activity, H.'s pencil control remained constant throughout the study as she used dark, heavy firm lines to complete her drawings. Again during the last two sessions, H. held her pencil between her thumb and first three fingers.

Approach to the task. With the exception of Symbol 1 in the first session (F:1), H. closed all of the symbols. The direction used for closure became more consistent as the study progressed. During the first three sessions, closure occurred in each direction for 50% of the symbols. Both directions were used within Symbol 4 (F:4) and Symbol 2 (M:2). Repetition was apparent in only one instance (M:1) when H. repeated the symbol in a right-left direction as she closed the figure. H. printed her name from left to right throughout the research period.

Spatial patterns. All closed symbols became incorporated in the representations. Groundlines became visible in April (A:1, 2) although the elaborated representations seemed to be in reference to a horizontal axis. In the enclosed portions of the representations, units were placed in agreement with each other. H. employed both the principle of overlapping space (A:1, 2) and units each to their own space. Use of a continuous line for body formation occurred in May (My:4). Proportion among units became evident in April (A:2) and May (My:2) (see Figures 16 and 17).

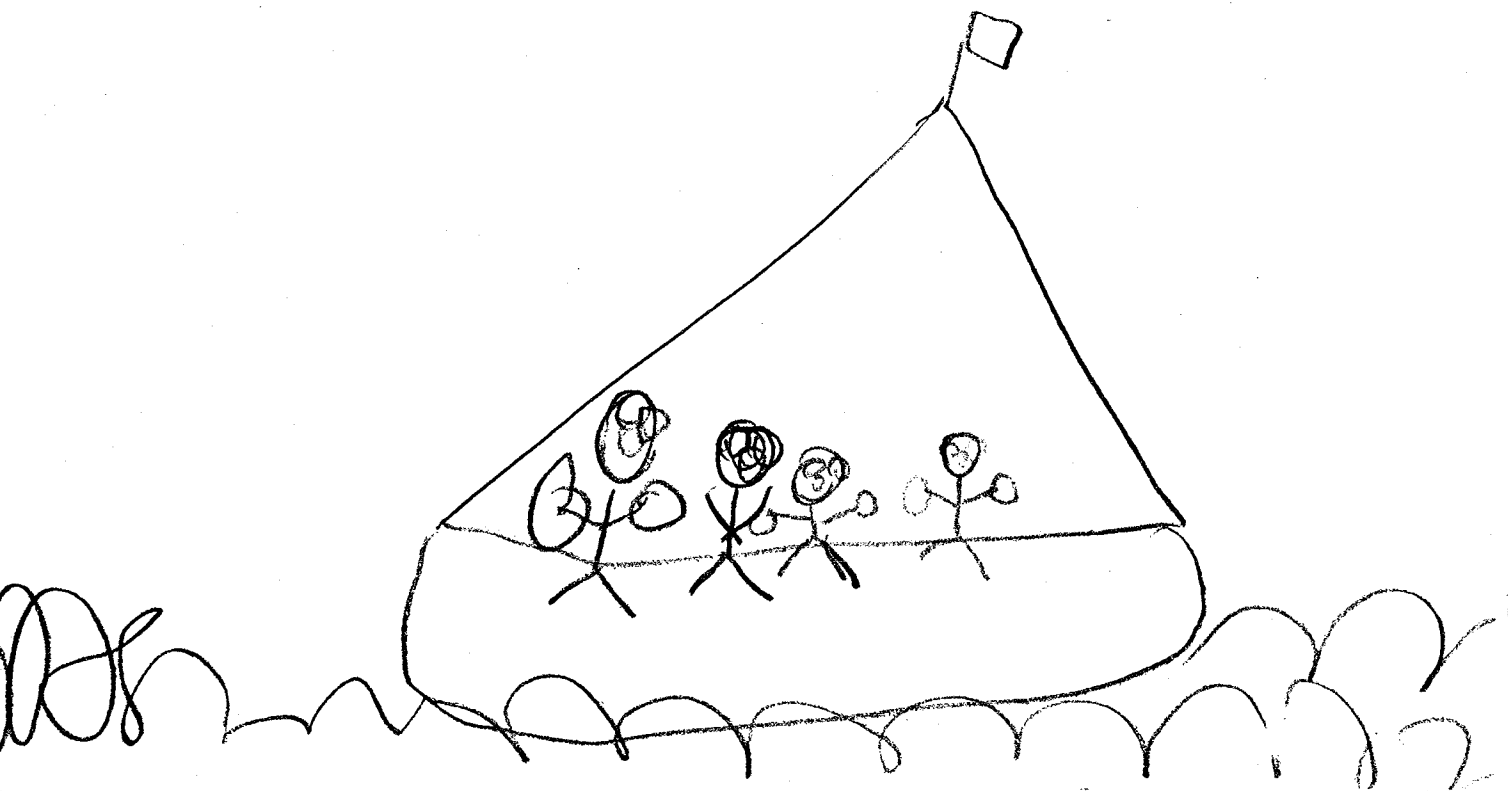


Figure 16: Session 3 Symbol 2

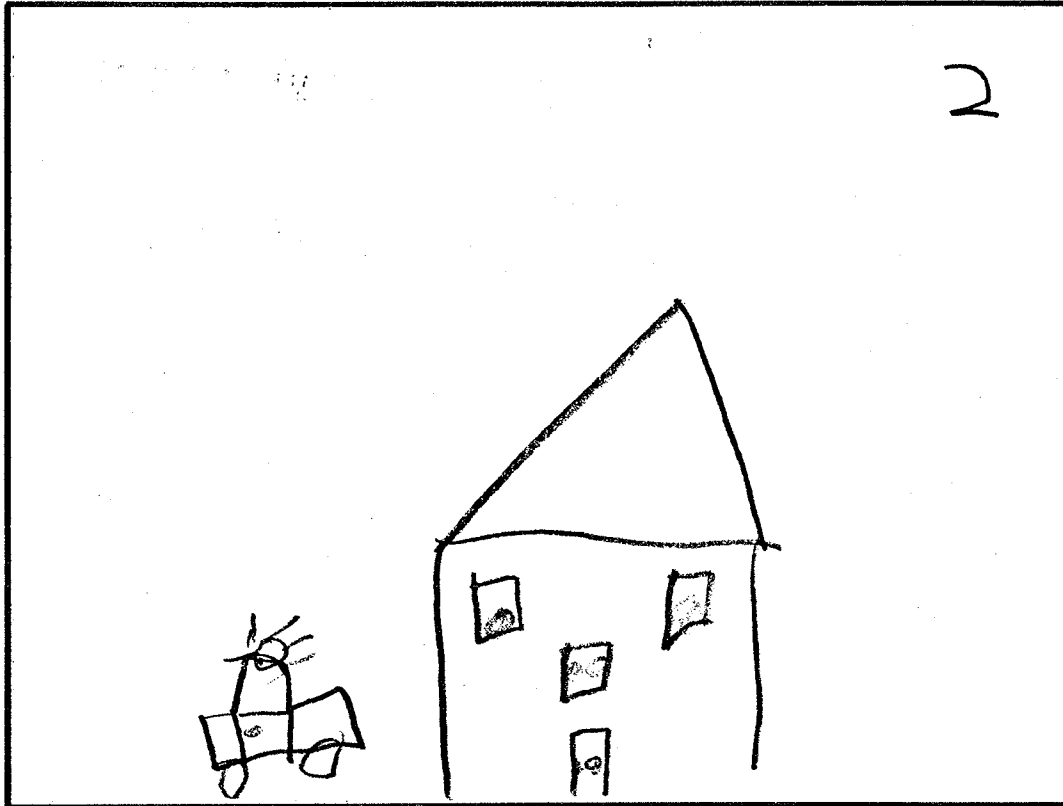


Figure 17: Session 4 Symbol 2

Sequence. In responding to the symbols, H. demonstrated characteristics of free drawings when she incorporated the figure within the total representation. As was previously stated, H. became more consistent in the direction of closure by the May session. However, when elaborating portions of enclosed figures, there was no consistent approach employed. Paired additions became evident in the March session. Radials appeared on the police car in Symbol 2 (My:2) and a radial enclosure became apparent when H. used a continuous line to form a body (My:4) (see Figure 18). Top to bottom to top sequence was employed in H.'s drawings. Core to accessory additions were made when drawing the human figure. However, when elaborating a closed symbol, H. worked from the outside to the

core. In these semi-constrained representations, units were placed in agreement with each other. Repetitions of shapes occurred in one instance (My:3) when H. changed a heart to a heart necklace (See Figure 19).

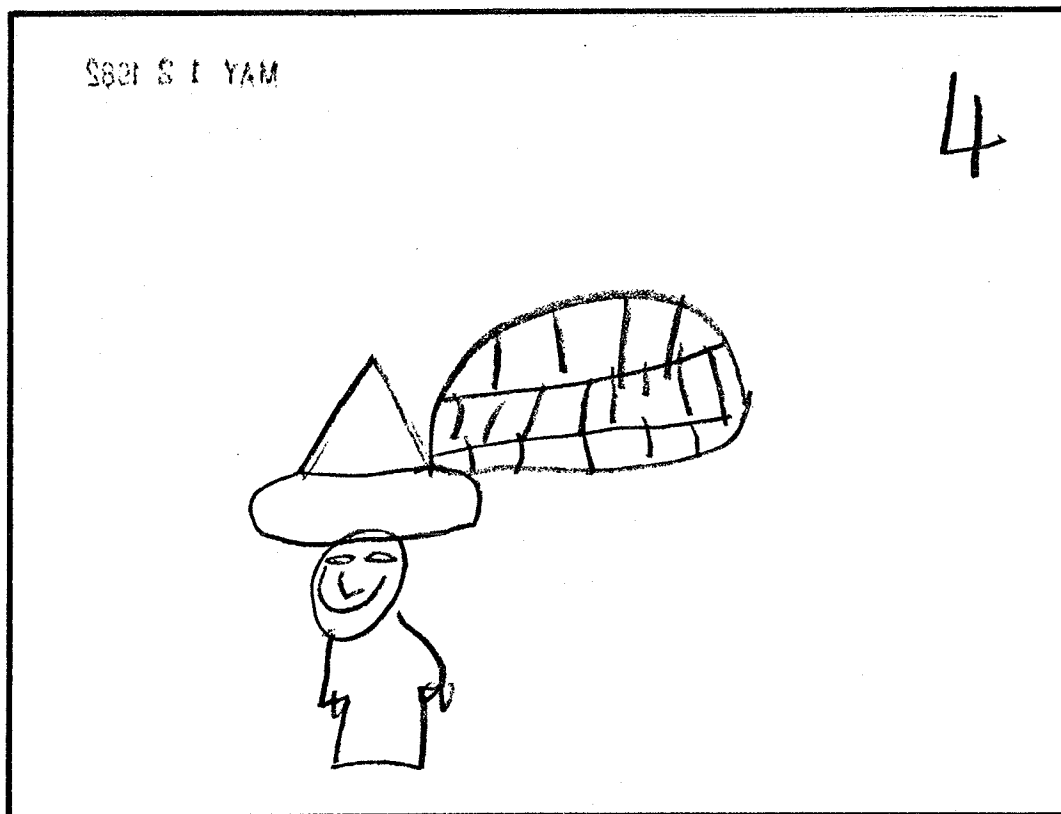


Figure 18: Session 4 Symbol 4

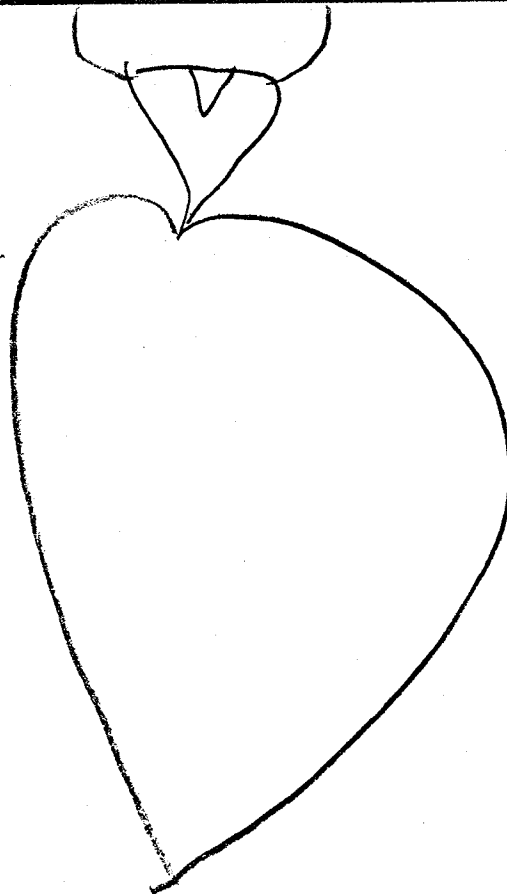




Figure 19: Session 4 Symbol 3

Equivalents/representations. H. demonstrated an understanding that a line can represent an object or a portion of an object. In her drawings, H. used straight lines for fire, a flagpole, the torso, arms and legs, and to indicate light on a police car. An angular enclosure represented a body and wavy lines stood for water. Circular enclosures were eyes, noses, faces, mouths, hands, rocks, ice cream, circles, a doorhandle, and a light on a police car. Semicircles were mouths and noses. Enclosed semicircles were mouths, ears, a snake head and tail, and a chain for a necklace.

Curved enclosures were the bottom of a boat, a feather, part of a witch's hat, an apple, a heart, an ice cream sign, a monster, hands, and leaves. Rectangular enclosures were doors, houses, and part of a police car. Squares represented a flag and windows. Triangular shapes were sails, roofs, an ice cream store, and part of a witch's hat.

H. also demonstrated the understanding that one object can be represented by many different lines and shapes (e.g., eyes, noses, and mouths).

Changes in representations. The ability to interpret a figure in several ways is an indication of fluency of ideas. There were two occasions in which H. verbalized changes in her response to the symbols. Symbol 3 () changed from a heart to an apple in April (A:3). In February, Symbol 2 () became a witch hat instead of a triangle.

Elaborations. Elaborations made to the symbols during Session 1 resulted from questions and comments by the writer. For Symbols 2, 3, and 4, H. indicated her intention through gestures but did not follow through until the writer agreed. Spontaneous closure occurred in Session 2. However, prompts were necessary for further graphic elaborations. Verbalizations of function as opposed to labels appeared in this session. Characteristic of the third session were spontaneous closure and the appearance of spontaneous elaborations and labelling. H. responded graphically and verbally to comments made by the writer. Prompt and comments made to H. in Session 4 elicited verbal responses. Throughout the research period, H. verbalized the components needed to complete her representations.

Gestures. H. employed gestures in Session 1 to indicate her intentions regarding responses and/or elaborations to the symbols. To some extent, this practice continued in the sessions which followed.

Verbal aspects. H. had an average MLU of 2.12 and a NP index of 1.5. The MLU was 1.4 in February and increased to 2.4 in May. Unlike the MLU, H.'s NP index began at 1.3 in February, rose to 1.5 in March, fell to 1.4 in April and peaked at 1.7 in May. In April, H. used fewer elaborated noun phrases in proportion to the total number of utterances than she did in March and May.

The largest percentage of modifiers (adjectives) appeared in Session 1 at 43% and decreased to 22% and 21% in March and May respectively. Although the number of modifiers decreased, the NP index rose indicating greater complexity in the phrases used. Symbols 2 (A:2) and 1 (My:1) elicited the highest NP index at 1.7. Responses for both representations contained modified plural nouns and multiple descriptors.

Modifiers which appeared in Session 1 were determiners and described size. In addition to the above, plurality, possession, and the use of prepositions characterized Session 2. An increased use of prepositions and double modifiers were apparent in the last two sessions.

The greatest fluctuation in use occurred with nouns even though they accounted for the largest percentage of the parts of speech used during the research period. Pronouns increased as the percentage of nouns decreased. In the last session nouns accounted

for 26% of the words, adjectives and verbs for 21%, adverbs for 14%, and pronouns for 11% of the words used.

There was no occurrence of pronouns in Session 1. Exophoric and personal pronouns appeared in Session 2 at 67% and 33% respectively. The April session elicited anaphoric pronouns at 33% while those classified as personal pronouns increased to 56% and the incidence of exophoric pronouns decreased to 11%. Session 4 responses were composed of 47% personal, 26% exophoric, and 26% anaphoric pronouns.

Concepts. Throughout the research period H. displayed an understanding of 363 concepts. When grouped according to Carroll's form-class categories, concepts within the nominal and adjectivals classes appeared in Session 1. All categories were apparent in the last three sessions. The nominal class included concepts of: actions, animals, body parts, clothing, colour, family members, flavours, food, friends, geometric shapes, locations, numbers, objects, possession, and time. Adjectivals were comparisons, colour, determiners, exclusion, number, opposites, possession, size, states, and weight. Verbals indicated an understanding of past, present, and future. Adverbials described location, negation, quantity, and spatial relations. Spatial relations and relations among class members characterized the prepositionals. Conjunctions described relationships among class members.

Since some of the concepts were used more than once, the total number of different concepts was computed at 155. Of the 155, 51% were nominals, 22% adjectivals, 15% verbals, 5% adverbials, 6% prepositionals, and 1% conjunctions.

In addition to form-class categories, concepts can be viewed in terms of development. Children use concepts to express directives, and referential and spatial relations among objects. H. used concepts which described spatial relations in terms of topological space, locatives (this/that), past, and causality (e.g., "Spank his bum", "Make mess").



Concepts can also be classed according to the qualities of concreteness and abstraction. Of the 363 concepts, 52% were concrete and 48% were abstract. The use of abstraction was high in the last three sessions at 51% in March, 55% in April, and 45% in May. The symbols, listed in decreasing order of abstract responses, were: Symbol 4, Symbol 2, Symbol 1, and Symbol 3.

Language use. Analyzing the uses of language is one way to determine a child's ability to distance him or herself from the existing context. From classifying the utterances used over the three months, it is evident that the majority of statements (62%) were within the reporting category of language use. The percentage of reporting utterances fluctuated from 50% in February to 68% in April and 58% in May. Predicting strategies decreased from 20% in February to 17% in May when reasoning strategies appeared. Noting comparisons, details, and incidences, labelling, recognizing related aspects, and describing sequences were reporting strategies found in H.'s language. Forecasting events, details of those events, and consequences appeared for predicting. Justification strategies were employed under logical reasoning. Symbol 2 elicited the most varied strategies and usages. Although reporting strategies predominated, development was indicated by the increased use of reporting

strategies and the incidence of predicting and reasoning usages.

Conclusion

Dot-line results indicated an understanding of one-to-one correspondence and an ability to plan ahead to accommodate the requirements of the task. H. was able to extract from and ignore extraneous stimuli when locating the line which led to a specified dot.

Overall response time to the symbols decreased from the initial session to the last. In Session 1 Symbols 1 () and 4 () elicited the longest time interval between presentation and response. The changes in representations which occurred did not seem to affect H.'s response time. Symbol 2 (F:2), which was transformed from a triangle to a witch's hat, elicited a 12 second response interval. However, response time for all symbols in the first session was longer than in the following sessions. Symbol closure was evident in February and continued throughout the study. Elaborations appeared in the first session but became more detailed in the succeeding sessions. Organization along a groundline, the use of overlapping space, and figures drawn in proportion with each other appeared in April. May was characterized by the use of a continuous line for a body.

H.'s language complexity increased over the research period. The MLU showed a continuous increase and the NP index, after some fluctuations, peaked in the May session. The incidence of anaphoric pronouns, which appeared in April, was highest during that session but decreased in May. Abstraction, as evident in the concepts used,

was over 50% in the second and third sessions and decreased slightly in May. Language strategies of recognizing related aspects, reporting and forecasting sequences, and justification of reasoning indicated an ability to see beyond the existing context.

From the above information, it is not only possible to see development through graphic representations, but it can be concluded that H. increased her ability to become distanced from the existing situation. This was indicated by the increase in language complexity, abstraction, and language used for predicting and reasoning.

Child 6: M.

M. was a 5:6 year old child who was born in Cambodia to Laotian parents. She came to Canada in July of 1979 and spoke no English at home.

Data was collected on February 26, March 24, April 28, and May 12, 1982. On February 26 M. completed the activities by herself. When the research team arrived for the second session, M. and a friend were involved in putting together a puzzle. She agreed to complete the activity if her friend accompanied her. For the last two sessions, M. chose a friend with whom she alternated responding to the symbols.

Dot-line Activity

M. responded quickly to the dot-line activity. The interval between directions and her first pencil response ranged from 3 seconds in February to 1 second in May.

During the first three sessions, M. held her pencil firmly between the thumb and first two fingers of her left hand as she used dark, heavy lines to connect the dots. She used her thumb and first three fingers during May.

M. attended well to the task with the exception of the April session when the writer had to remind her of the activity at hand. During that session, she failed to plan her movements to stop directly at the dots although in two instances she corrected herself. In May, however, she planned her movements to stop directly at the dots for 50% of the connections. M. crossed lines immediately throughout the study.

M.'s body movements increased slightly during the research period. When she was involved in the pencil activity, her feet were on the floor whereas they were placed on the ledge when she was not drawing. During the last two sessions she moved her head in the direction of her pencil. She indicated that she was finished by placing her hands in her lap. Verbalizations about the activity concerned numbering the dots and, in May, location of the dots and inferences about the line based on the shape. M. also commented on her inability to complete her name after making an M.

M. demonstrated an understanding of one-to-one correspondence as she labelled the dots. When completing the task, M. was able to identify and follow the correct line in order to locate the next dot.

Symbol Activity

M.'s response time to the symbols varied with the symbol and session. After the first session there was a decrease in the response time to all symbols. Symbols 1, 3 and 4 in Session 1 elicited the longest interval between presentation of the figure and the first drawing response at 101, 109, and 73 seconds respectively. The time noted for Symbol 1 represents the combined lapses for the first and second presentations of the symbol. In the second session (M) the response time was 24 seconds for Symbol 1, 35 seconds for Symbol 3, and 6 seconds for Symbol 4.

With the exception of the first session, the other symbol which elicited the most variation in response time was Symbol 4. There was a 6 second increase in response time from April to May

when M. closed and elaborated the symbol. Although M. labelled the third symbol a heart, she stated that she didn't know how to draw it. The 35 second interval was the time lapse between presentation of the symbol and closure as she followed directions.




Once involved in the activity, M. attended well to the task. As with the dot-line activity, she held her pencil firmly between her thumb and first two fingers and used dark, heavy lines to complete the symbols. In May she held her pencil with her thumb and first three fingers. As in the dot-line activity, M. became slightly more physically active as the study progressed.

Except in Session 2, when small paper was selected three times, M. chose each paper size twice. Small paper was selected 100% of the time for Symbol 4 and 75% of the time for Symbol 2. Symbol 1 and 3 elicited large paper for 75% of the choices.

Approach to the task. The direction used in responding to the symbols became more consistent as the study progressed. In Session 1, there was a vertical extension (F:1), a left-right closure (F:2), no response to Symbol 3, and a right-left closure of each section of Symbol 4 beginning with the right section. Right-left directions accounted for 75% of the closures in Session 2 whereas, in the last two sessions, the percentage was reduced to fifty. Symbols 2 and 3 elicited left-right closures in the April and May sessions. After the first session, M. printed her name from left to right.

All symbols in the last three sessions were closed. Only those in the last session (My) were graphically elaborated.

It is interesting to note that labels applied to the closed

figures in the first three sessions were based on inferences made about the shapes (e.g., Symbol 1, , was a three, Symbol 2, , a triangle, and Symbol 3, , a heart).

Spatial patterns. Representations from the sessions indicated a progression in the use of lines from vertical extensions to closure. Although no axis was visible the elaborated symbols seem to be organized along vertical and horizontal axes (see Figure 20).

Problem solving was evident in M.'s reaction to positioning the components of her drawing. Symbol 2 and 3 of the last session (My: 2,3) followed the principle of each to its own space. Symbols 1 and 4 (My:1,4) demonstrated the principle of components in agreement with each other. There was no incidence of overlapping space.

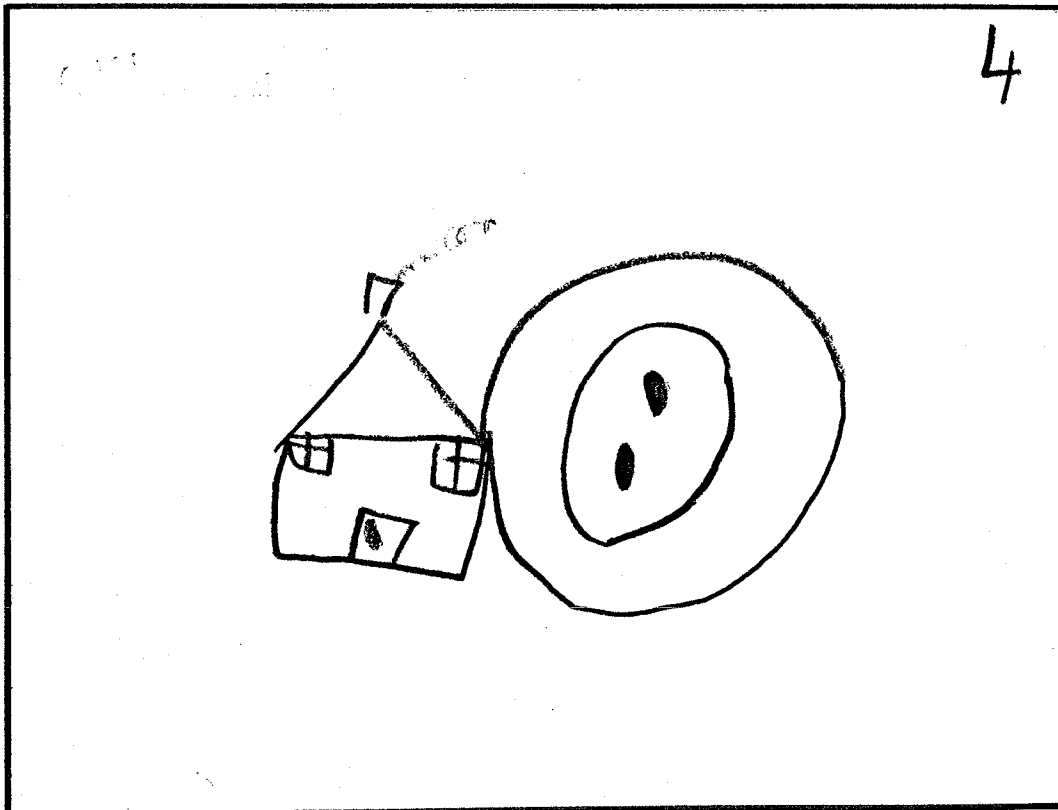


Figure 20: Session 4 Symbol 4

Sequence. As was previously mentioned, a more consistent approach evolved over the research period. Closed symbols were elaborated with a repeated top to bottom sequence (My:1). M. worked from the core to accessories when adding the hair, ears, neck, arms, and feet to her figure using paired elaborations when appropriate. When making additions within the closed figure, the facial features and components of Symbol 4 were placed in agreement with each other. Symbols 2, 3, and 4 (My) demonstrated the principle of patterns repeated within a larger pattern (see Figures 21 and 22).

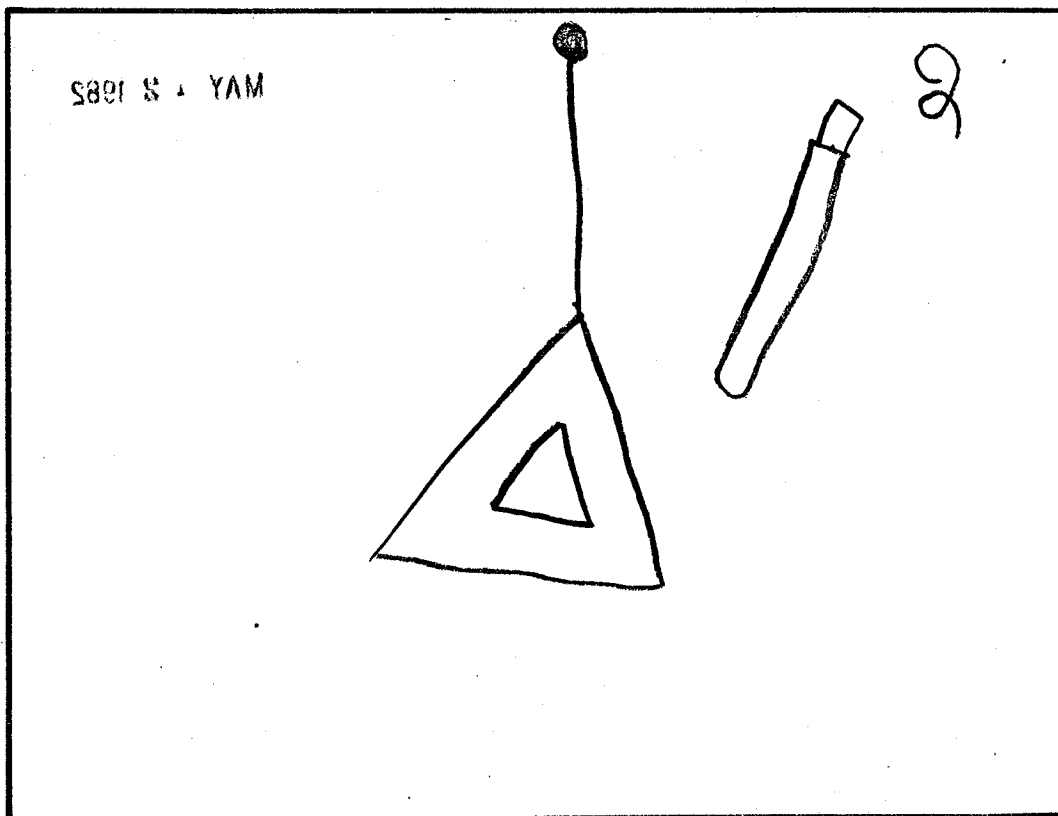


Figure 21: Session 4 Symbol 2

3

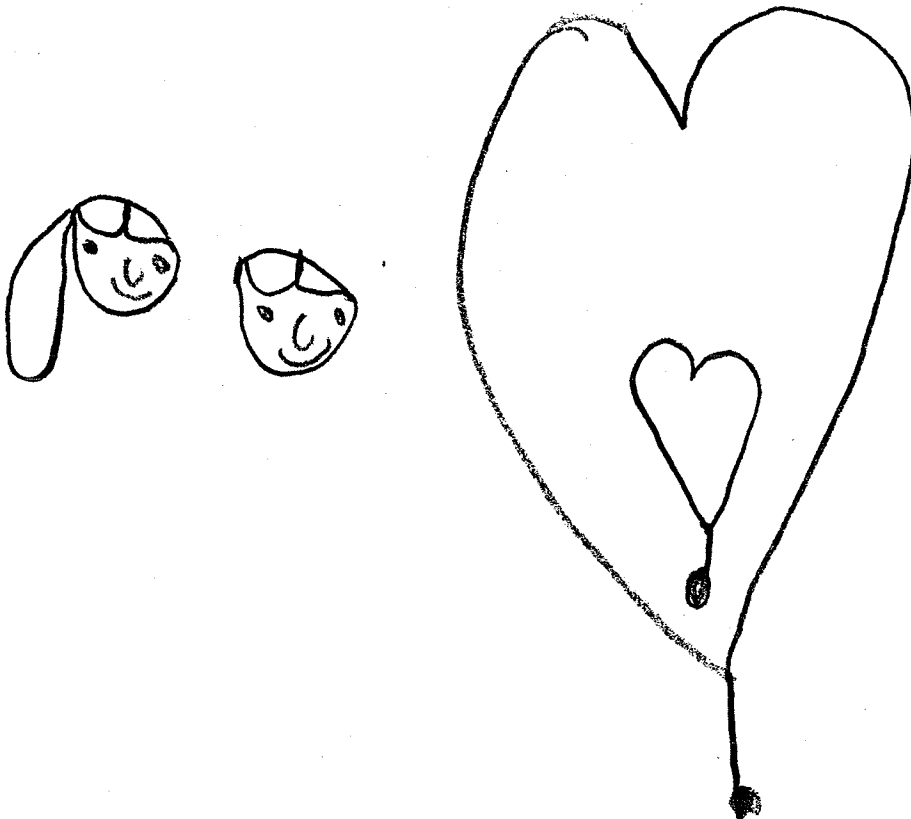


Figure 22: Session 4 Symbol 3

Equivalents/representations. Even with nonclosed and nonelaborated closed figures, M. demonstrated an understanding that one shape could represent more than one object. Her labels reflected present and past information and occasionally her friend's comments. For nonelaborated and open figures, her labels were based on inferences made from the shape. Straight lines represented the side of a triangle. Wavy lines stood for a three, hair, mouths, and smoke (nonverbalized). Circles were circles, eyes, a doorhandle, decorations

on a heart, faces, and a football. Curved enclosures represented ears, a face, fingers and toes, hair, hearts, a neck, and a rock. Triangular shapes were triangles and a roof. Rectangles represented arms, a baseball bat, a chimney, and legs. Squares stood for a door, windows, and the handle of the bat. Mouths were represented by curved lines and a curved line with angles which represented a smile. Noses were v shapes and semicircles.

Changes in representations. There was two instances of changes in representations which occurred during the research period. Symbol 2 (F:2) changed from a line to a triangle. The change in Symbol 4 (My) was verbalized by another friend. M. labelled the left portion of the symbol a triangle; her friend renamed it a house in response to the elaborations M. made.

Elaborations. During the first three sessions the graphic response to the symbols was extension (F:1) and closure of the figures. Closure in the first session occurred after a prompt from the writer. Spontaneous closure of the symbols began with the last symbol in Session 2 (M:4). In the last three sessions, M. rotated the symbols in response to the query "What else can you do?". Verbalizations were single and specified labels which reflected the implied or obvious shapes of the figures. Symbols in Session 4 elicited graphic elaborations. All symbols became integral components of the representations. Elaborations were made in response to prompts from the writer.

Gestures. M. employed a gesture during the last session to clarify her meaning. After adding a semicircular shape to the bottom of her drawing (My:1), M. indicated that it was a neck by pointing to

her own neck.

Verbal aspects. For the research period, M. had an average MLU of 1.7 and a NP index of 1.46. Both indices fluctuated over the three month period. Both decreased by seven tenths of a point from February to March. After March, both indices increased with the NP index showing a slightly greater increase in April while the MLU increased more sharply from April to May. In February the MLU was 2.0 and the NP index was 1.8. May responses were computed to an MLU of 1.9 with a NP index of 1.55. The majority of symbols in the first session (75%) had more elaborated noun phrases in proportion to the single word responses as descriptors than did those symbols in the May session.

All forms of speech fluctuated over the three month period. The greatest change occurred in the use of nouns and adjectives. The second session elicited the largest percentage of modifiers. The modifiers used decreased from 22% in March 3 to 17% in April and rose again to 28% in May. Symbols 2, 3, and 4 in the first session (F) elicited the highest symbol NP index at 2.0, since within a few phrases, 67% to 100% of the nouns were modified. In March 14% of the nouns were modified, 19% in April, and 52% in May. Computations of the last two symbols in this session (My:3,4) revealed that 80% of the nouns were modified.

The modifiers in Session 1 were determiners and size descriptors. Possession characterized the second session. In addition to determiners, negation and prepositions appeared in the last session.

The predominate parts of speech used by M. were nouns and adjectives. Nouns accounted for 35% of the words used in February,

rose to 46% on March 24, peaked to 67% in April, and then fell to 40% in May. The percentage of adjectives rose from the first session to 33% in March, dropped to 17% in April, and increased to 28% in May. The appearance of verbs, pronouns, and adverbs varied between 13 and 15% throughout the research period. Pronouns used were personal, anaphoric (those with a referent in the sentence) and exophoric (those with no referent within the sentence). Personal and exophoric pronouns accounted for 100% of the pronouns used during the second and third sessions respectively.

Concepts. Throughout the study, M. displayed an understanding of 142 concepts. They can be classed according to Carroll's Form-class categories of nominals, adjectivals, verbals, adverbials, prepositionals, and conjunctives. The nominal class included concepts of: age, body parts, geometric shapes, letters, location, number, objects, plurality, sex, and sports. M.'s use of gestures indicated a knowledge of neck, although she didn't know the label. Adjectivals were: colour, comparisons, determiners, exclusion, length, possession, and two dimensional size (big, little). Verbals demonstrated an understanding of past and present. Adverbials implied negation. Prepositionals expressed logical position among members. Relations among class members were found in the conjunctive class.

Since some of the 142 concepts were used more than once, the total number of different concepts was tabulated at 57. Of the 57, 60% were nominals as opposed to 29% adjectivals. When the proportion of nominals was tabulated for the total number of concepts used, the percentage fell to 53%. This was an indication that proportion of concepts within the nominal category was higher than

those classed as adjectivals. The number of new concepts which appeared for each session was: 15 in February, 3 for March 24, 11 during April, and 28 for May.

In addition to the form-class categories, concepts can be viewed in terms of development. Children use concepts to express directives and referential and spatial relations among objects. Evidence of concepts used to express referential relations appeared in May (e.g., "It watching somebody" in My:1). Spatial relations were shown through verbs (e.g., kick in A:4 and hit in My:2) and topological space (e.g., outside in A:4 and further in My:1).

Concepts can also be classed according to the qualities of concreteness and abstraction. The transcript for the April session was not available. Therefore the concepts expressed, although counted in the form-class categories, were not computed in the abstraction percentages as it was not possible to determine when the terms were used in relation to the development of the representation. Of the 114 concepts expressed in the first, second, and fourth sessions, 68% were concrete and 32% abstract. Abstraction appeared in all sessions computed. May symbols elicited the higher percentage of abstraction at 38% whereas February and March were 27% and 13% respectively. The symbols which elicited the highest percentage of abstract concepts were Symbol 2 in May, Symbol 1 in February, and Symbol 3 in May at 62%, 57%, and 50% respectively.

Language use. Analyzing the uses of language is one way to determine a child's ability to distance him or herself from an existing situation. The number of self-maintaining statements used by M. decreased from 38% in Session 1 to 16% in Session 4. Reporting

usages decreased from 38% in the first session to 25% in Session 2 and increased to 46% for in May. Predicting usages which first appeared in Session 1 rose from 23% at that time to 35% for the last session. One reasoning statement appeared in Symbol 2 (My:2) responses at that time. As was previously mentioned, the April session was not recorded due to a malfunctioning tape recorder. Consequently language usage was not computed for that session.

The largest percentage of statements were used for reporting labels, details, and incidences. Self-maintaining strategies were expressing needs and justifying behaviour. Strategies within the predicting category were forecasting events and details of those events. Justification appeared under reasoning. Although Symbol 1 elicited the most responses, the most varied usages appeared with Symbol 2 statements. Symbol 3 accounted for the largest variety of strategies used. Even though reporting strategies predominated, there was an increase in the percentage of predicting statements over the three month period and evidence of beginning reasoning usage.

Conclusion

Dot-line results demonstrated an understanding of one-to-one correspondence and an ability to plan ahead to accommodate the requirements of the task. M. was able to extract from and ignore extraneous stimuli when locating the line which led to a specified dot.

Overall response time to the symbols decreased from the initial session to the last. Changes in representations to Symbol 4 coincided with an increased response interval in the May session.

Changes also occurred with Symbol 2 but did so in February when all response intervals were elevated. Symbol closure first appeared in February and continued throughout the study. Only the symbols in May were elaborated. M. arranged components along a vertical axis as was evident in Symbol 4 (My:4) when a chimney was placed vertically in the drawing as opposed to a 90 degree angle to the roof.

After an initial decrease in both the MLU and NP indices, M.'s language complexity increased during the last two sessions. Although the NP index increased, it remained lower than in the first session. Characteristic of May was a lower incidence of elaborated nouns in relation to the nonelaborated phrases. However, the use of abstraction, as determined by concepts, and the percentage of language statements used for prediction and reasoning increased in the last session.

From the above information it can be concluded that M. is developing her ability to become distanced from the existing situation. This was indicated by the increase in abstraction and the incidence of language used for predicting and reasoning.

Chapter 5

DISCUSSION OF THE RESULTS

Children's Responses

The purpose of this study was to conduct a formal indepth investigation and analysis of the information collected from six ESL children's responses to the unfinished symbol. The analysis was used to: (a) determine the extent of information that could be obtained from the responses, (b) determine if growth could be identified over a three month period, and (c) generate questions to be used in further research.

Areas considered were motor coordination (pencil control) and cognitive development as exemplified through graphic representations (response time, directionality, imitation/representation, closure, use of horizontal/vertical baseline, sequence, detail, and changes in representations), and language (language complexity, concepts, and language use).

Changes were noted in all areas. Throughout the study, all of the children exhibited good motor control or improvement in their pencil use. During the April and May sessions, T.P., H., and M. held the pencil with their thumbs and first three fingers. Only T.P.'s lines seemed to be affected by the change in grip. When completing the dot-line activity all demonstrated or improved the ability to control their pencils to stop at a designated point.

Considerations under cognitive development were: response time, directionality, imitation/repetition, closure, details, use of focal points, sequence, changes in representations within a

symbol, and concepts. The latter two were generally expressed verbally.

There was an overall decrease in response time from the February to the May sessions. However, there were specific factors associated with each child which coincided with an increased response interval. T.'s and M.'s response times increased for symbols in which there were changes in representations (My:1,2,3, for T. and My:4 for M.). T.P.'s response time increased with symbol closure, and, like T.'s, was shorter when extension of the lines occurred. The longest delay of responses for N.A.'s representations occurred when she changed her reaction from repetition and enclosure to repetition of Symbol 3 (M2:3), crossing Symbol 2 (A:2), and closure of Symbol 2 (My:2). The increase in response time could reflect planning of alternative actions. H.'s response time decreased after she became familiar with the requirements of the activity.

Directionality is a function of development. Preschool children prefer right-left direction but as they become older, left-right orientation appears. For all children except M., a left-right direction for symbol closure predominated. Direction was a function of the symbol and the session. A. and T. used a left-right direction for 75% of the closures. A. increased the incidence of left-right closures from 50% in the first session to 100% in May. T. changed his left-right closures from 50% in February to 75% in May. However T. printed his name from right to left. Throughout the study, T.P. employed left-right closure for all symbols except Symbol 3. All of N.A.'s and H.'s symbols were

closed with a left-right movement during the May session which was not the evident in earlier sessions. Although in May, M. had the lowest percentage of left-right closures of all the children, she printed her name from left to right.

Goodnow (1977) stated that children learn to see the relationship between perceiving and reproducing objects by copying. Imitation and repetition were evident in N.A.'s and T.P.'s responses to all symbols prior to closure and incorporation of the figure in the representations.

Closure allows children to discover that shapes have limits and boundaries and therefore can be representations of objects (Gardner, 1980). The incidence of closure increased for all children over the three month period. N.A. and T.P. demonstrated the least of amount of this response during the study. Graphic elaborations only became evident in symbols which they closed. Nonclosed figures elicited labels which were inferences from the shapes in N.A.'s and M.'s experiences.

Kolls (1980b) proposed that children have not begun the drawing process until they make a mark on a paper with the intention of representing an object. All children in the study demonstrated that a line was symbolic of another object. Development in the use of denotational and transformational rules was evident in N.A., T.P.'s, and T.'s representations.

Openness and flexibility are demonstrated by the child's ability to return to and elaborate a portion of a drawing once he or she has finished with that area (Goodnow, 1977). This was practiced by T., A., T.P., N.A., and to a limited extent by H.

and was more evident in the last two sessions. The ability to see relationships is exemplified by placing objects along a vertical or horizontal line. To some extent this was evident in all of the children's representations. A. used groundlines in all sessions. However, in May (My:4) he used multiple groundlines. Evidence of vertical or horizontal lines appeared in T.P.'s representations in the third session while M. and N.A. did not employ the focal lines until the May session.

Fluency is one component of creativity. Fluency can be indicated by the number of different ways children view information. Changes in representations were evident in all but N.A.'s responses. The change in T.P.'s representation was based on a combination of two concepts to form one response. H. and M. had two instances of change whereas T. and A. had evidence of four changes, one of which involved multiple transformations.

One means of determining a child's ability to understand and use language is through consideration of concepts. A., H., and T. demonstrated an understanding of the largest number of concepts. Growth, in terms of the number and form-class categories, was evident in the concepts used for all children. Although N.A. continued to use only nominals and adjectivals, the number of each increased over the sessions. However, when looking at abstractions, A., H., and T. demonstrated the most ability to distance themselves from the situation by verbalizing information which was not contained in their representations. Sigel and Cocking (1977) and Tough (1976, 1977a) discuss the necessity for children to become distanced from the existing context as a means to more abstract operations.

All of the responses contained some gestures. However, only M. and N.A. used them as a substitution for unknown terms. The other children used gestures to emphasize or clarify their meaning or intensions.

MLU's for all of the children ranged from 1.28 to 2.93. Since the MLU is a valid measure for utterance lengths of 3.00 or under, the measure was appropriate for the children in this study because of their limited English. With the exception of M. and T., all of the children's MLUs increased over the sessions. A. exhibited the highest MLU when he alternated symbols with his friend. This supports the information found by Cocking and Copple (1979) when they found children included more in their representations when drawing in a small group. For most children the NP index increased in May. For the cases in which there was a decrease (N.A. and M.), there were fewer elaborated phrases used in proportion to the nonelaborated ones.

The use of anaphoric pronouns and relational terms is another means of determining a child's ability to use his or her language. Anaphoric pronouns allow the listener to understand the child's meaning without being part of the situation on which the language is based. N.A. was the only child who had no evidence of anaphoric pronouns. Differentiated terms, relational terms, and coordinated descriptions form a progression in the use of modifiers. There was no incidence of relational terms used in comparison statements or coordinated descriptions, but A. and M. used differentiated terms. There was evidence of relational terms in A.'s responses. However, they were not used in comparison statements.

Tough (1977a) and Sigel and Cocking (1977) state that children are better able to function in school and to become distanced from the concrete situations if they are able to use their language for many purposes. This increases their ability to operate in an abstract context. In the last two sessions there was some evidence of projecting and reasoning statements in all responses except those of N.A. However, she did use some predicting statements. The majority of statements used for reporting on present events. Predicting, projecting, and reasoning usages require the child to draw on his or her experiences and apply that information to new, unknown situations. In other words, to operate outside the concrete situation. The ability to distance themselves was apparent to some extent in all of the children's May responses.

From the results it is evident that the developmental levels of the children included in this study ranged from the intuitive thought phase of the preoperational level to early concrete operations as described in chapter 2 pages 38 to 50.

Kolls (1980b) provided characteristics which give an indication of reading readiness. They are: failed realism (inability to combine parts to form a whole), egocentricity (unable to accept another point of view), groundlines/juxtaposition (organizational strategy which shows awareness of relationships), transparencies (recognizes visual discrepancies and will change directions to correct the mistake), and scale, proportion, and perspective (indicates logical reasoning based on critical attributes of objects) (p.6). All of the characteristics except transparencies were found in this study.

Implications for Education

Since the number of children included in this study was small, the results can not be generalized to the larger population. However, the information does provide indications of developmental growth. Therefore, based on these results it can be concluded that the information gained from the symbol activity can be used as an indication of children's developmental levels, language complexity and competence, and readiness to read. When used for an extended period, evidence of growth in the above-mentioned area can be recorded. Over a three to four month period there would be evidence of growth which occurs naturally. The unfinished symbol activity is a systematic means of (a) gaining access to information which may indicate change and (b) monitoring that change. By using the symbol approach, which is an extension of children's early manipulation of and experimentation with pencil and paper, teachers can obtain information about their students which would otherwise be hindered by the constraints of standardizations.

From the information in this study, the children involved demonstrated an increasing ability to distance themselves from the existing situation. Therefore, the symbol activity may also be employed to help children with early reading since, through this process children may be able to increase their representational and distancing abilities, and thereby develop early reading skills. As an extension of the activity, the children can be asked to write about their representations. This may assist them in understanding that the written word can represent their experiences.

Cocking and Copple (1977) found that when small groups of

children drew about common experiences there was more diversity in the language used than when a child was alone with a researcher. In this study A. demonstrated a higher level of language complexity and diversity of language use when he alternated symbols with a friend. Therefore, alternating the symbols with a small group of children may be a means of developing and extending children's language use and competence.

Transcripts of the sessions yielded information about the quality of adult comments in terms of unfinished sentences, labels used, and the number of fostering and distancing techniques employed. Adults can use that information to improve the quality of their interactions with children, thereby becoming more effective mediators in the children's learning.

From this information, the symbol activity was found to be an effective and valid procedure for obtaining extensive information about children's cognitive processes and for recording growth.

Evaluation of the Procedure and Implications for Further Research

The research was conducted in the children's classrooms in order to provide a natural context for the study. However, the presence of the writer and two observers necessarily affected the children. In order to provide for optimum responses, the symbol activity could be conducted more productively by the classroom teacher, who not only is part of the arrangement, but has access to other information which could supplement that available from the graphic and language representations.

As a result of random selection, two children were the only

ones in their room to be included in the study. This effected their reaction to and willingness to engage in the activity. In future research, precautions should be taken to prevent the possibility of children being singled out. If the teacher completed the symbol activity with each child, the above situation would be eliminated.

Although the time period for this research was sufficient to obtain data which demonstrated growth, information gathered throughout the year would provide better insights into the children's development and would allow each sessions' data to be interpreted in terms of the current context.

Questions Generated by the Study

Information from the data analysis provided a basis from which the following research questions were generated:

1. Do the symbol responses yield the same or similar information as that found by standardized tests?
2. With a larger population, would there be a difference in response time and the number of changes in representations within a symbol, thereby indicating fluency of ideas?
3. With a larger population, would symbol closure elicit longer response intervals?
4. With a larger population, would closure be necessary for symbol elaboration and incorporation in the total representation?
5. With a larger population, would line crossing as an initial reaction, elicit longer response intervals?
6. Is line crossing indicative of an understanding of equivalence?
7. With a larger population, would response time increase with the incidence of predicting and squencing statements?

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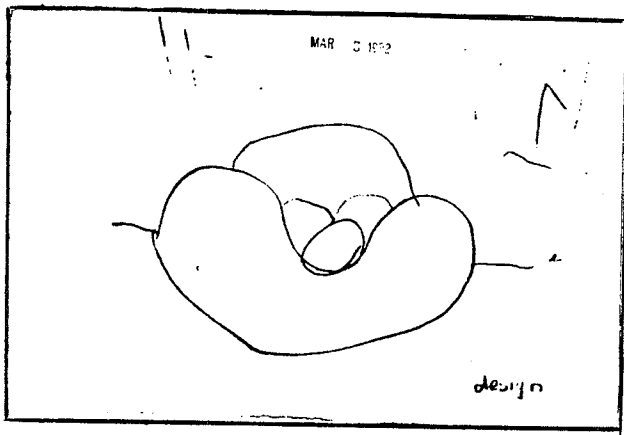
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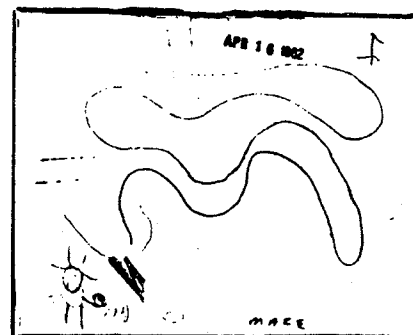
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APPENDIX A: SYMBOLS

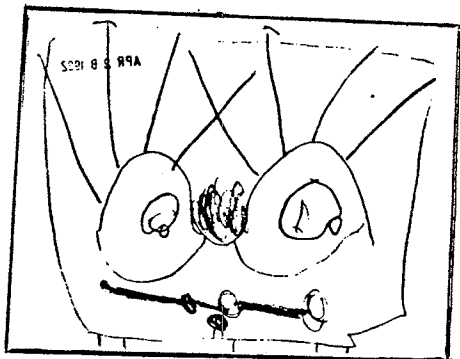
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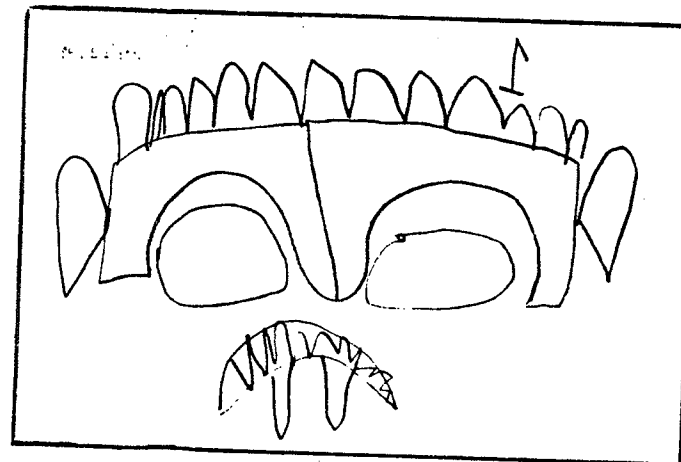
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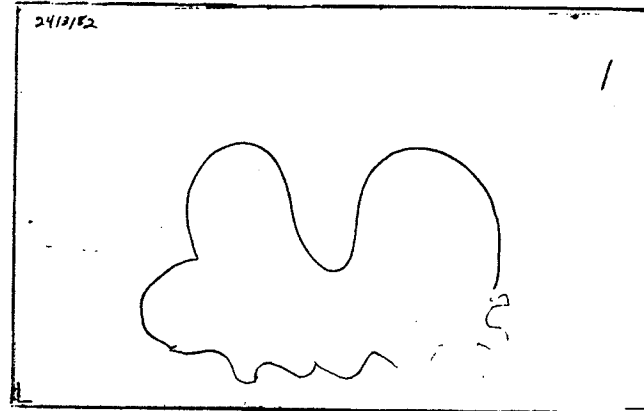


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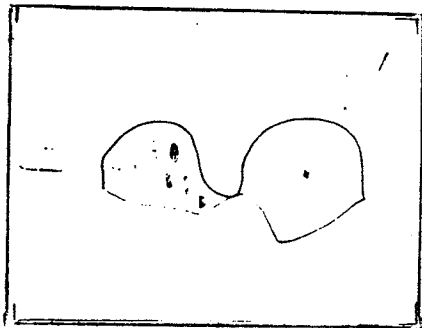
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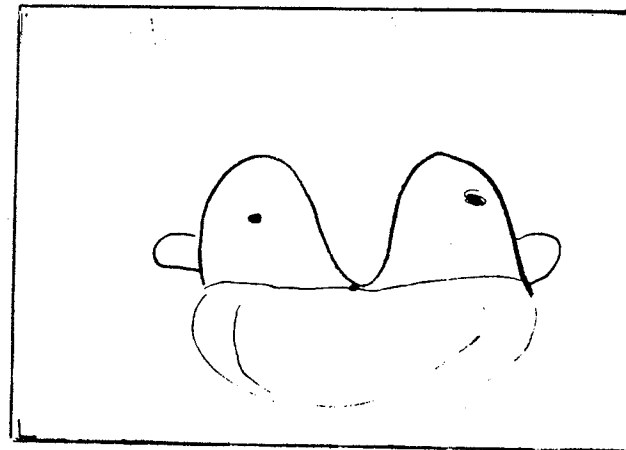
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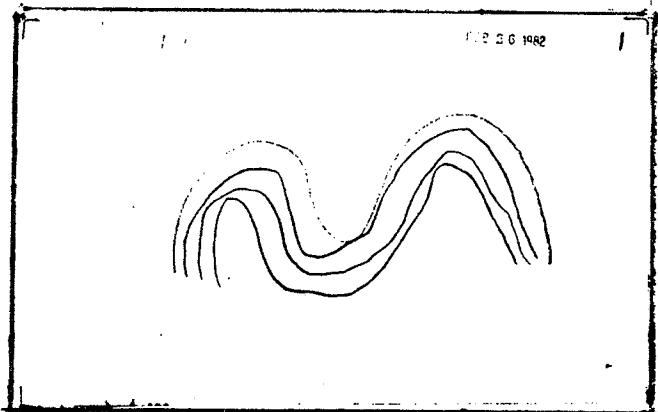


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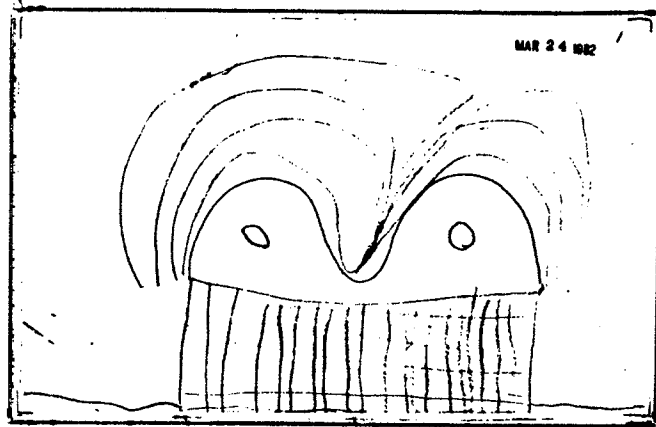


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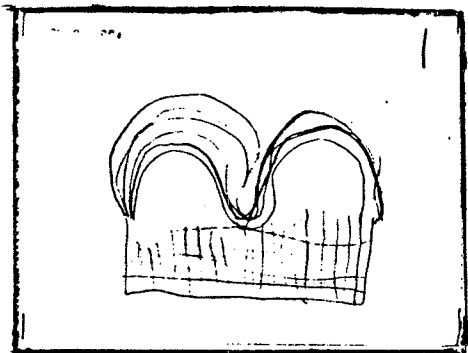
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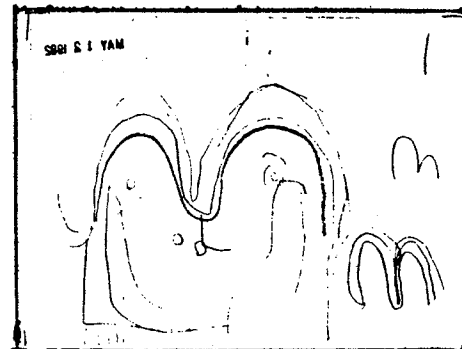
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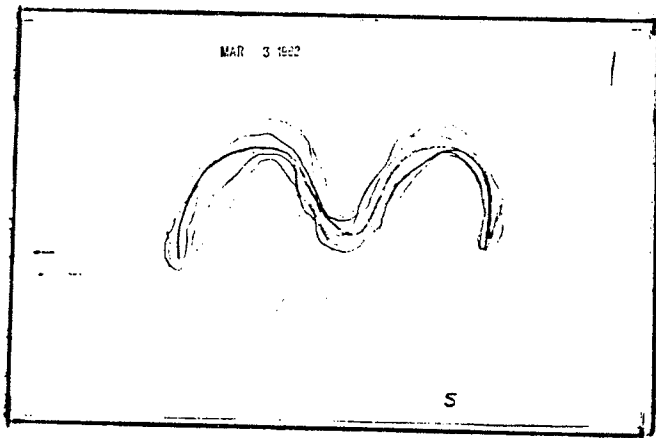


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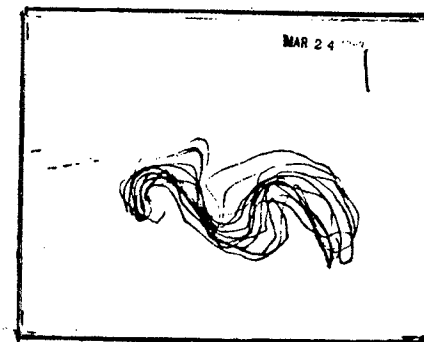


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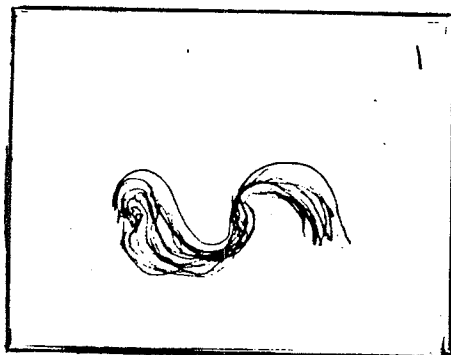
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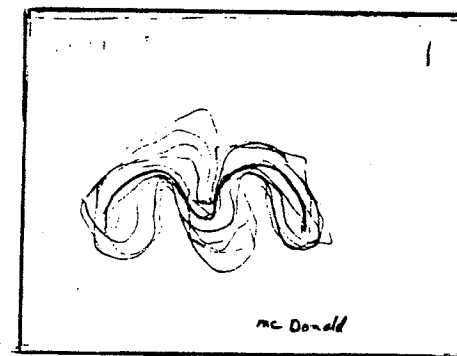
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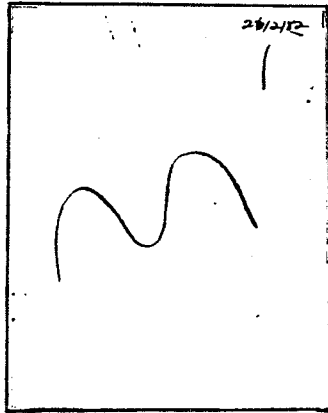


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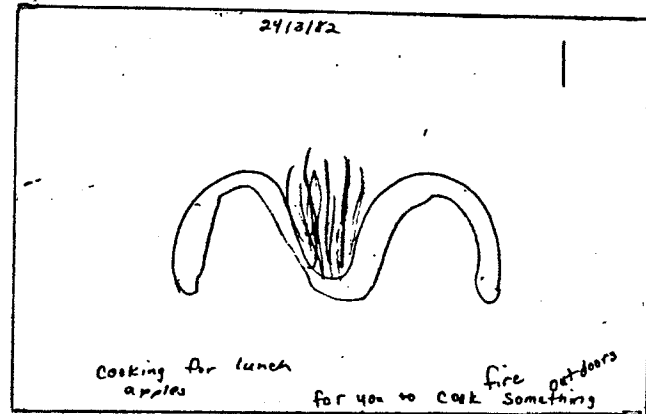


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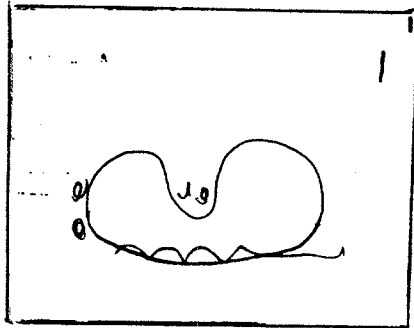
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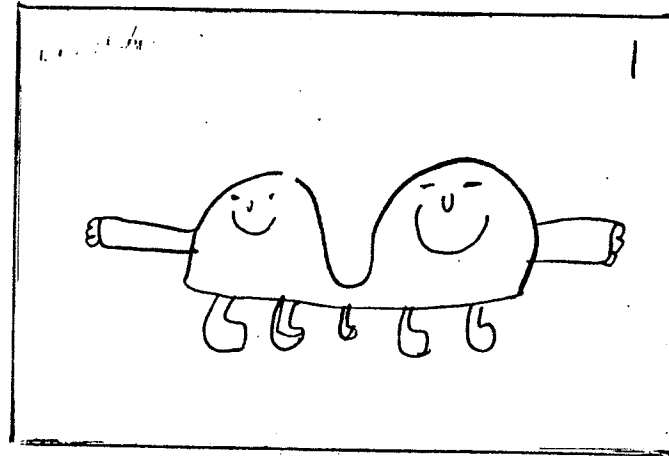
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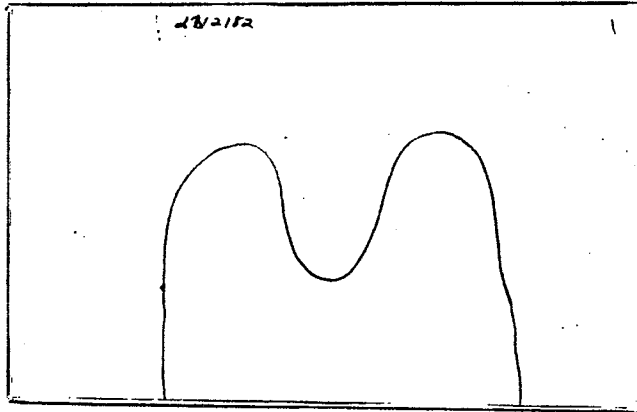


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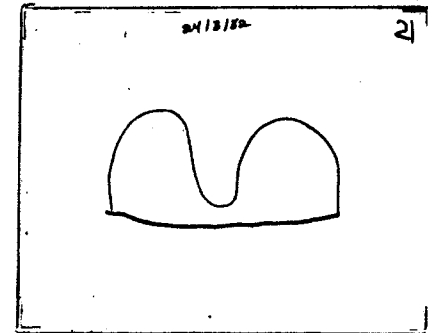


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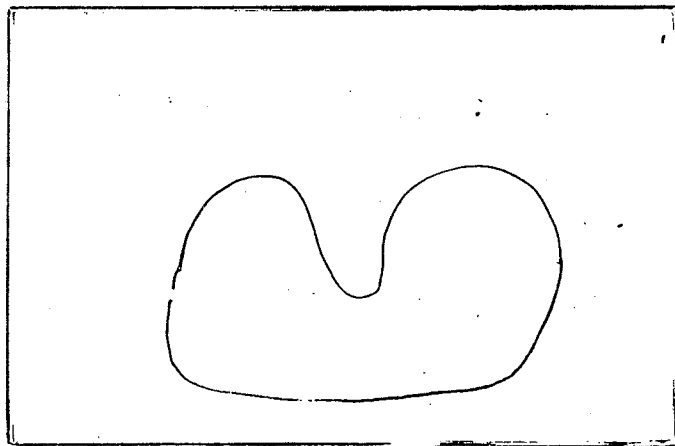
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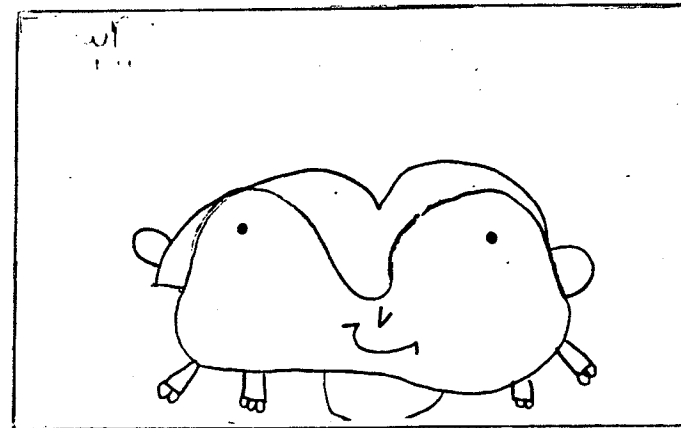
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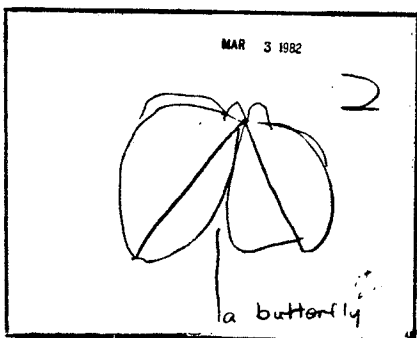


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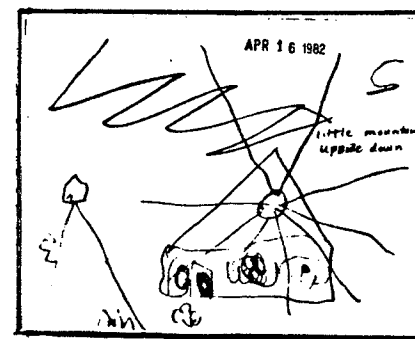


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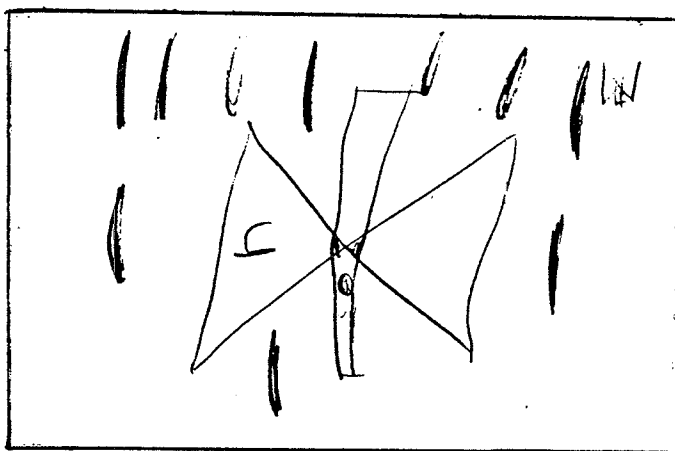
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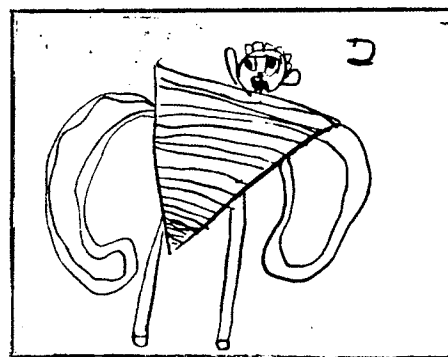
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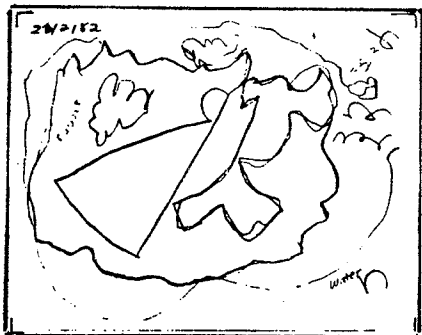


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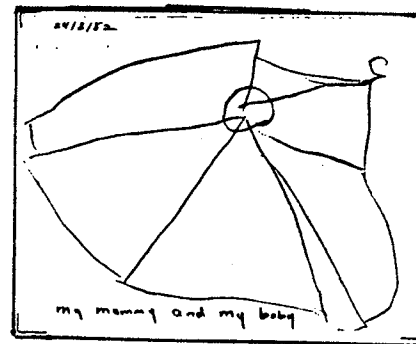


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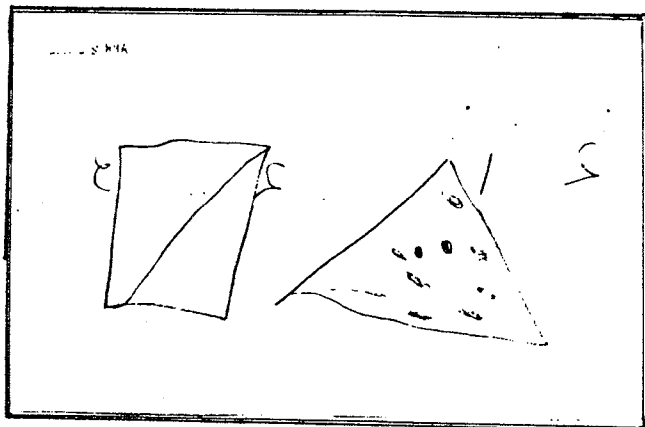
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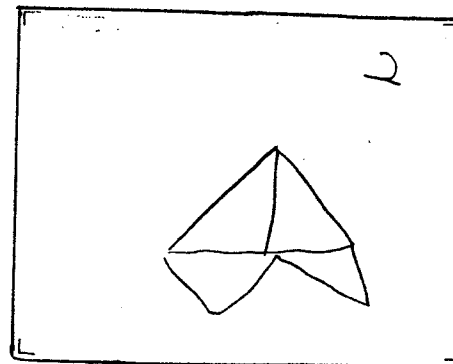
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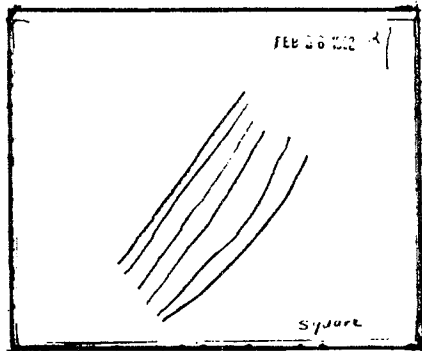


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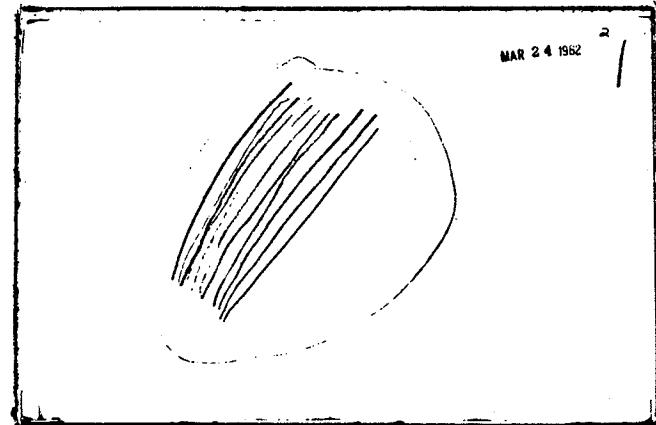


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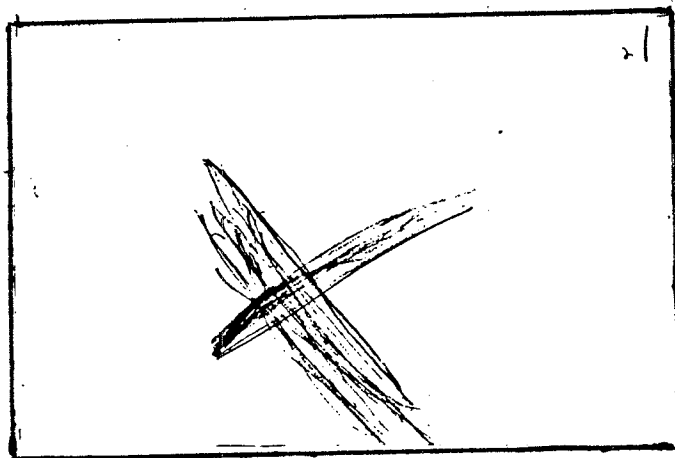
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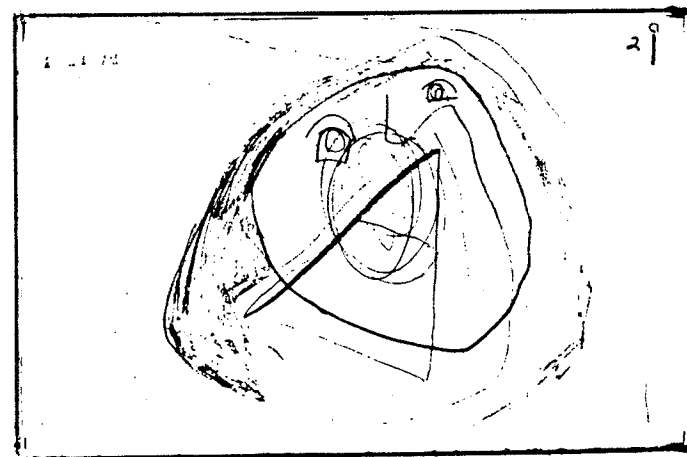
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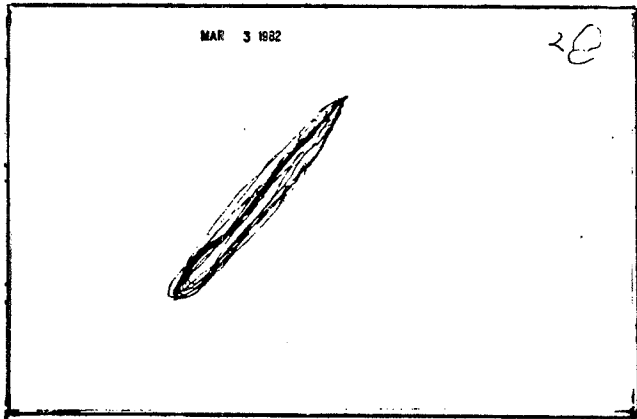


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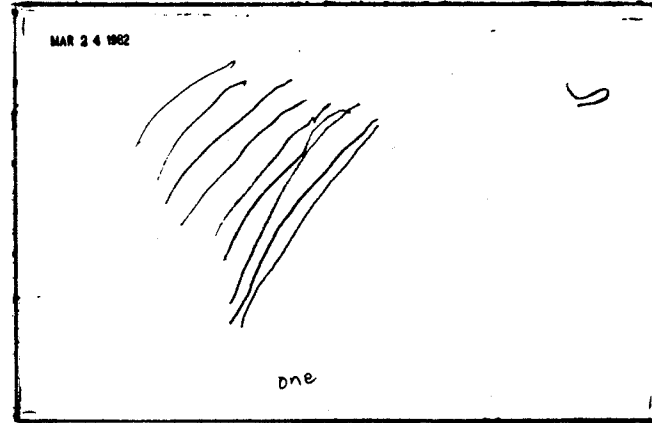


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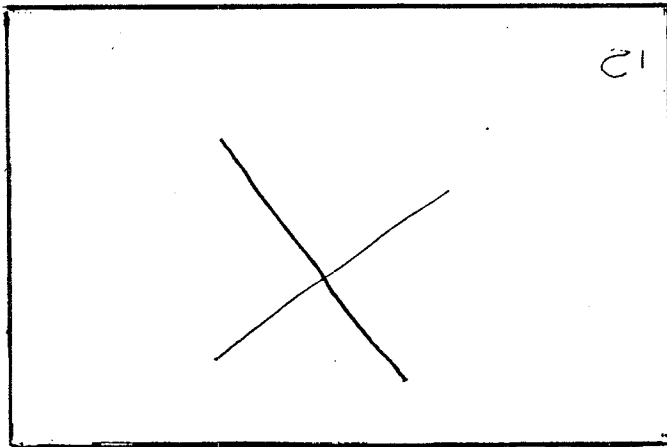
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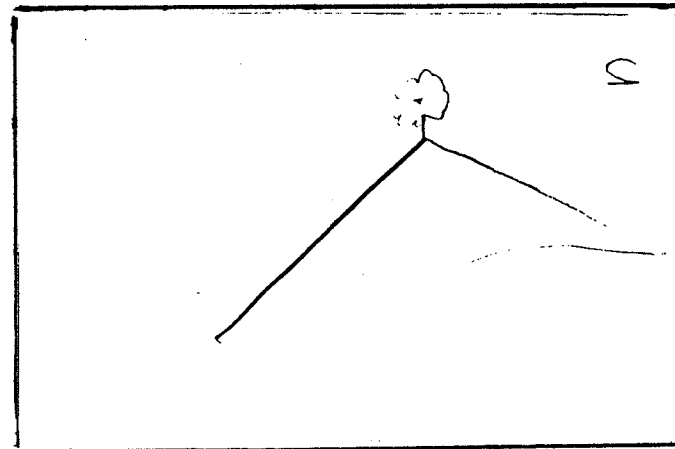
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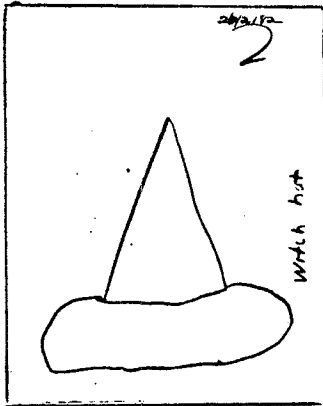


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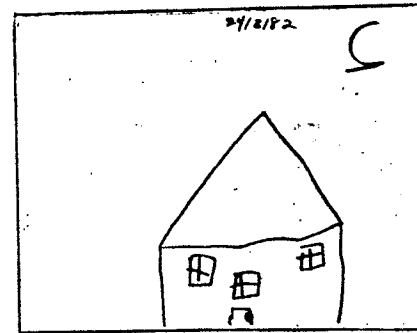


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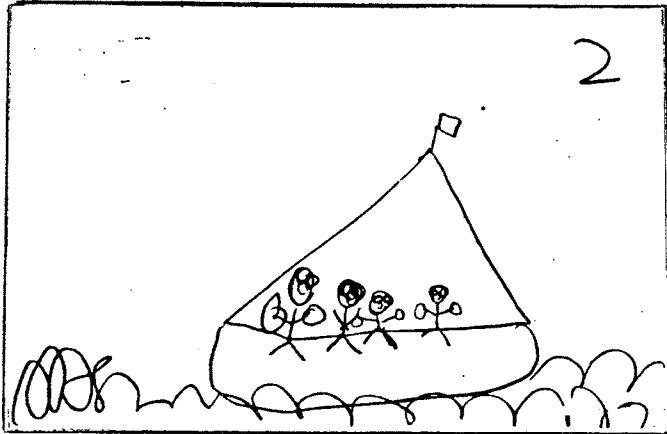
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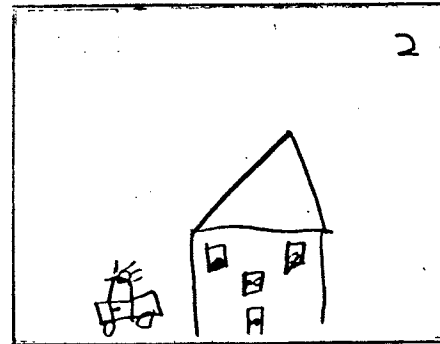
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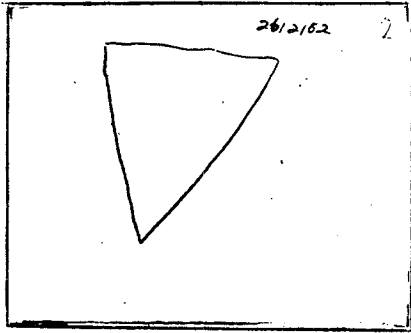


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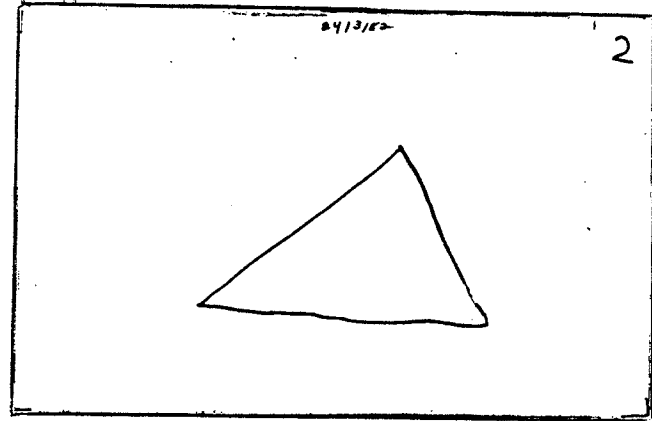


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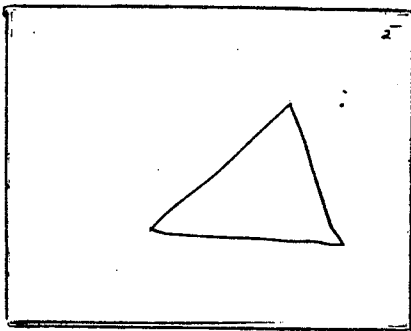
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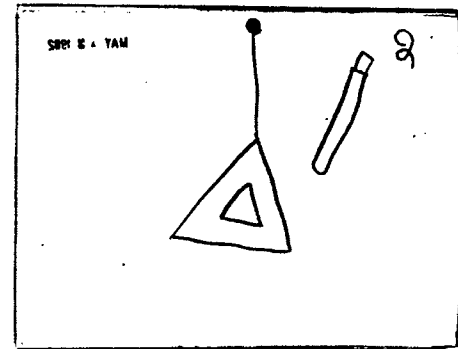
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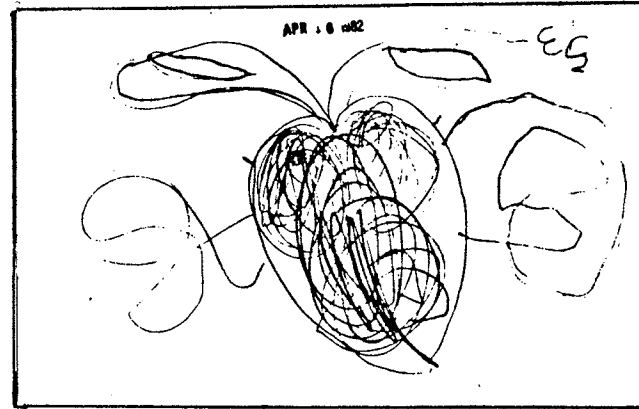
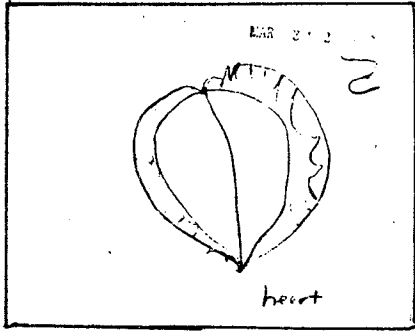
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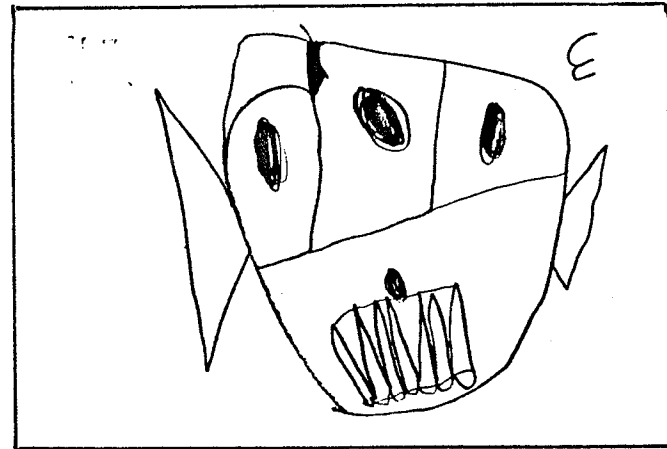
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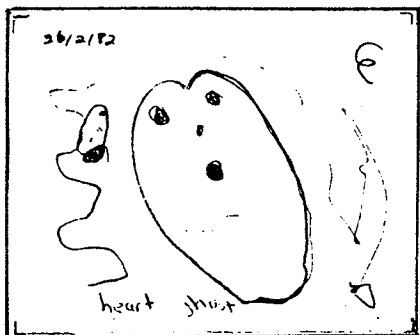


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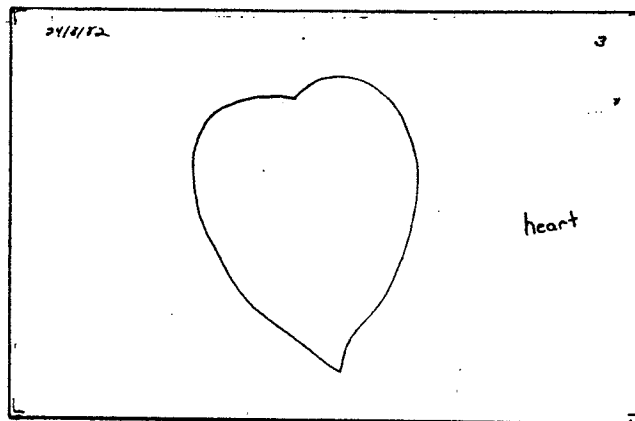


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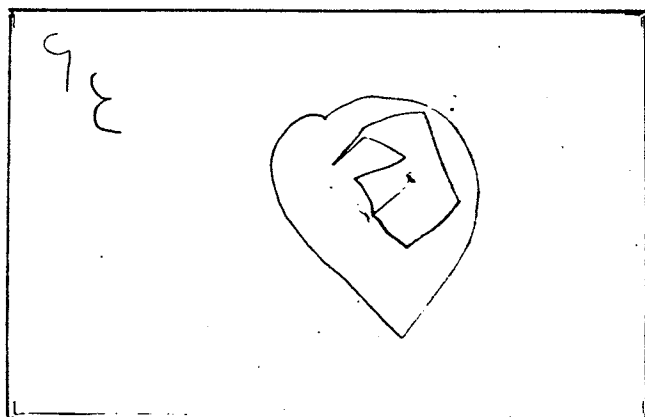
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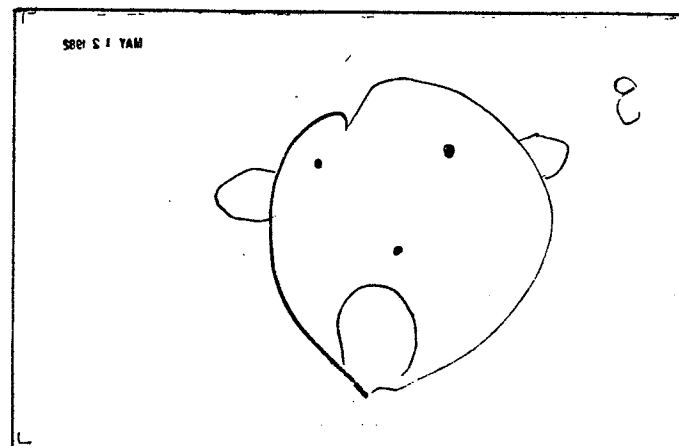
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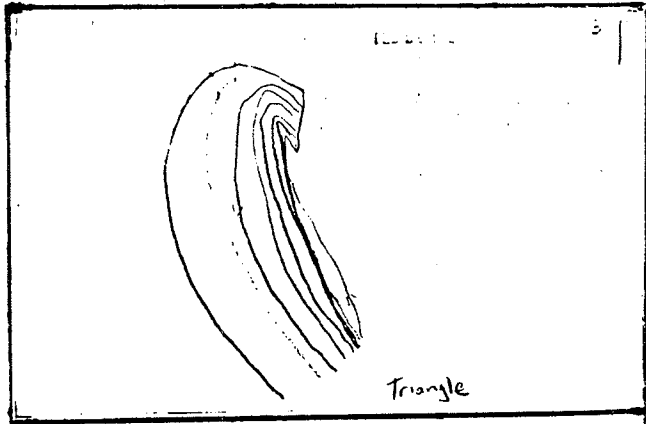


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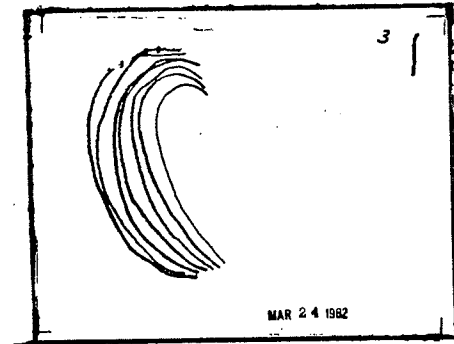


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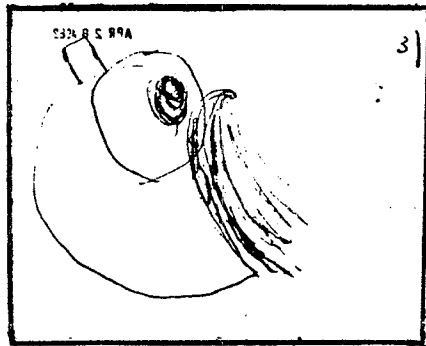
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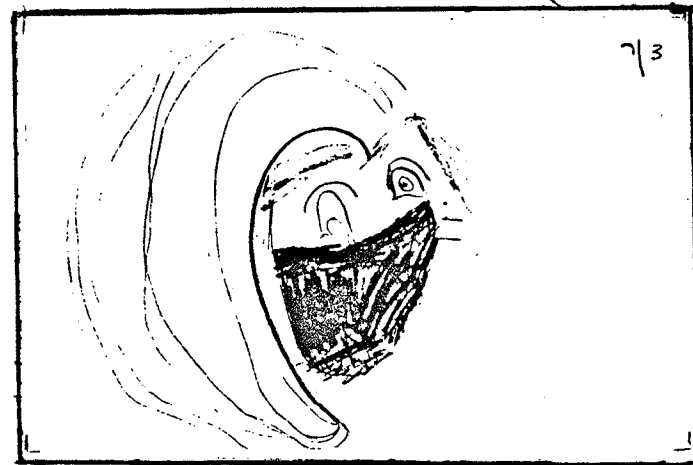
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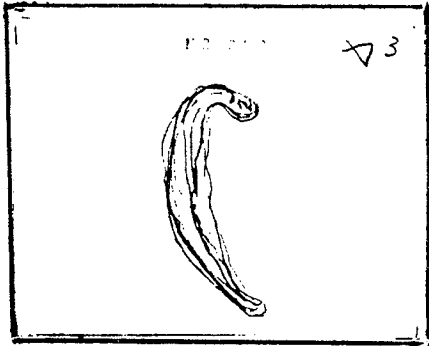


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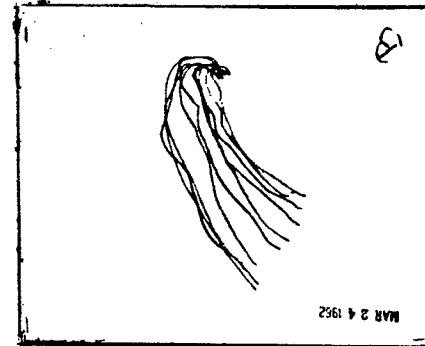


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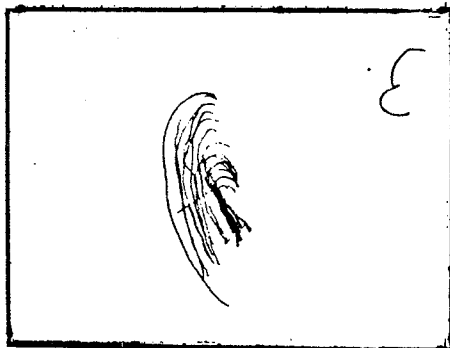
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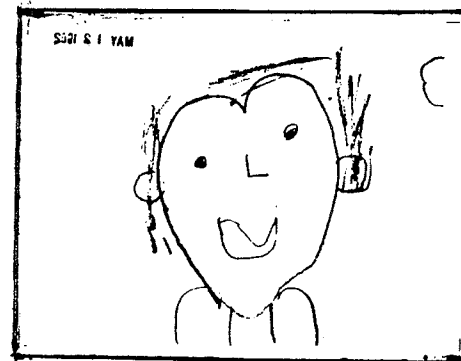
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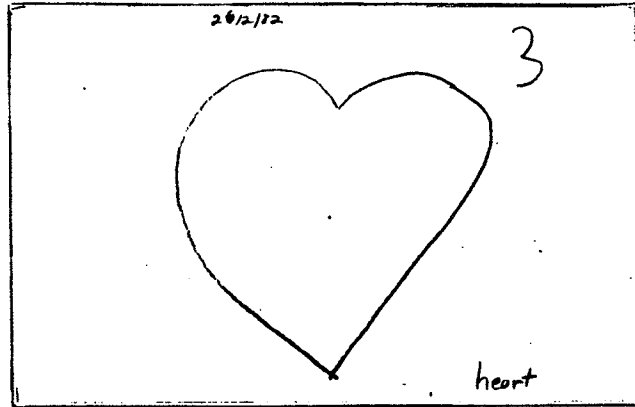


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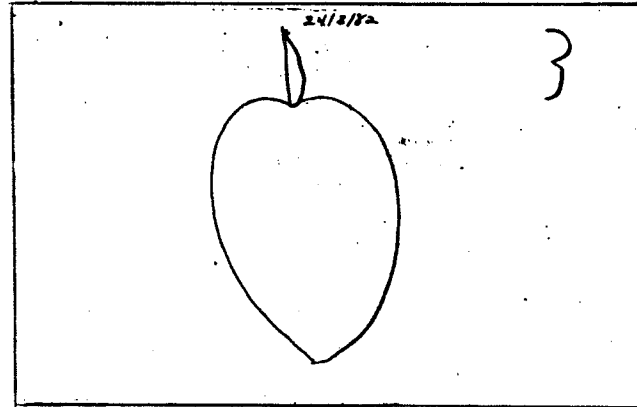


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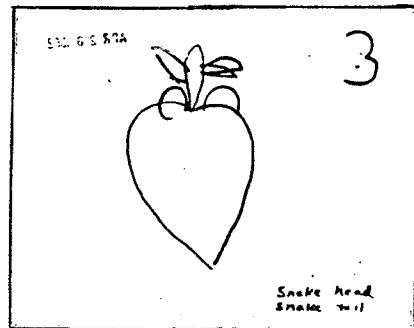
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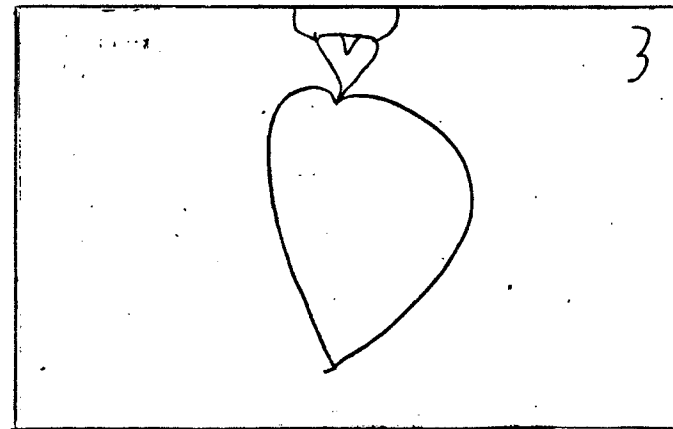
Session 1



Session 2

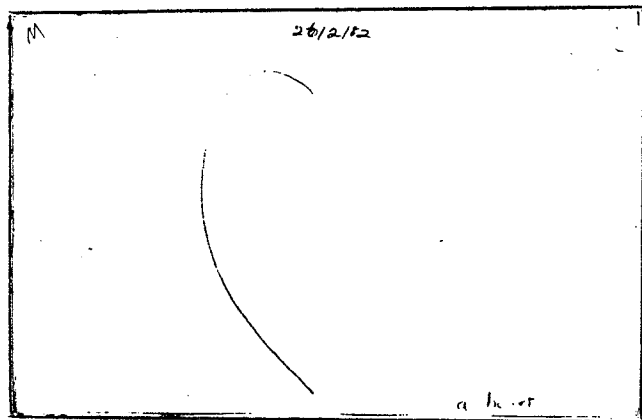


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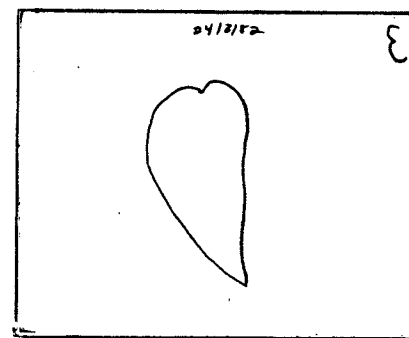


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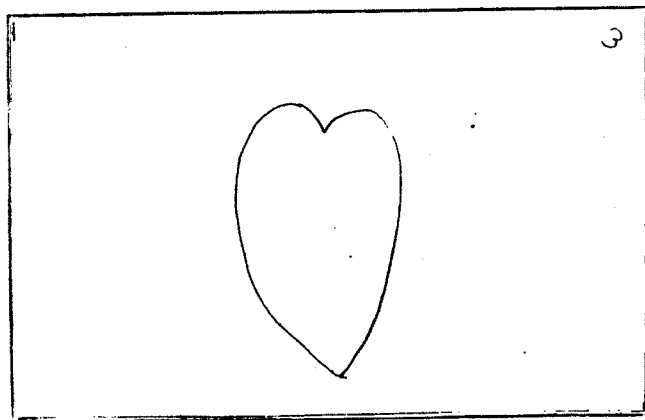
SYMBOL 3 CHILD 6: M.



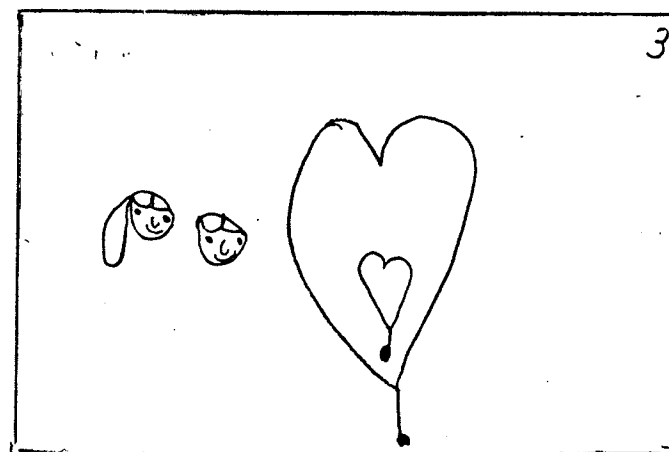
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Session 2

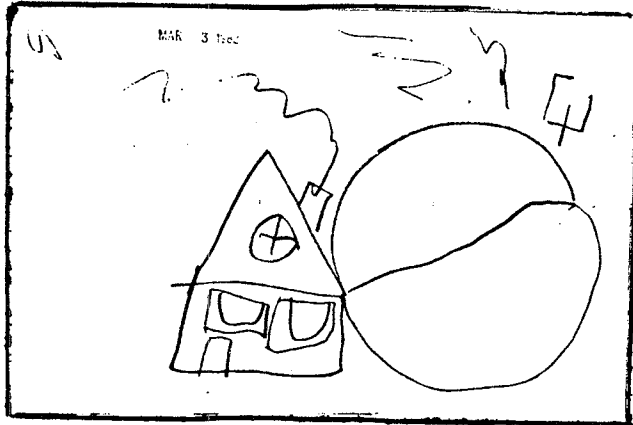


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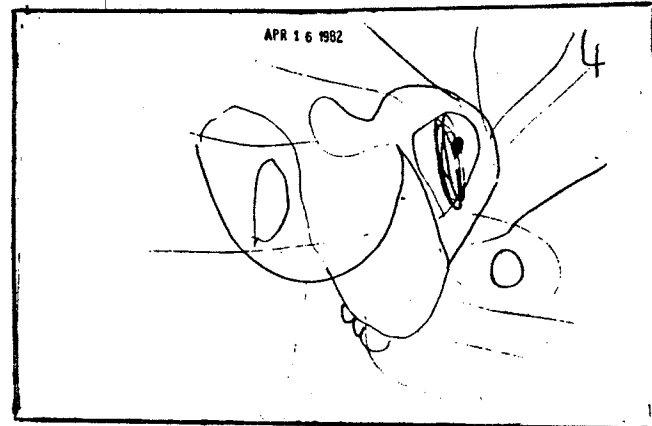


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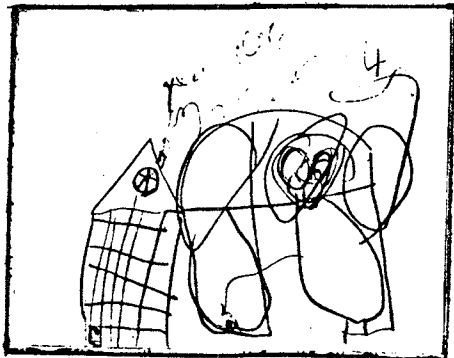
SYMBOL 4 CHILD 1: A.



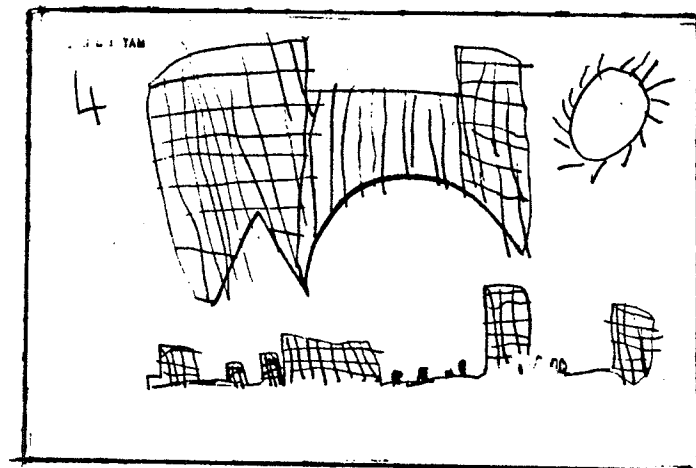
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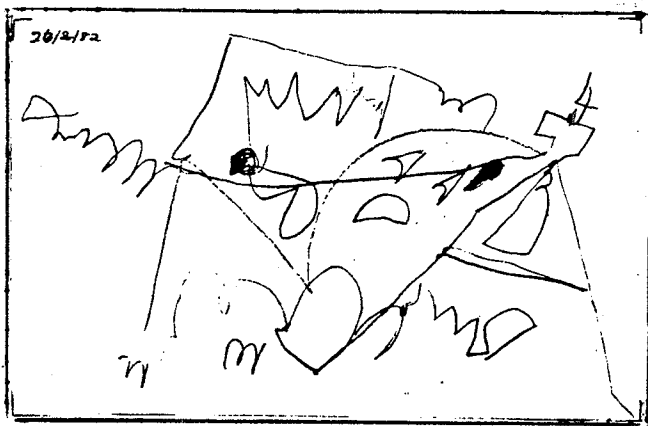


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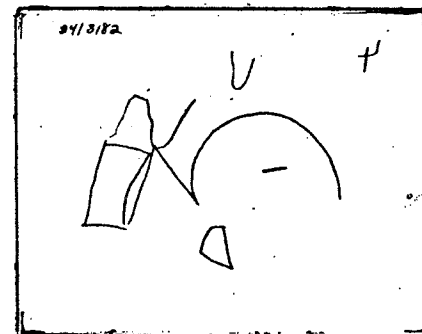


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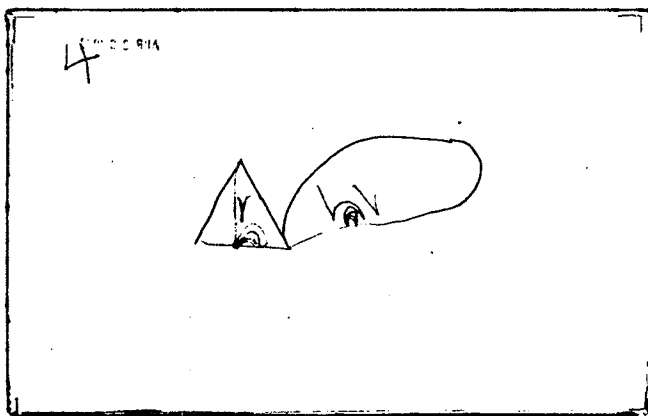
SYMBOL 4 CHILD 2: T.



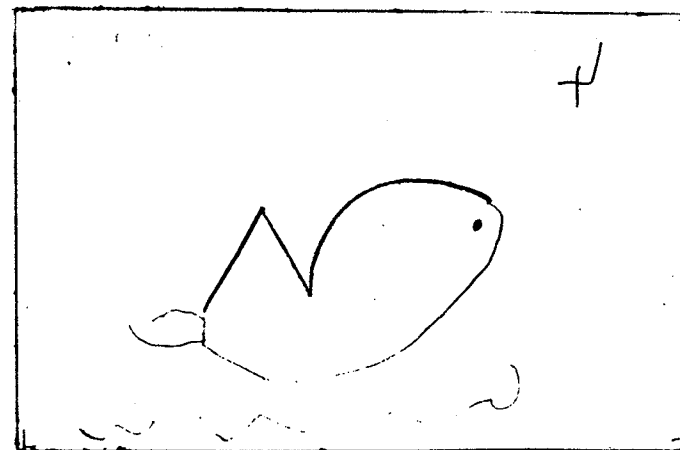
Session 1



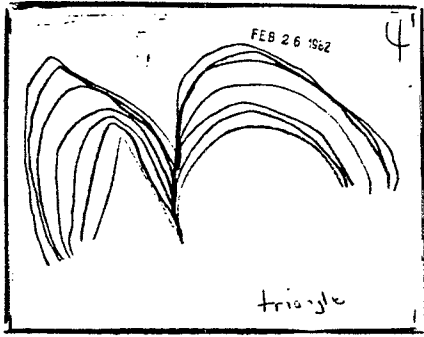
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Session 3

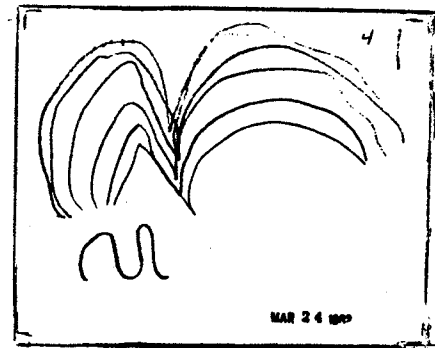


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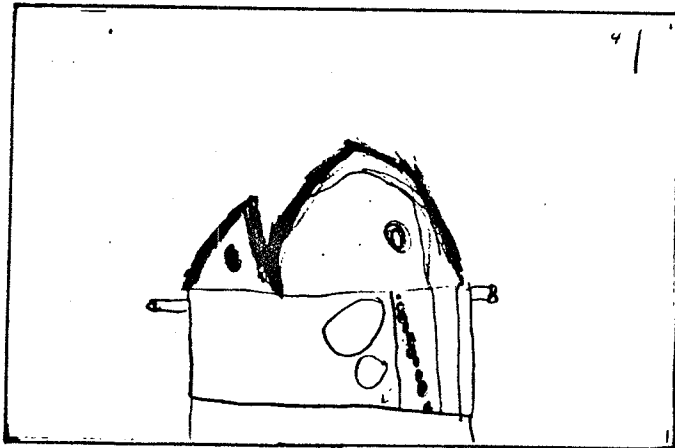


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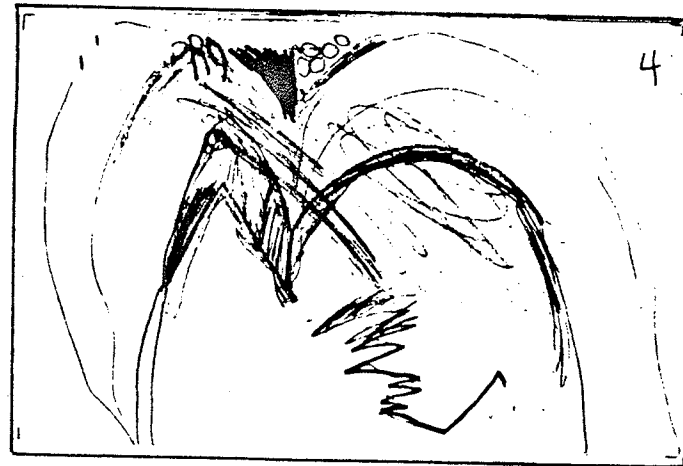
SYMBOL 4 CHILD 3: T.P.



Session 2

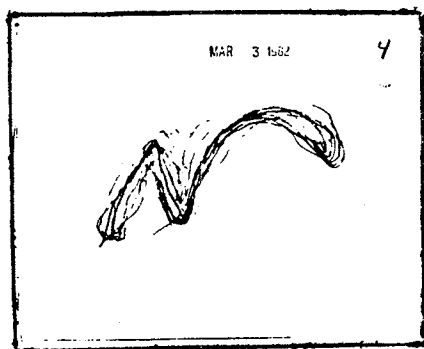


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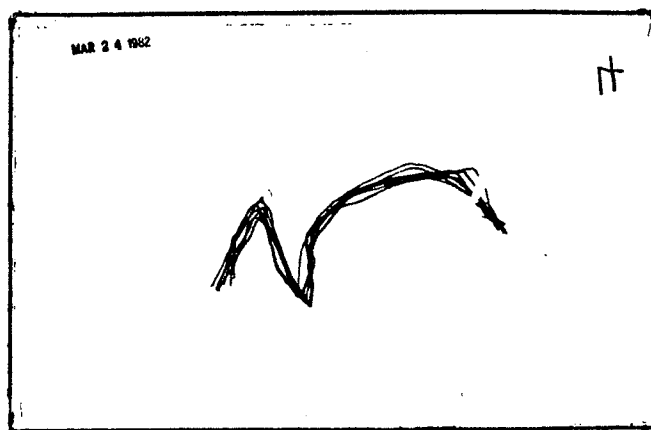


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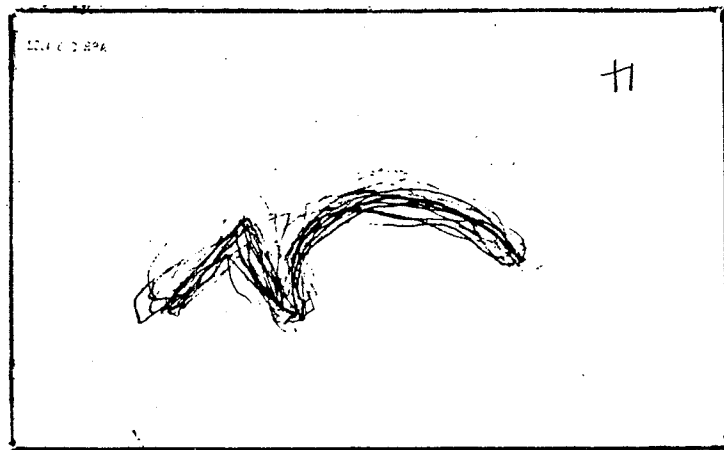
SYMBOL 4 CHILD 4: N.A.



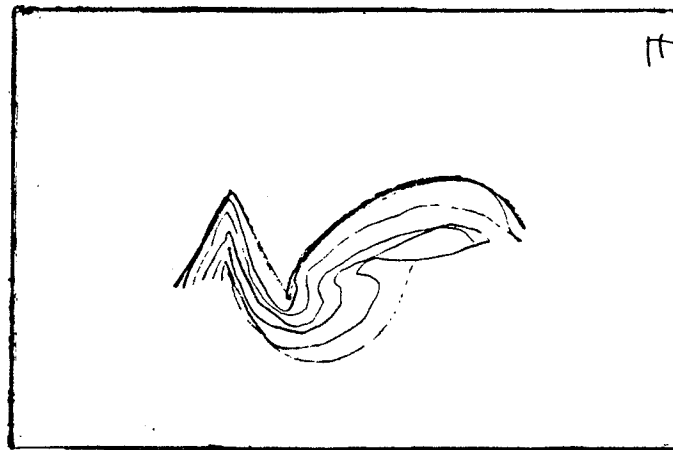
Session 1



Session 2

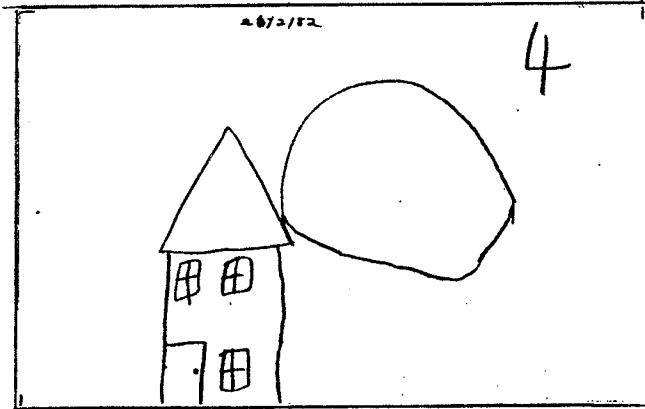


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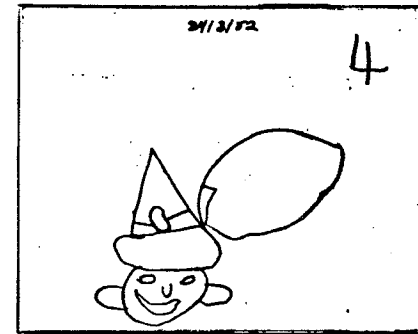


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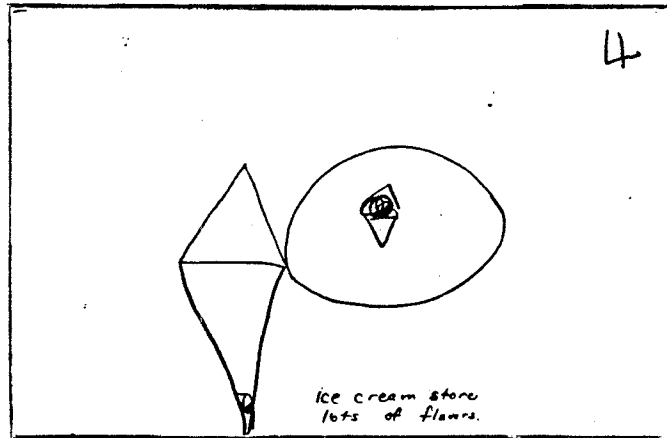
SYMBOL 4 CHILD 5: H.



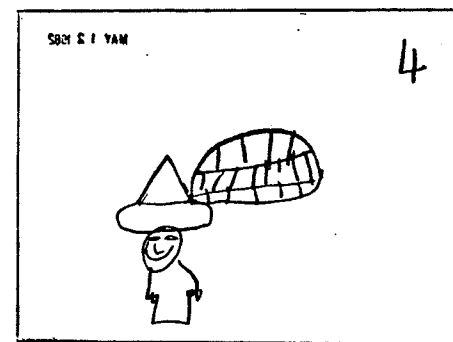
Session 1



Session 2

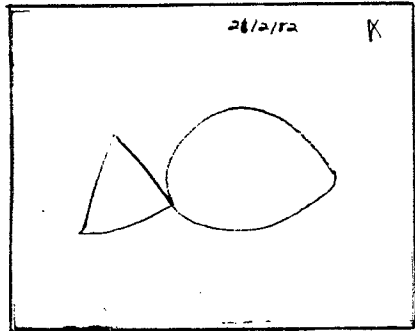


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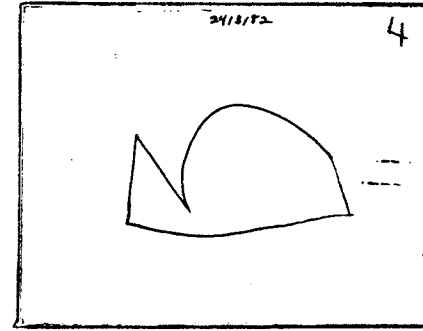


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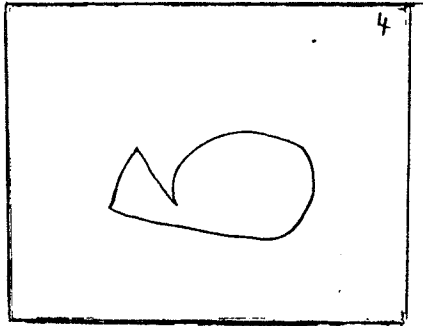
SYMBOL 4 CHILD 6: M.



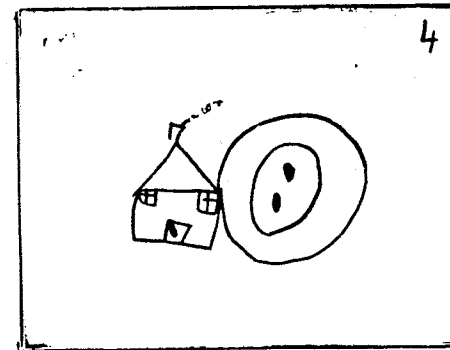
Session 1



Session 2



Session 3



Session 4

APPENDIX B: TRANSCRIPTS

Transcription of the First Session

A. (27/1/76)

March 3, 1982

Dot-line

- N. You remember this, don't you H?
I'm going to draw a dot here, I'm going to draw a dot here
and I'd like you to draw a line between those dots, ok?
- (A. connected the first and second dots.)
- N. Start with this dot.
- (A. connected the second and third dots.)
- A. From that one to that one (proceeded to connect the third
and fourth dots)?
- H. That's a star.
- A. No, a four.
- N. Can you start with this one?
- O. I know what is it. I know it's a star.
- N. You know it is, eh? How do you know that?
- Ne. Here's a star.
- N. What do you think it is, A.?
- A. A star.
- N. Ok. You need to move over so S. can see (directed to H.).
- Ne. Nope (referring to the star configuration).
- N. What is it this time then?
What do you think?
- A. Uh (unintelligible).
- N. Ok. Now, this is a number one. Can you put a number one
there? Ok.
- (A. put a one.)
- N. Ok. This is number.....?

A. (27/1/76)

March 3, 1982

Dot-line - Continued

A. Two.

N. Can you put a two there?

(A. put a two.)

N. Ok. This is number.....?

A. Five.

N. Three. Can you put a three there?

(A. made a three.)

Ne. That's easy to do.

N. This is number.....?

A. Four (made an upside down shape).

N. Ok.

Ne. Upside down.

N. Yeah, put a line like that, ok. This is number.....?

A. Five.

N. Ok. Can you put a five? Do you want me to put a five for you?

(A. nodded.)

H. I know how to make a five.

Ne. Five's are easy. They're one of my easiest numbers.

N. It's not easy for me upside down. Ok. This is number.....?

A. Four.

Ne. Six.

A. Six.

N. (Directed to Ne.) How 'bout if I give you this paper and

A. (27/1/76)

March 3, 1982

Dot-line - Continued

N. you go make a picture for me, Ne.? This is going to be harder. Could you make something out of that one? It's got three different parts.

Ne. A car.

N. Whatever picture you can make out of it.

H. Seven. Number seven.

A. Seven (responded to N. pointing to the next dot).

N. And (pointed to the next dot)?

A. Eight.

N. Can you put your name on there A.?

A. Ok.

(N. had a conversation with one of the observers as A. printed his name.)

N. Oh, you have an H in your name.

A. Yeah.

N. Oh, ok. I didn't know you spelled it that way. And..... can you put.....a number one here so we know it's the first one you did?

(A child reported to A. that another child was playing with his toy.)

Symbol 1

N. Ok, now for the next one I'm going to draw some shapes on paper, ok, and you can use either a large or small paper. Which would you like to use?

A. A large one.

N. A small one like this or large one like this?

A. Large one.

A. (27/1/76)

March 3, 1982

Symbol 1 - Continued

- N. And also.....I'm going to use carbon paper so you can have a copy to take home. We'll need the space. I want you to take a look at this and if you need to.....you can turn it around all different ways after I draw, ok? Ready? (N. drew the first symbol and handed it to A.)
Ok?
- A. What do I do?
- N. Whatever you can. If you can make something out of it or whatever you can do with that. Ok.

(A. closed the figure drawing from right to left.)
- N. Ok. What else can you do with that?
- A. Uhm.....
- Ne. Finished.
- N. (Directed to Ne.) Ok. Can you ask Mrs. M. or Mrs. K. to write down what you did? Thank you.
(Directed to A.) Ok. What else can you do with that now?
- A. Uhm (continued drawing).
- N. Anything else?
- A. Nope.
- N. Can you turn it around and maybe you can see.....that's turning it over. Can you turn it around like this? Does it make you think of anything else that way?

(A. spent 10 seconds drawing.)
- N. Alright.

(A. continued drawing for the next 38 seconds. During that time other children brought back completed symbols.)
- N. Ok, can you make anything else out of that now? Can you tell me about what you've made?
- A. Uh.....design.

A. (27/1/76)

March 3, 1982

Symbol 1 - Continued

- N. Ok. Fine. (pause) You know what that looks like? Somebody looking over a hill. It looks like a nose. Ok. Can you put your name on here and can you also put a number one?
- A. Yep. (A. printed his name and numbered the drawing.)
- N. Can you tell me what kinds of shapes or lines that you used to make your design?
- A. Uhm.
- N. By looking at your pictures?
- A. Nope (after a 10 second pause).
- N. Ok, that's for you. (N. handed A. the carbon copy of his symbol.)

Symbol 2

- N. And now for the next one do you want a large or small paper?
- A. Uhm. Small paper.
- O. I'm finished.
- N. Ok ask Mrs. K. or Mrs. T., Mrs. M. to write down what you did. (To A.) Ok and this one (drew symbol) is going to be like that.
- O. Finished Miss W.
- N. You go and ask Mrs. K. to go write down.....
(to A.) Oh, can you do anything else with it?
- H. There's a picture on the back of it.
- N. Anything else?

(A. continued to draw for 24 seconds.)
- N. Can you make anything else out of that?
- A. Uhm (pause) that's all.

A. (27/1/76)

March 3, 1982

Symbol 2 - Continued

- N. Ok, can you tell me about what you made?
- A. A butterfly.
- N. It looks like a butterfly, ok.
- Ne. Give me another one. I forgot to.....that one.
(A. printed his name.)
- N. Good thank you. And I need a number two there.
(A. made a two on the paper.)
- N. Can you tell me anything else about your butterfly?
- A. Nope.
- N. Well, can you tell me where it is right now?
- A. On a flower.
- N. On a flower.
(A. drew the stem of the flower.)
- N. Ok. What's it doing on the flower?
- A. Uhm. I don't know.
- N. Just sitting?
- A. Yeah.

Symbol 3

- N. For the next one would you like a large or small paper?
- A. Uhm small paper.
(N. made the symbol, handed it to A. who drew for 28 seconds before he smiled and leaned back from his drawing.)
- N. Ok. Can you do anything else with that?

A. (27/1/76)

March 3, 1982

Symbol 3 - Continued

(A. drew for the next 13 seconds.)

N. Anything else?

H. (unintelligible) Bigger one.

A. Done (after drawing for 26 seconds).

N. Ok. Can you tell me what it is you made?

A. A heart.

N. That's what I thought. That's why you smiled, right?

(A. nodded.)

N. What else can you tell me about your heart?

A. Nothing.

H. Make a number three on it.

A. Number three?

N. You're right.

H. (unintelligible)

O. I finished.

N. What is that?

A. Caterpillar (to another child).

N. (To another child) Want to take that over and have Mrs. K. write down your story about it?

Symbol 4

N. Big or small? It's up to you. (pause) Have you decided yet? I didn't hear you. Do you want a big or small one? (pause) I can't tell if you just smile. Can you tell me? You only have one more to do. (pause) Ok do you want a large or small paper?

A. (27/1/76)

March 3, 1982

Symbol 4 - Continued

- A. A big one.
- N. Ok.....a big one. Ok are you ready for this one now? The last one..... Almost done and then you can have your snack. Do you know what you're having for snack? Do you have any idea? (To H.) Do you know?
- H. Crackers and cheese.
- N. Ok are you ready for this one (handed the symbol to A.)?
(A. spent 14 seconds drawing.)
- N. Ok, now what else can you do with it?
(A. continued drawing for 3 seconds.)
- N. And.....
- A. That's a house (after he drew for 4 seconds).
- N. Ok what else do you need for your house then?
- A. That.
- N. What else do you need?
- H. You could make a bathroom. That's a church.
- N. Do you need anything else for your house or is that a house still?
(A. nodded yes and continued drawing.)
- N. Ok. What else do you need?
- A. (Said a word which sounded like "tail").
- N. Anything else for your house? Ok. Can you tell me about this?
- A. Number five?
- N. What?
- A. Four number.

A. (27/1/76)

March 3, 1982

Symbol 4 - Continued

- N. Yes, it's a four number but what can you tell me about that?
- A. Circle. A big red ball.
- N. A big red ball?
- A. It's the sun. It fell down.
- N. It's the sun that fell down? Ok, where did the sun come from?
- A. In the sky.
- N. Tell me really fast about this and then you can go have your snack.
- A. That's all.
- N. That's all you can tell me? Ok, can you tell me anything about who lives in that house?
- A. My Mum and my Dad, my brother.
- N. Your Mum, your Dad, your brother and.....
- H. You.
- A. And me.
- N. Can you tell me your Mum's, your Dad's, your brother's name?
- H. There's Richard, that's his brother.
- A. Richard.
- N. Richard and..... Do you know your Dad's name?
(A. shook his head.) Do you know your Mum's name?
(A. shook his head.) Ok what else can, what made that sun fall down, I wonder?
- A. Storm.
- N. Where's the storm? It looks awfully clear there in the picture.

A. (27/1/76)

March 3, 1982

Symbol 4 - Continued

(A. drew in the storm.)

N. I see and can you tell me about the storm?

A. Night time.

N. Night time, ok.

A. They're sleeping.

N. So they didn't see the sun fall down.

A. Yeah, but their house shook.

N. When the sun fell? Ok. What else happened?

A. Nothing else happened.

N. Did their house shake when that happened?

A. Yeah.

N. Can you tell me what that is?

A. A storm.

N. Ok, can you write your name please and then put number four?

A. (A. made a four.) Then there's four.

H. How do you make that?

N. How do you suppose you made this?

A. (unintelligible) That's a smoke.

N. No, I don't mean that. How did you get this picture?

A. By a magic paper.

N. Do you know what this is called?

A. Magic paper.

N. Another name for it is carbon paper. Ok. Here we go. Thank you very much for staying H. See you later, A.

Transcription of the Third Session

A. (27/1/76)

April 28, 1982

Dot-line

- N. Do you first and then H. can do it after you, ok?
- A. (Spelled his name for K.) A, R, and T, H, U, R.
- N. Ok, here's a dot for you and another dot.
(A. connected the first and second dots.)
- N. Alright.
(A. connected the second and third dots.)
- N. Making longer lines on this one, aren't you? There (made the dot). Whoops, start with this one.
(A. connected the third and fourth dots.)
- N. And.....
(A. connected the fourth and fifth and the fifth and sixth dots.)
- N. Now, I'm going to make a really long line. I'm going to make a dot, you're going to need to make a really long line.
(A. connected the sixth and seventh dots.)
- N. You did, right in the corner. One more.
(A. connected the seventh and eighth dots.)
- N. Ok, so you started with this dot. This is number.....?
- A. One.
- N. Can you put a one.
(A. made a one.)
- A. Two (made a two).
- A. Three (made a three).
- N. Can you follow this line and see which dot you go to next?

A. (27/1/76)

April 28, 1982

Dot-line - Continued

N. Right. Ok and you guys get to switch chairs.

Symbol 1

N. Do you want a large or a small piece of paper?

A. Uh.....a small paper (laughed).

N. Thank you H. Put these over here. A small piece of paper. Ok, I have to put a small piece of carbon paper.

A. Big pieces (referred to large sheets of carbon paper).

N. This is new carbon paper. What will new carbon paper do, do you think?

A. Write better.

N. So what will it do to those lines? If it writes better, what will it do to the lines?

H. Straight.

A. Straight.

N. What else besides straight?

H. Make it dark.

N. Right, make it dark. You said a big piece of paper?

A. Nope.

N. Ok, now I've got this right.

A. Thanks.

N. Yours (handed A. the pencil).

(A. laughed and closed the symbol using a left to right movement.)

N. Oh, that's different. Ok, go ahead.

A. Two eyes.

A. (27/1/76)

April 28, 1982

Symbol 1 - Continued

- N. Two eyes?
- A. And one nose.
- N. And what else?
- A. Nothing else.
- N. That's the nose, two eyes. What do those eyes and nose belong to?
- A. Me.
- N. Oh (laughed). Where's the rest of you?
(A. coloured in the nose.)
- N. What's this?
- A. Eye, one.
- N. So what part of the eye is this?
- A. I don't know.
- N. Is that the dark part? The little teeny dark part?
- A. Yep.
- N. It's called the pupil. Ok, so you have a nose and two eyes with pupils and irises and what else?
- A. Uhm (continued drawing for 15 seconds).
- N. Ok, those are.....
- A. Eyebrows (made eyelashes).
- N. Eyebrows? Ok, now what's holding those eyes and nose together?
- A. The nose.
- N. The nose is keeping the eyes together? Ok, what else is there that you have to have for the eyes and nose?

A. (27/1/76)

April 28, 1982

Symbol 1 - Continued

A. Mouth.

N. Ok.

(A. used 15 seconds to draw two dots in a straight line and connect them with a heavy line.)

N. That's the mouth?

(A. enlarged the dots and darkened the lines.)

N. Ok, tell me what part this is?

A. Mouth.

N. Oh, what are these two dots?

A. Mouth!

N. Oh go ahead and finish. I thought maybe they were teeth.

(Four second pause)

N. Ok, you've got eyes, nose, mouth, eyebrows. Are these, these things right here (pointed to A.'s eyelashes)?

A. Yep.

N. Those are eyelashes then. This is your eyebrow right here, ok?

A. Making a little teensy one.

N. What are those little things?

A. I don't know.

N. Are they for the eyebrows?

(A. nodded.)

N. Ok, but you know what, that's not going to show up because the paper wasn't underneath it. Can you go over those again?

A. Ok (traced the eyebrows).

A. (27/1/76)

April 28, 1982

Symbol 1 - Continued

- N. Ok, so what else do you need for you?
- A. Nothing else.
- N. Nothing else?
- A. Yeah.
- N. What?
- (A. added to his drawing.)
- N. What holds all those parts together?
- A. Body.
- N. Ok, well.....
- (A. made a very small body.)
- N. (Laughed) What's that?
- A. The body.
- N. Isn't that a tiny body for all those big eyes and nose?
- A. Yep.
- N. Hum.....what's this part?
- A. The head.
- N. Ok, is your head there too?
- (A. enclosed the eyes, nose, mouth, body in a square.)
- N. Is your head a square?
- A. Yeah.
- N. Ok, what else do you need for your body, er, for your face?
- A. Legs.
- N. Well now look, your body is inside your head. How can that be?

A. (27/1/76)

April 28, 1982

Symbol 1 - Continued

- A. I don't have a head.
- N. Well, what's this square thing?
- A. T.V.
- N. Oh, your face is on T.V.?
- A. Yep.
- N. Ok, so your eyebrows are above the T.V. (pause) Ok, what else do you need if you're on T.V.? Why are you on T.V. anyway?
- A. Little legs.
- N. Of what?
- H. To hold that.
- A. Yeah, to hold it.
- N. To hold what?
- A. The T.V.
- N. Oh I see. Why are you on T.V.?
- A. 'Cause I wanna.
- N. Well, what are you doing on T.V.?
- A. Uh, I don't know.
- H. Playing movie star.
- A. Yeah.
- N. What?
- A. Play movie star (laughed).
- N. Ok, anything else you can tell me about your picture?
- A. Nope.

A. (27/1/76)

April 28, 1982

Symbol 1 - Continued

N. I have a question now.

A. What?

N. Where are you going to put your name?

A. In my eyes.

N. Ok.

(A. printed his name.)

N. Where are you going to put number one?

A. One?

N. Uh huh.

A. In the other eye.

N. I have to remember that when I look at your picture to make sure that.....

A. (Laughed) Me on T.V.

Symbol 2

N. Now do you want a large or a small piece of paper?

A. A large piece of paper.

N. And then H., after that you get to draw one.

A. Two.

N. Well, he'll draw one and you'll draw another one. Ok, you ready?

A. Yep (looked at the symbol for 8 seconds, then made an "X").

N. X. Ok, now what else?

A. (A. continued drawing for 30 seconds.)

A. (27/1/76)

April 28, 1982

Symbol 2 - Continued

It's a bat.

N. It's a bat? Oh, ok. Where is that bat?

(A. pointed to the paper.)

N. Yeah, I know, I mean..... There's his body. Where is he? Is he on the paper, is that the only place?

A. Yeah.

N. He's not anywhere? Where do you find bats?

A. Uhm.....in caves.

N. Is he in a cave?

A. Yep.

N. How do I know he's in a cave?

(During the next 17 seconds A. drew short, thick vertical lines on the paper.)

N. Can you tell me about these?

A. They're ice cubes on the.....roof.

N. Ah, they're the things that hang down from the roof on the cave.

A. Yeah.

N. Which are called.....(to observers). Are they stalagmites or stalactites? Well, one of them. Stalactites or stalagmites - one grows up and one grows down. I don't know which is which. Ok, uh, what else do you need in a cave with the bat?

A. Uhm.....more bats.

N. Ok.

(During the next 32 seconds A. made a smaller bat in the top right hand corner of the page.)

A. (27/1/76)

April 28, 1982

Symbol 2 - Continued

- N. Anything else? That's one more bat.
- A. Yeah.
- N. Is this bat flying or what's he doing in the cave?
- A. Flying.
- N. What's the bat doing?
- A. Hanging on the cave. Up.
- N. Ok, they both look the same. How do I know this one's hanging?
- A. 'Cause this one's.....not up. Up there like this.
- N. Oh, I see. This is on the ceiling?
- A. Yeah.
- N. Anything else you can do with your bat and your cave?
- A. Nope.
- N. What else do you need to do then?
- A. My name.
- N. You're right.
- (A. printed his name.)
- N. And a number.....
- A. Two.
- N. Where are you going to put it? (A. put a two on the wing.)
On the bat's wing. He's going to think he's something special.

Symbol 3

- N. Do you want a large piece of paper?

A. (27/1/76)

April 28, 1982

Symbol 3 - Continued

A. A large piece of paper.

N. Large piece of paper?

H. Mine.

N. Yeah, you need that don't you. Ok, (pause) do you know what I'm going to draw?

A. Hum?

N. This shape.

A. (After 20 seconds A. turned the paper sideways.)

This way.

N. Ok, what can you do with it that way?

(A. continued to draw for 33 seconds.)

N. What else can you do?

(A. continued drawing for 28 seconds.)

N. Are you drawing what I think?

(Seven second pause)

N. I bet so. What else do you need?

A. (Fourteen seconds later A. began laughing.) This is H.
H. you wanna see yourself?

N. Where are his arms?

A. H., you wanna see yourself? (H. came to the table.)
Wanna see yourself?

N. Ok, you take.....

H. I put the nother piece of paper.....

A. This is you.

A. (27/1/76)

April 28, 1982

Symbol 3 - Continued

H. Oh.

A. You got two boobies (laughed) and one dinky (laughed).

N. What else do you need for, what's this thing that you've drawn?

A. A boat.

N. That's what I thought. What else do you need?

A. Long hair.

H. Yeah.

A. Long hair (as he drew it).

N. H.'s hair is not that long, look.

(Both A. & H. laughed.)

H. Yeah, your hair's long.

A. This is your hair.

H. You've got a longest hair.

A. (Reply unintelligible).

H. Yeah, up to his neck.

A. This is your hair.

N. Who's in the boat with H.?

A. Me here (drew himself in and laughed).

N. H. made clothes on you, you going to make clothes on H.?

A.&H. No.

N. Ok, I see.

A. You're gonna be bare naked. Look at me. Me's so tiny.

N. Why are you so tiny?

A. (27/1/76)

April 28, 1982

Symbol 3 - Continued

- A. H. made it with his hair.
- H. Yeah, I made him tiny, now he made me tiny, right?
- A. No. First H. made me tiny, then you (to H.) made me tiniest.
- N. Ok, A., what do you need on the boat or what do you need....
- A. What about your longest hair?
- H. Noooo.
- (A. laughed.)
- H. (Laughing) I want to be bald.
- A. Ok.
- N. What do you need for the boat?
- A. Water?
- N. Yes, I think so.
- A. The water up to here. Deep water (as he made the water).
- H. Up to his face.
- A. Up to my face.
- N. It's splashing all over, you must be paddling fast.
- A. Yeah, boom boom. Splashing all over.
- N. How 'bout if you put your name?
- A. The water.
- N. How 'bout if you put your name?
- A. Down here.
- H. (Response unintelligible).
- A. Why did you make dots for me so I know?

A. (27/1/76)

April 28, 1982

Symbol 3 - Continued

- N. Well because I thought you needed to know where to put your name. I guess you didn't.
- H. I'm going to do something.
(A. printed his name.)
- N. Ok, and this is number.....
- A. One, two.
- N. No.
- A. Three.
- N. Right. Ok, do you have anything else that you want to put in here?
- A. Ok. The long hair for H. (said as he drew).
- N. I thought his hair went up this way.
- A. Some of it even going down.
- N. Why? What happened to his curly hair?
- A. It's still his hair.
- N. Oh, ok.
- A. Finished.
- H. I want a drink of water.
- A. Me, too. H., you wanna see yourself? You wanna see you.
- N. Show him when he gets back.

Symbol 4

- N. Ok, now a big or small piece of paper for your one more?
- A. Small piece of paper. (To H.) Look at you. You got long hair going down and long hair going up.

A. (27/1/76)

April 28, 1982

Symbol 4 - Continued

H. No that's you.

A. You.

H. You.

A. You.

H. You.

A. You.

H. You.

A. You.

H. You.

A. You.

N. Shh.

H. You.

A. You.

H. You.

A. You.

N. Ok, sit. Thank you. Ready for your last one?

A. Yeah (N. handed the symbol to A.). This time I'm not gonna do the same.

N. This time you're not going to do the same as what?

A. As the house and the sun.

N. (Laughed) Ok.

H. Do the same.

A. No.

H. I like it that way.

A. (27/1/76)

April 28, 1982

Symbol 4 - Continued

N. You didn't make this one the same either, did you?

A. Yep.

N. Oh no. What did you make this last time?

A. Boat (pause). A heart.

N. A heart.

A. There.

N. Well, now.

H. Have to make a story out of this.

N. Ok.

A. There.

H. Yeah.

A. Going back to the chimney (pronounced "chiminy").

H. Yep.

A. Back in (laughed).

N. The chimney's on the roof and what's the roof of?

A. Uhm, uhm, uhm, plastic, plastic.

N. The roof is of plastic or it is on plastic?

A. It's plastic!

N. Ok, what's is it on?

A. House, it's a building.

N. Building. Ok, what kind of building?

A. (To H.) What's that?

H. I made a (unintelligible) number one.

A. (27/1/76)

April 28, 1982

Symbol 4 - Continued

A. Why?

H. Because I want to.

N. That's number two, no that's number one, you're right.

A. There.

N. Ok, what else?

H. I should make.....

A. A little teensy door.

N. Oh A. Ok, anything else?

A. Nope.

N. Aw, what can you tell me about this?

A. It's a house and this is a.....

H. I'm gonna do two more.

N. And this is a.....

A. Tent.

N. A what?

A. A tent.

N. A tent. Oh well, that is different from the second time.
Ok, who's in the tent? Who is living in the tent?

A. Uh.....H. and me. This is your side and this is my side.

(N. laughed.)

H. That's me little. Make yourself real teensy, ok?

A. No.

H. Yeah.

N. Big.

A. (27/1/76)

April 28, 1982

Symbol 4 - Continued

H. No.

(A. and H. made noises while drawing.)

N. Who is this?

A. Me.

N. Well, your head's almost bursting out of the tent.

A. (Laughed) ooch, ooch, ooch.

H. How 'bout arms?

A. Ooh, arms.

H. You need some arms.

A. Awow (laughed as he made large arms).

N. Ok, now seriously, what are you going to get with this great long arm?

A. The house, go like this ahow (made a grabbing motion).

N. Why do you want to grab hold of the house?

A. 'Cause I want to smash it on H. (laughed).

H. (Response unintelligible).

N. Why are you in the tent instead of the house?

A. Because I like the tent better. I live in the house and the tent. Richard, this is you real teensy in the house.

N. What about the tent, why do you like it better?

A. Because tent's nice.

N. So what about the tent is nicer than the house?

A. It's cooler.

N. Why is it cooler?

A. (27/1/76)

April 28, 1982

Symbol 4 - Continued

A. 'Cause it's outside and it's got holes in it.

N. What kind of holes?

A. Big giant holes.

N. If it has holes what's going to happen if it rains?

A. H. gonna get cold.

H. No, I'm gonna hide under your legs.

N. There's a.....there's a hole on your side too so what's going to happen to you?

A. It's not gonna rain on me.

N. Why?

A. 'Cause it's not a hole.

N. What is that?

A. Uhm a.....

H. And I'm gonna smash you with that axe.

N. Well you already had.....

(An undecipherable conversation occurred between H. and A.)

N. Can you put your name here, please?

A. A, oosh, oosh, oosh, oosh, oosh, oosh.

N. And what is this?

A. A two, a four.

N. Right. Ok.

S. Hey can I do one now?

N. All done. (To S.) Well you know what, it's time for snack now. You didn't have snack outside, did you?

Transcription of the First Session

T. (21/10/77)

February 26, 1982

Dot-line

N. Can you write your name? Can You?

(T. printed his name.)

N. Ok. Can you put a number one right there?

(T. put number one on the paper.)

N. Ok. Now what I'm going to do (pause) I'm going to put a dot, here, you need this pencil. I'm going to put a dot here and I'm going to put a dot there and I want you to draw a line between the two dots, connecting the two dots.

(T. connected the first and second dot. N. made the third dot.)

N. Ok. From this dot, start at this dot.

(T. connected the second and third dots. N. made the fourth dot.)

N. From this dot and go over to that one.

(T. connected the third and fourth dots. N. made the fifth dot.)

N. That's it. Ok.

(T. connected the fourth and fifth dots. N. made the sixth dot.)

N. And this dot.

(T. connected the fifth and sixth dots.)

N. Whoa, you made a wavy line. Ok. (N. made the seventh dot) this dot. Always start at the very last dot. That's it.

(T. connected the sixth and seventh dots. N. made the eighth dot.)

N. Ok.

(T. connected the seventh and eighth dots.)

T. (21/10/77)

February 26, 1982

Dot-line - Continued

- N. And...(N. made the ninth dot.)
(T. connected the eighth and ninth dots.)
- N. Ok. (pause) Now, I'd like you to put numbers at the dots.
Ok? So we started with this one, this is number one. Can
you put a one there?
(T. put a one.)
- N. And this is number.....?
- T. Two. (T. made a two.)
- N. Right. This is number.....?
- T. Three. (T. made a three.)
- N. Fine.
- T. Four. (T. made a four.)
- N. Uh huh.
- T. Five.
- N. Ok. Make a five.
(T. made the rounded portion of the five.)
- N. Ok, and you need a top on it. That's it.
(T. finished the five.)
- N. Ok. And then we go to this one. What's that?
- T. Number six. (T. made a six.)
Number seven. (T. made a seven.)
Number eight.
- N. Where's number eight?
(T. pointed to the dot and made an eight.)
- T. Nine. (T. made a nine.)

T. (21/10/77)

February 26, 1982

Symbol 1

- N. Ok. Now we have another paper. We're going to do another game now, ok? And you can use either the big or little paper. Which one would you like to use? Either of these two.
- T. This (pronounced "Dis").
- N. The big one? (pause) Now, the way we're going to do this drawing, I'm going to make a shape on this paper. Then I want you to look at it and then I want you to make something out of it, ok, or do something with it. Alright.
- (T. nodded his head.)
- N. Ok. So I'm going to make (N. made the symbol on the paper) that kind of shape.
- A. What's that?
- N. I don't know, whatever T. makes it. What can you do with that?
- T. Draw. Aw. (T. drew a line and closed the figure.)
- N. What else can you do with that?
- T. Triangle.
- N. Whoops, you're pencil's getting away from you.
- (T. continued drawing.)
- N. There's one triangle. (pause) Ok. What else can you do with it?
- (T. added more to his drawing.)
- N. Can you do anything else with it? (pause) You made lots of corners there. Can you do anything else with it? Do anything else with it? (pause)
- T. There, a triangle.
- N. Ok. Here you want to blow your nose?
- T. (Continued adding to his drawing) There, I make a hat.

T. (21/10/77)

February 26, 1982

Symbol 1 - Continued

- N. You made a hat. And this is a triangle over here. Yeah? Anything else you can do?
- T. Square, circle. Moon.
- N. A moon. That a moon too?
- T. (Unintelligible) There.
- N. Can you tell me about your picture that you made?
- T. Moon and moon, circle and hat. Square.
- N. Who's wearing the hat?
- T. Uhm. M _____ H _____.
- N. M _____ H _____ 's wearing the hat? Ok. Well, I don't see M _____ H _____ 's face there.
- T. (T. began drawing her face.) There (as he finished).
- N. She's got a big smile on her face but that hat looks as if it'd cover her whole body. (pause) Would it? Yeah? (pause) What else can you tell me about your picture?
- T. That.
- N. What is that? Can you tell me?
- T. Moon.
- N. Is M _____ H _____ outside her house at night? Is she outside her house at night?
- (T. nodded yes.)
- N. I wonder where she's going.
- (T. added more to his drawing including some slanted marks.)
- T. Raining!
- N. Raining. Ok. (pause) I wonder if all of these are going to get wet. (pause) Hum. They are? What else can you tell me? It's raining and it's night and M. H.'s there

T. (21/10/77)

February 26, 1982

Symbol 1 - Continued

- N. with a hat on.....and you've got a moon. Is there anything else you can tell me about your picture?
- T. Morning.
- N. Alright. I'm going to put raining, I'm going to put morning. What do you do, what does M. H. do in the morning?
- T. Brush our teeth.
- N. What else does she do in the morning?
- T. Go outside.
- N. Eh?
- T. Go outside.
- N. Ok. What does she do outside?
- T. Playing.
- N. (Pause) You know what I'm writing?
- T. (Watched N. print word) Hat.
- N. That's right, hat. And this is.....?
- T. M_____. H_____.
- N. Ok. Can you write your name on these now?
- T. (Printed his name) My (unintelligible) name (unintelligible).
- N. And can you put number one right there?
(T. put a one on the paper.)

Symbol 2

- N. Ok. Now would you like a big or a little piece of paper for the next one?
- T. Little.

T. (21/10/77)

February 26, 1982

Symbol 2 - Continued

N. The next sheet..... You ready for this one.....ok?

T. (Looked at symbol) Number one.

N. Yeah, it looks like a number one, doesn't it? What could you make out of that number one?

T. Three.

N. Ok. Go ahead.

T. Bigger.

N. A what?

T. Bigger.

N. It's a long line, isn't it? Ok. What else can you do with that?

(There was a conversation among the children who were watching and one child announced that it was clean-up time.)

N. You're tracing all of your lines again, aren't you? Can you tell me about your picture? (pause)

T. These are for water.

N. Oh I see and what's in the water?

T. Boat.

N. Where's the boat? I don't see it. (pause) That the boat? No? (pause) Is this water all over here too or is just this water?

T. All over here.

N. Where's the boat on the water? Where's the boat?

T. I don't know how to draw a boat.

N. Oh. I see.

(Another conversation with other children about clean-up time followed.)

T. (21/10/77)

February 26, 1982

Symbol 2 - Continued

- N. Ok. You finished with your picture? Ok. Can you put a number two (pause) right up here at the top?
(T. numbered the page with a two.)
- N. Ok. Can you put your name (T. printed his name) and can you tell me about your picture that you made?
- T. Triangle.
- N. There's a triangle and.....
- T. Water.
- N. Ok and what else? You said there was a boat.
- T. Boat?
- N. You said that boats go on the water. What else is in the water?
- T. Boats.
- N. Besides boats, is anything else in the water? (pause)
What's that? Can you tell me what that is?
- T. Rabbit.
- N. A rabbit in the water? Not walking on the water? Where's the rabbit then?
- T. Rabbit (pointed to his picture).
- N. Rabbit, water. Where is this water?
- T. Over here.
- N. Hum. I know. It's all around your picture, isn't it?
(Pause) Ok. Ready for another one?
(T. nodded his head.)

Symbol 3

- N. Big or little paper?

T. (21/10/77)

February 26, 1982

Symbol 3 - Continued

- T. Small.
- N. Hold on for a second. This time we're going to make (N. made the third symbol) that shape.
- N. Oh what can you make out of it?
- T. Make a heart.
- N. Looks kind of like a heart, doesn't it? Ok. Go ahead and make it.
- T. There (after closing in the shape).
- N. Ok. It's recording. Can you make anything else out of that heart? Can you do anything else with the heart? (pause) Anything else you can do with that heart?
- T. (The first word sounded like Christopher) Ghost. Ghost, its for ghosts. Look, hey look, it's for ghost.
- N. It's a ghost. Ok. It went from a heart to a ghost? Where's that uh ghost, where is that ghost?
- T. There.
- N. Where does he live?
- T. On to the monster house.
- N. Well do I see that monster house in the picture?
(T. shook his head.)
- N. Where is it?
- T. There.
- N. That's the monster house. Ok. What else can, what else....
- T. That's monster.
- N. Is it a monster now or is it a ghost?
- T. Mouth (pronounced "mouf").

T. (21/10/77)

February 26, 1982

Symbol 3 - Continued

N. Ok. What else?

T. There I finish.

N. Finished? Ok.

T. Write my name.

N. Yes, please write your name and what else do you need to do to the picture? (pause) You know what that looks like? It looks like your name is the ghost's mouth. Is it?

T. Ghost.

N. Ok. Now can you tell me what number that is? Three. Can you put a three on there?

(T. put a three on the paper.)

N. Ok. And what else can you tell me about your ghost? He lives in a monster house and he's got another little ghost. What's he going to do tonight?

T. Sleep.

N. Oh I see ok.

Symbol 4

N. For the last one do you want a large or small paper?

T. Big.

N. Ok. Now this one (pause) goes like (N. drew the symbol). Uh huh. What can you do with that?

T. (Unintelligible).

N. Ok. What else can you do with that? (pause) Anything else?

(T. put a four on the paper.)

N. You're right. It's number 4. Ok. Can you make anything else out of that?

T. (21/10/77)

February 26, 1982

Symbol 4 - Continued

T. An A.

N. An A, a little A?

(There was silence as T. continued drawing.)

N. What did you make there?

T. Circle.

N. Hum, looks like eyes.

(There was another silence as T. continued drawing.)

N. Can you tell me about your picture?

T. Monster.

N. It's a monster. Can you show me which part is the monster?

T. This.

N. This, this part right here, eh?

T. Monster eyes.

N. What's this on the monster?

T. Three eyes.

N. Three eyes. So the monster can see lots. What does he see out of those eyes?

T. He see monster.

N. Hum. Does he see other monsters? Can you tell me what your monster's doing?

T. Fighting.

N. He's fighting. Is that what you said? Who's he fighting with?

T. (Unintelligible)

N. I can't hear you. Can you say it louder?

T. (21/10/77)

February 26, 1982

Symbol 4 - Continued

T. He's fighting.

N. With?

T. Somebody.

N. Why's he fighting?

T. I don't know.

N. I see. Ok. You ready to go eat your snack now?

T. Yeah.

N. Yeah? Ok. Can you..... Whoops you need to put your name on this. You already put the four but you need to put your name on this.

(T. printed his name.)

N. Ok. Thank you very much T. Bye bye.

Transcription of the Third Session

T. (21/10/77)

April 28, 1982

Symbol 1

N. Ok, now we're going to do one picture and then you can ask M.H. to come back afterwards. Ok? Ok, do you want a big or a small piece of paper?

T. Small.

N. Alright, you can put that inside of it.

(T. placed the carbon in the paper.)

N. Ok now.....you ready? (N. drew the symbol and handed it to T.)

(T. used 9 seconds to close the figure.)

N. What else can you do with it?

T. Circle.

N. Ok.

T. There (after 17 seconds of making circles).

N. Ok, anything else?

T. Hey, taking M.H.'s (referred to a child using his friend's paper).

N. That's right, you're using M.H.'s paper. We'll give you another piece of paper.

O. Can I have one piece?

T. There.

N. Ok, anything else you can do with that? No? Ok, can you put your name?

(T. printed his name in 11 seconds using in a left-right direction.)

S.M. What's that?

N. Well, T.'s going to tell us as soon as he puts his name.

T. (21/10/77)

April 28, 1982

Symbol 1 - Continued

- N. Can you tell S.M. what you made there?
- T. (Lifted up the paper) Same.
- N. It's the same. Can you tell her what you made though?
- T. Circle.
- N. You made lots of circles, didn't you. Ok, here let's see if I've got this (as N. creased the paper). I'm not sure. Ok, see if you can tear it now. Alright. Oh, you know what we forgot?
- S.M. Haha the same (referred to the carbon).
- N. We forgot to put the number on here. What number goes on this one, do you remember?
- T. What number?
- N. Number one. Can you put one right there? Right there. Now we need to do a number two. You get to keep that one.
- T. There (after he finished tearing and numbering the paper).

Symbol 2

- N. Ok, now do you want a big or a small piece of paper for your second.....
- (T. pointed to the large paper.)
- N. Big one? Can you put this in (referred to the carbon paper)?
- T. Yep.
- N. Ok, are you ready?
- O. Can I do that?
- N. Uh, just a minute. Ok, ready? (N. drew the symbol and handed it to T.)
- T. Triangle.

T. (21/10/77)

April 28, 1982

Symbol 2 - Continued

N. Ok.

T. There (said after he closed the figure with a left-right diagonal and a right-left horizontal line).

N. Ok, what else can you do with that triangle?

T. Square. (T. made a square in 3 seconds.)

N. You made a square. Now what else can you do?

(In the 35 seconds which followed, T. made circles in the triangle and a diagonal line in the square.)

O. Look at his face.

N. He's got paint on it, hasn't he?

O. Sandwich (referred to T.'s square).

T. There (pronounced "der"). Sandwich.

N. A sandwich. What kind of sandwich? What's inside that?

T. (Indecipherable.)

N. Yeah, I see you made it and you cut it in half. What's inside the sandwich?

K. Is there meat inside the sandwich?

T. No, cheese.

N. Cheese, ok. What else do you put on a cheese sandwich?

T. Only cheese.

N. Just cheese, nothing else? You don't put anything on the bread?

(T. shook his head.)

N. So you have bread and cheese.....

T. I write my name.

T. (21/10/77)

April 28, 1982

Symbol 2 - Continued

- O. I'll write my name.
- N. Ok, so write you name and after you write your name, you have to put a number on. Do you know which number goes there?
- T. Two (as he made a two).
- N. Good for you.
- T. Three (as he made the three).
- N. Oh, ok because you've got three different shapes, right? And you've got a number two, you need to put a number two right in that corner.
- T. Two (as he numbered the page).
- N. Two, ok. So you've got a cheese sandwich and.....
- T. Triangle.
- N. That looks like a piece of pie.
- T. See the same (as he lifted the paper).
- N. Ok, I think you can rip it again.
- T. I like to take this one (pointed to the original).
- N. Ok, here. No, I need this one, ok?
- T. Why?
- N. Well because I need this one.

Symbol 3

- N. Ok, now do you want a big or a small piece of paper?
- T. Bigger.
- N. A bigger one, alright. Oh no, you use these bigger ones (as T. reached for the largest paper). Then maybe the very last one you can do a great big one, ok?

T. (21/10/77)

April 28, 1982

Symbol 3 - Continued

O. Me too. Look.

N. You know what T., I'm going to give you another piece of carbon paper and maybe that will help your picture come out. It'll make it darker.

T. (As he opened the paper) There put it in.

N. Well, just a second. I have to put the other pieces in.

T. There (as the carbon was inserted).

N. Ok, that should make your picture really dark.

T. Dark?

N. Dark.

T. What dark?

N. Dark is uh.....

T. Black.

N. Like that line. Yeah, black. Alright (as N. drew the symbol).

T. Heart.

N. Ok.

T. (T. closed the symbol in 5 seconds.) There.

N. Can you do anything else with that heart?

(T. shook his head.)

N. Oh, I bet you can.

(T. used 10 seconds to put a continuous line inside the heart.)

N. You made a design inside your heart. What else can you do to it?

T. Nothing. Can't do.

T. (21/10/77)

April 28, 1982

Symbol 3 - Continued

- N. Oh, I bet you can. I wonder who that heart is for?
- T. For valentine.
- N. Ok, are you going to decorate your heart anymore then if it's for valentine's?
- T. There (after he made another line).
- N. Ok, who are you going to give the valentine to, the heart to? (pause) Hum?
- T. Store.
- N. You get it at the store. Are you going to give it to anybody?
- (T. shook his head.)
- N. No?
- T. I keep it.
- N. Oh, you're going to keep it. Ok, can you tell me what design you made in there.
- T. Face.....
- N. Face?
- T. and a hat.
- N. And a hat. Oh, I wonder where the eyes are.
- T. This is the eye (as T. made a circle).
- N. Oh, ok and I wonder where the mouth is.
- T. This is (pointed to the horizontal line).
- N. That's the mouth. I wonder where the nose is.
- (T. made a vertical line on the outside of the face.)
- N. Oh, that's the nose on the outside. Ok, whose face is this?

T. (21/10/77)

April 28, 1982

Symbol 3 - Continued

T. I don't know.

N. Ok, you need to put a number down here though.

T. What number?

N. Well you already did a two, so what would this one be?

T. One.

N. Three. You need to put.....this is a number three, the third picture you've drawn.....

M.H. I want another paper.

T. There (after he made the three).

N. Ok and.....

T. I want to make my, make my like M.H.'s.

N. You want to make a big one like M.H.'s? Ok, we well, after you do one more then you can use a big one, a great big piece of paper, ok?

T. Fix it (said after he ripped the paper).

N. Hey, you did a good job of ripping that. Oh, not yet (as T. reached for the large paper).

Symbol 4

N. Ok, now for the other picture like this, do you want this size, a small one or a large one?

T. No, like M. Make like M.H.

N. Well you'll have to have one of these two first. Do you want the bigger one of the two?

(T. nodded his head.)

N. Ok.

T. Put in (referred to the carbon).

T. (21/10/77)

April 28, 1982

Symbol 4 - Continued

- N. Ok, you ready? Going to (indecipherable) things, ok?
- T. Hey you write on. (T. used 14 seconds to close the figure in a right-left direction.)
- N. Ok, what else can you do with that?
- O. Can I do some more?
- T. Make another line.
- N. Oh, look what he did.
- T. There.
- N. Anything else you can do?
- T. (Made lines for 10 seconds) There.
- N. Anything else you can do with this, T.?
(T. continued drawing for 8 seconds and looked around.)
- N. Oh nobody's lost. M.H. was there. Anything else you can do with that?
- T. There finished.
- N. Ok, now what goes here?
- T. Three.
- N. That's your fourth picture.
- T. Two.
- N. You put a four there.
- T. Four?
- N. Four.
- T. There (as he made the four).
- N. Ok, now can you tell me about what you made?

T. (21/10/77)

April 28, 1982

Symbol 4 - Continued

- T. (As T. lifted the paper) Uh oh.
- N. Look how much blacker that is.
- T. Hey (pointed to an extra line).
- N. Yeah, how'd that line get in there?
- T. There (as he compared it the original).
- N. How'd that happen? Must have been your pencil that came across. Can you tell me what you made there? Can you tell me about your picture?
- T. I don't know.
- N. You don't know? Looked as if you were making this letter in there.
- T. Yeah.
- N. Ok, can you tear it apart now?
- T. It's broken. (T. ripped the paper apart) There. I gonna keep this one, please.
- N. Well actually I'll keep this one and you can keep this one. You know why? You know how that extra line got there? Cause you had your pencil scraped across the paper and you made it with this. This part of your pencil scraped across the paper. (pause) Ok, you want this big paper now?
- (T. said he wanted to do "number" and indicated the dot-line.)

Transcription of the First Session

T.P. (21/4/77)

February 26, 1982

Dot-line

- N. Here's one dot, here's another dot. Can you draw a line that goes like this?
- T.P. Ok (as she connected the first and second dots).
- N. Ok. Next dot here, from there to there.
(T.P. connected the second and third dots. N. made the fourth dot.)
- N. Go from this dot to this dot.
(T.P. connected the third and fourth dots. N. made the fifth dot.)
- N. Ok. From this dot.
(T.P. connected the fourth and fifth dots. N. made the sixth dot.)
- N. Ok. And another one. That's right.....that's the dot.
(T.P. connected the fifth and sixth dots. N. made the seventh dot.)
- N. Ok. This dot. My fingers were in the way, weren't they?
(T.P. connected the sixth and seventh dots. N. made the eighth dot.)
- N. Start from this dot.
(T.P. connected the seventh and eighth dots.)
- N. Ok.....and (N. made the ninth dot) this dot.
(T.P. connected the eighth and ninth dots.)
- N. Ok. Can you write your name on there? I'm going to zip up the back of your shirt.
(T.P. printed her name.)
- N. Ok. And can you put a number one right there?

T.P. (21/4/77)

February 26, 1982

Dot-line - Continued

(T.P. made a one.)

N. Can you put a one right by that dot?

(T.P. put a one.)

N. Ok. And can you put a two there?

(T.P. made a six.)

N. Ok. Can you put a three there?

(T.P. made a "T".)

N. Ok. Can you put a.....what comes here do you know?
What comes after three?

(T.P. made an "O".)

N. Ok. And, that's four, and what comes after four? What's
this one? Five?

(T.P. made an "h".)

N. Ok. That's a number six. Can you put a six there?

(T.P. put a "P".)

N. You know what, you're putting, you're spelling your name
all the way around there, aren't you. Yeah? Ok. What
comes after six, do you know? Seven. Can you put a.....,
over here, this one.

(T.P. put an "O".)

N. And this is eight.

(T.P. made a "g".)

N. And this is nine. Can you put a nine there? Right by
that dot.

(T.P. put a "P".)

N. Ok. (pause) Ok. Now I'm going to..... We need to.....
Can you give this to K.? This one here. Can you give this

T.P. (21/4/77)

February 26, 1982

Dot-line - Continued

N. paper to K.?

Symbol 1

N. Now for the next one we're going to do four more drawings. Which paper would you like to use? Which size, the big or the little?

T.P. Bigger (pronounced big-ger).

N. Ok. Bigger. (pause) Ok. I'm going to draw a shape on here and then I want you to make something out of it, ok? Hold on just a second and let me draw the shape. (N. drew the shape and handed the paper to T.P.) Ok.

(T.P. repeated the symbol.)

N. Can you do something else with it?

(T.P. nodded.)

N. Ok. What else can you do?

(T.P. reproduced the symbol again.)

N. Anything else?

(T.P. nodded.)

N. Ok. What else? Anything else? No? Can you tell me about your picture? (pause) What's your picture about?

T.P. T _____ P _____

N. T _____ P _____. Ok. Can you write T.P. here?

(T.P. nodded.)

N. Ok. Go ahead. Put your name here.

(T.P. printed her name.)

N. Ok. Put a number one.

(T.P. made a one.)

T.P. (21/4/77)

February 26, 1982

Symbol 2

N. Ok. Now.....which one would you like, a big or small one?

(T.P. pointed to the small paper.)

N. A small one? Ok. This time I'm going to make a different shape. I'm going to go like this. What can you do with that?

(T.P. repeated the symbol. She continued to repeat the symbol in response to each further enquiry.)

N. Ok. Can you do anything else with it? (pause) You made a lot of lines. Can you make something else besides lines with it? Ok. What else can you do? Can you do something else with it? Ok. Can you write T.P.?

(T.P. printed her name.)

N. And we need, can you make a number two? Do you know how to make a number two?

(T.P. put a one on the paper.)

N. Can you tell me about your picture?

(T.P. nodded.)

N. What?

T.P. (Whispered) Square.

N. Square?

Symbol 3

N. Ok. Big or little paper?

T.P. Big-ger.

N. Big. Alright. (N. drew the symbol on the paper and handed it to T.P.)

(T.P. repeated the symbol drawing from right to left.)

T.P. (21/4/77)

February 26, 1982

Symbol 3 - Continued

N. What else can you do with it?

T.P. Square.

N. Can you do something else with that shape?

(T.P. repeated the lines.)

N. Oh look. You made a little teensy corner there, didn't you? Can you (pause) make some other kinds of lines besides these?

(T.P. drew a line following the shape of the symbol starting on the right side, across the top and down the left side.)

N. Ok. You went around it, didn't you? Can you do anything else with it? Can you tell me about your picture? (pause) What did you make?

T.P. Tri-angle.

N. A triangle? Ok. Guess what I want you to do now?

T.P. (Whispered) Circle.

N. What do you need to put here? That's a number. What about your name?

(During a long pause T.P. printed her name.)

N. Ok. And can you put a number three on there?

(T.P. put a one.)

Symbol 4

N. Ok. Now for the last one, what size paper do you want?

T.P. Small.

N. Ok. Do you need your chair scooted up further?

T.P. Triangle.

T.P. (21/4/77)

February 26, 1982

Symbol 4 - Continued

N. Ok. Do you want me to scoot your chair up this way (used gestures to indicate the meaning)? Yeah? Ok.
Ok. Whoa, wait just a second. Ok. You ready? I've got to get my pencil. It's ok. You can keep it on there.
(N. drew the symbol and handed it to T.P.) What can you make out of that?

(T.P. repeated the symbol.)

N. You know you said that you could make a triangle. Can you make a triangle out of that? How could you do that?
(pause) Can you look at this and see how you can make a triangle? Can you look at it and see..... (pause)
Ok. What if I go like that (covered up the rounded part of the symbol)? What can you make out of that? (pause)
You remember making lines before with me, don't you? Go ahead.

(T.P. repeated the symbol.)

N. You all done? Can you write your name?

(T.P. printed her name.)

N. Ok. And can you put a four on there?

(T.P. put a one on the paper.)

N. That's part of it and the other part goes like that and that's a four. Ok. Can you tell me about your picture? What? Can you tell me what you did with this? What?

T.P. Triangle.

N. Ok. And that's what I'll write.

Transcription of the Third Session

T.P. (21/4/77)

April 28, 1982

Symbol 1

N. Ok, would you like a large or a small piece of paper?

T.P. Small.

N. Small, ok.

S.M. When I do too, do small paper to small paper, too.

N. (To S.M.) Are you going to do a small paper too when it's your turn?

S.M. Uh huh.

N. Ok, whoops, we need to fix it so it won't fold over (referred to the carbon paper). See how it bent there? Ok, you ready? (N. made the symbol and handed it to T.P.) There you go.

(For 40 seconds, T.P. repeated the symbol using a left-right movement.)

N. Ok, can you do anything else with this? Can you do anything down below with it?

(In the 9 seconds that followed, T.P. used a rectangular shape to close the figure.)

S.M. That look like a heart. Oh, oh.

N. Ok, what else can you do with it now?

(During the 55 seconds which followed, the following conversation occurred as T.P. drew vertical and horizontal lines within the rectangle.)

S.M. Bed.

N. Looks kind of like a bed, doesn't it?

S.M. A bed.

N. Yeah, it does look kind of like a bed. (pause) Makes an awful lot of lines. (pause) Ok, can you do anything to the top of it here? Anything at all?

T.P. (21/4/77)

April 28, 1982

Symbol 1 - Continued

(T.P. printed her name in a left-right direction.)

N. Ok, T.P., can you tell me about what you've done? Can you tell me about your picture? (pause) What can you tell me about it? You can put a number. Ok, can you tell me anything else about what you've done? What?

T.P. Lie.

N. It's lines? Yeah, you've got lots of lines, haven't you? Let's make the crease really sharp so you can tear it apart.

S.M. Now you gone rip it off.

N. Ok, now this is yours to keep and this is mine.

Symbol 2

N. Ok, do you want a big or a small piece of paper?

S.M. Bigger.

T.P. Bigger.

N. How come your mouth answered when I asked T.P., huh?

(S.M. laughed.)

N. Ok, you can put this piece of paper in too, T.P. Ok, whoops wait, hold it a second. Ok, you ready for this one? What can you make out of that (as N. made the symbol and handed it to T.P.)?

S.M. This way T.P. (as S.M. crossed the line with her finger).

N. Huh? (unintelligible)

(A conversation about clothes followed with S.M. as T.P. spent 43 seconds crossing and repeating each line.)

N. Look at that. That looks almost like an animal. Can you tell me what you've done? Or can you do anything else with it? Look at that. Ok, what else can you do now?

(The following conversation occurred as T.P. continued to

T.P. (21/4/77)

April 28, 1982

Symbol 2 - Continued

repeat the symbol using short lines for 24 seconds.)

S.M. I know what you're doing with that.

N. She's making lots of little short lines now, isn't she?
Ok, can you tell me what you've done?

S.M. Make her name.

N. Yeah, she printed her name, didn't she, or she's printing her name. (pause) (To S.M.) Well, you know what, as soon as T.P. is finished with this and puts a number on it then it will be your turn to do one. (To T.P.) Ok T.P., just a second, just a second (as N. creased the paper).

S.M. Rip them.

N. Ok T.P., now S.M. is going to do one with me and you can stay right where you are because you're going to do one after.

M.S. (To T.P.) Can you show me what you made? How 'bout this, there are lots of lines here?

T.P. Bed.

M.S. Where would your head sleep, where would you put your head?
(T.P. pointed to one side of the rectangle.)

Symbol 3

N. T.P. what size paper do you want for your drawing?

T.P. Small.

N. Small ok. (To S.M.) This one you get to keep. This one you get to take home.

S.M. Miss. S. can take it.

N. Well, I've got one for her. (To T.P.) Ok, now (made the symbol) you're right, you've got to have the pencil, don't you? (N. handed the symbol to T.P.)

T.P. (21/4/77)

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Symbol 3 - Continued

(T.P. spent 37 seconds repeating the symbol and colouring it in.)

N. You're colouring it all in, aren't you? (pause) Can you tell me what all those lines are?

(T.P. continued adding to the left side of her drawing for 23 seconds.)

N. What else can you put on there?

(For 35 seconds T.P. made additions to her picture which resulted in a circular form attached to the left of the line, a small rectangle attached to the top of the semi-circle, a small circle, and a smaller shaded circle inside the larger one.)

N. You've got lots of things in your picture, I wonder what you could have drawn.

(T.P. gave no response.)

M.S. What's this, T.P.?

T.P. Hat.

M.S. A hat. Oh, and this?

T.P. Eyes.

M.S. What is all of this?

T.P. Mouth.

M.S. That's a mouth.

N. I wonder what this is. Who's got an eye, a mouth and a hat? Who has all of that? Is this a person?

(T.P. nodded.)

N. It is? Well, I wonder what that person is doing?

T.P. Big mouth.

N. He's got a big mouth, that's right. Is he saying something?

T.P. (21/4/77)

April 28, 1982

Symbol 3 - Continued

(T.P. nodded.)

N. What's he saying?

T.P. Eye.

N. He's got big eyes. Does he see anything with those big eyes? Oh, you're making the eye even bigger. That's a huge eye. I wonder what he can see from that eye. (pause) What's this?

T.P. Bigger eye.

N. Bigger eye. What does he use that eye to see? What does he see from that eye?

T.P. Big things.

N. He sees lots of big things? What kinds of things does he see.....?

T.P. Small eye, big eye.

N. I wonder what he's saying when he's talking? I wonder what he would say to you? Would he say "T.P."?

(T.P. nodded.)

N. What else would he say to you?

(T.P. gave no response.)

M.S. Are you finished now?

N. No, one more.

M.S. (To T.P.) I'd love to see another one.

N. You fixed that up, didn't you (as T.P. made the crease in the paper)? Ok, that goes on your pile there.

Symbol 4

N. Ok, do you want a large or small paper for your last one?

T.P. (21/4/77)

April 28, 1982

Symbol 4 - Continued

T.P. Bigger.

N. A bigger paper, ok. Ok, now you ready for this one?

T.P. Yeah.

N. Ok (made the symbol and handed it to T.P.)

(During the next 1:13 minutes, T.P. repeated the symbol above the original and coloured in the space.)

N. Ok, I wonder if you can do anything else with that..... besides your name (said as T.P. began to print her name).

(T.P. finished her name and looked up.)

N. T.P., can you draw something else with this? Can you draw something else? What about down here, can you make something else like you did your other one?

(In 3 seconds T.P. closed the figure.)

N. Ok, can you make anything else down there?

(In 19 seconds, T.P. made two circles in the humps of the figure.)

N. You've got two circles. How about that. Can you do anything else with that now?

(During the next 42 seconds, T.P. added a large rectangle to the bottom of the figure, added lines and large and small circles within the rectangle, and extended the outside vertical sides downward.)

N. You've got big circles and little circles. Can you tell me what this is?

T.F. Eye.

N. And what are these?

T.P. The mouth.

N. Oh, I see. And what's this, what are these?

T.P. (21/4/77)

April 28, 1982

Symbol 4 - Continued

T.P. Nose (pronounced "no").

N. Ok, is this a person? Is he?

(T.P. nodded.)

N. I wonder where he is. I wonder where this person is.

T.P. Eyes, mouth, nose.

N. He's got eyes, mouth and nose. Is he at home?

(T.P. nodded.)

N. Is he? What's he doing at home?

T.P. Cold (said as she wrapped her arms around her body).

N. He's cold? How can I tell, how can you tell he's cold?
(Pause) What made him cold? (pause) Is he cold because
he doesn't have a jacket on? No.....what?

T.P. No jacket.

N. He doesn't have a jacket. No jacket, eh? Is it cold in
his house?

(T.P. nodded.)

N. What could he do to make it warm?

(T.P. gave no response.)

N. This is his nose? Is he holding his arms, is he squeezing
himself with his arms? When you said he was cold, you
went like this (N. wrapped her arms around her body). Is
he doing that too?

(T.P. nodded.)

N. Where are his arms?

(T.P. placed arms straight out from each side of the
rectangle.)

N. Ok, is he with anybody else at home? Yeah? Who else is

T.P. (21/4/77)

April 28, 1982

Symbol 4 - Continued

N. there with him?

T.P. No one there (pronounced "dere").

N. Hum?

T.P. No one there.

N. No one's there? He's all by himself, eh? Can you tell me anything else about what he's doing?

(T.P. shook her head.)

N. You don't know what he's doing, ok. You know what, you put lots of things in your picture today. It's really nice. You already put a number one, can you take it apart?

M.S. What are these on the bottom? What are those?

T.P. Foot.

N. His what?

T.P. Foot.

N. His foot, eh.

(T.P. tore the paper apart.)

N. Thank you very much. You did lots of drawing today. Can you put this paper clip on them?

Transcription of the First Session

N.A. (27/1/77)

March 3, 1982

Dot-line

- N. I want you to draw a line between them, ok, like this.
Then draw a dot here and I'm going to draw a dot here
and I want you to draw a line from this dot to that dot.
(N.A. connected the first and second dots.)
- N. Ok. (N. made the third dot.)
(N.A. connected the second and third dots.)
- N. Ok.....and that dot. No, start with this dot.
(N.A. connected the third and fourth dots.)
- N. (To T.P.) You did that too, didn't you?
(To N.A.) Ok, and that dot starting with this dot.
(N.A. connected the fourth and fifth dots.)
- N. Ok, and another one. That's it.
(N.A. began her line at the fifth dot and connected it to
the sixth dot.)
- N. Ok, and another one.
(N.A. connected the sixth and seventh dots.)
- N. Ok. Now can you put a number one here? Do you know how
to make a number one? Can you put a one there?
(N.A. made a one.)
- N. Number two there?
(N.A. made a two.)
- N. Then what's this one? What comes after.....three.
Can you put a three?
(N.A. made a four.)
- N. Ok. Can you put a number four here? (pause) Would you
like for me to make a four for you?

N.A. (27/1/77)

March 3, 1982

Dot-line - Continued

(N.A. nodded. N. made a four.)

N. Ok. What's this one? Do you know what comes after four?
(Another child answered.) Right. Can you make a five or
do you want me to?

(N.A. indicated N.)

N. Me? Alright. Ok and what's this one. (A friend answer-
ed six.) This one? (Same friend answered seven.)
Can you.....do you know how to print your name? No?
(N. printed N.A.'s name.) Ok. Now can you put a number
one on that page, right there? A number one right there.

(N.A. numbered the page.)

N. That's it. Ok.

Symbol 1

N. Now for the next one, I want you to.....we're going
to draw..... (conversations with observers).

I want you to draw a picture now and you can use either a
big paper or a small paper. Which one do you want to use?

(N.A. pointed to the small paper.)

N. Which one is this? Small one. Now, what I'm going to do,
I'm going to draw this shape on here (drew first symbol)
and I want you to see what you can do with it. Anything
you want to do with it.

You can look at it, turn it around.....Can you turn it
around, ok.

(Twelve seconds elapsed while N.A. turned the paper around
and looked at it.)

N. Anything you want to do. You can draw any kind of lines
on it you want.

(Fourteen seconds elapsed as N.A. looked at the symbol.)

N. Can you think of anything at all? No? Ok, let's turn it

N.A. (27/1/77)

March 3, 1982

Symbol 1 - Continued

N. around like that.

(A 12 second pause elapsed as N.A. considered the symbol.)

N. Can you think of anything to do with it at all? Ok we'll come back to that one later.

Symbol 2

N. Ok, for the next one do you want a big or a small piece of paper?

N.A. Bigger.

N. Bigger.

(N. had a conversation with another child in N.A.'s class.)

N. Ok. I'm going to draw (made second symbol) that shape. Now what can you do with that? Aw go ahead. You can do something with it.

(A 10 second pause followed as N.A. considered this symbol.)

N. Anything at all. Anything you can think of you can do with it? Ok.

(A 9 second pause)

N. What do you think you can make out of that?

(A 15 second pause)

N. Any ideas?

(A 16 second pause)

N. Maybe if you put your pencil on there and just started drawing.....I bet if you put your pencil on there and start drawing you can think of something. Why don't you just put your pencil down on the paper and see what you can do with it?

(A 19 second pause)

N.A. (27/1/77)

March 3, 1982

Symbol 2 - Continued

N. Want to try another one?

(After a conversation with the observers, it was decided to have another child complete a symbol to see if N.A. would then respond to the symbols.)

N. (To T.P.) Ok. Would you like to try one for us? Ok. T.P. will do one for us too, ok? Let's see what we can do with you, T.P. What about (drew a symbol not included in this study) that shape? What can you do with that?

(Twelve seconds elapsed as T.P. repeated the symbol.)

N. Can you do anything else with it?

(T.P. continued to repeat the symbol for 11 seconds.)

N. Ok. Can you tell me about what you made? No? Ok. You can take that one.

Symbol 3

N. Ok. Do you want a big or small paper, N.A.?

N.A. Small paper.

N. Small one. (A short conversation with another child followed.) Ok. This one is like, leave that alone please, like that (drew symbol 3) that.

(Forty-eight seconds elapsed as N.A. repeated the symbol.)

N. Can you do anything else with it now? What if you turn it around like this? Can you do anything with it that way? Ok.

(Twenty seconds elapsed as N.A. repeated the symbol and enclosed the symbol and lines with a line following the symbol shape.)

N. Ok. Are you finished? Can you put a number three on this one? Do you know how to make a three?

(N.A. made a triangular shape for a three.)

N.A. (27/1/77)

March 3, 1982

Symbol 3 - Continued

- N. And can you tell me uh about what you've done? Can you tell me about what you've made, how you made it? No? Ok. (N. gave N.A. the carbon copy of the symbol.) That's for you to take. Two more, ok.

Symbol 4

- N. Ok, for this one do you want a big or small paper?

N.A. Small.

- N. Small paper. (N. conferred with observers.) Ok. I'll put this one over here for just a second, ok? Alright, now this one.....this shape (made fourth symbol) like that. (N. handed symbol to N.A.)

(N.A. spent 47 seconds repeating the symbol.)

- N. Ok. I wonder if you can make lines anywhere else on that, can you?

(N.A. spent 18 seconds repeating the symbol with one continuous line from left to right and right to left.)

- N. (Turned the paper around) What if I do that? Can you think of anything else you can do with it? (pause) What do you think you can do with that?

(N.A. looked at the symbol.)

- N. Ok, go ahead. Ok. (pause) You almost finished with that one? Ok. Now this is a four and this is your name (said while numbering the paper and printing N.A.'s name). What do you think is going to be underneath here? What do you think? Do you think that's the same one? Ok, that's for you (gave N.A. the carbon copy).

Symbol 2 - Second attempt.

- N. Now really fast, what can you do with that one?

(N.A. spent 34 seconds enclosing the symbol in a continuous line.)

N.A. (27/1/77)

March 3, 1982

Symbol 2 - Second attempt.

N. Can you do anything else with that line, besides go back and forth over it? Can you make any other lines? Nope?

(Five second pause)

N. Are you almost done? (pause) You're making that quite wide aren't you? And it's long too. Ok. Can you put a two on here?

(N.A. made an "e".)

N. Alright. Ok, we'll put your name. Can you tell me about what you made?

(N.A. didn't respond.)

Symbol 1 - Second attempt.

N. Ok. We have just one more to do. There you go.

(N. handed the symbol to N.A. who enclosed the symbol in a continuous line during a 48 second period.)

N. Ok. You done? Ok. Could you tell me about this picture? Can you tell me about what you've done here?

N.A. Five.

N. A five, ok. Is that what you said, a five? Can you put a one right there?

(N.A. numbered the page.)

N. And I'll put your name (wrote N.A.'s name). Turn around and see what the kids are doing. What are the kids doing? (N. gave N.A. the carbon copy of her symbol.) Go have snack and take these with you. Take your pictures with you. Thank you for drawing for us.

Transcription of the Third Session

N.A. (27/1/77)

April 28, 1982

Dot-line

N. A dot here and a dot there. Please draw a line connecting them, put one to the other.

(N.A. connected the first and second dots.)

S.M. She just making it the same like mine.

N. Well, we'll see if it's the same as yours, ok?

O. Same like me.

N. And another dot, from this one.

(N.A. connected the second and third dots.)

S.M. See, that's not the same. Ha! That's not the same.

N. It may be because I'm putting the dots a different place. Down it comes (said as N.A. connected the third and fourth dots).

S.M. That means the same, ha, ha, ha.

N. Same?

S.M. Yeah.

W. I did it.

O. Star.

S.M. That's not a star.

O. Yes.

N. (To N.A.) What do you think it is?

(Three second pause)

N. Ok. This is a one. Can you put a one there?

(N.A. numbered the dot.)

W. Now what happens?

N.A. (27/1/77)

April 28, 1982

Dot-line - Continued

S.M. One strike.

N. Ok, do you know what this is? Two (both W. and S.M. answered).

N. Ok, and then what's this?

(Another said five and S.M. said three.)

N. Ok, let's see if N.A. can tell me. (To N.A.) What is this?

(W. answered six and S.M. said four.)

N. Ok, this is a number.....?

S.M. Five.

N. Five. And this is a number.....?

(S.M. said six and W. answered number seven.)

N. This is six. (To N.A.) Do you know how to make a six? (N.A. shook her head.) Draw a line like this and then make a little circle at the bottom.

(N.A. made a six.)

N. Ok, and this is a number.....?

N.A. Seven (as N.A. made a seven).

N. Ok. Can you put your name on here?

(N.A. used 24 seconds to print her name.)

N. And this has a.....number one. Ok, now, I'm going to do a picture with you and then S.M. will do a picture, ok?

Symbol 1

N. What size paper do you want?

N.A. Small.

N. Small? Ok and we have some super duper carbon paper this time.

N.A. (27/1/77)

April 28, 1982

Symbol 1 - Continued

S.M. Super?

N. Super duper. It means that it's new and will make darker lines. (pause) If I can find the right size piece.

S.M. You wrong size. This. That's right size.

N. This is the right size. (To N.A.) Can you put this in between the pieces of paper? Ok, are you ready? Turn it this way and.....(turned the paper, drew the symbol and handed it N.A.).

(N.A. repeated the symbol moving from the left to right for 45 seconds that followed.)

S.M. S. Three.

N. It looks like a three, doesn't it?

S.M. 's better. Look like a "s". "S" like that.

N. Kind of looks like an "s". It's got one more hump though.

S.M. Two "s".

N. (To N.A.) Ok, is there anything else you can do with that? Any lines, anything you can do above it or on the sides? (N. pointed to the appropriate spots as she asked the question.)

(N.A. continued repeating the symbol during the 54 seconds which followed.)

N. Are you done? Ok, can you put your name right there?

(N.A. laughed as she printed her name in 23 seconds.)

S.M. N.....A.....

N. Ok, and can you put a one right there? And can you tell me anything about your picture?

S.M. "S".

N. (To N.A.) Can you tell me anything about your picture?

N.A. (27/1/77)

April 28, 1982

Symbol 1 - Continued

N.A. "S".

N. "S"? Ok, look at that! How'd you do that? (This was said as N.A. separated the paper.)

(N.A. smiled and S.M. laughed.)

N. Ok, so.....

S.M. Rip it.

N. I'll start it, you finish ripping it. Ok, I'll keep this one, you keep that one and we'll do one more with you and then one with S.M.

Symbol 2

N. So do you want a big or a small piece of paper?

N.A. Bigger.

N. Big? Put that inside (handed the carbon paper to N.A.). Make sure it's down though.

S.M. What a big drawing.

N. Ok, ready? Here's your pencil. There you go. What can you do with it?

(N.A. looked at the symbol for 11 seconds while S.M. used her finger to draw a line on N.A.'s paper to make an "x".)

N. She's doing something else with it.

S.M. Go!

(N.A. made an "x".)

S.M. Haha. "X". Excellent.

N. What else.....

S.M. Excellent.

N. What else can.....excellent? "X" for excellent?

N.A. (27/1/77)

April 28, 1982

Symbol 2 - Continued

S.M. Yeah.

N. What else can you do with that "x"?

(A 2 second pause followed as N.A. looked at the symbol.)

Can you do anything else with it?

N. (To S.M.).....It's her turn. (pause) It's N.A.'s turn. Let her see if she can do anything with it. (To N.A.) You can turn it around and see if that makes you think of anything else to do with it.

S.M. Nope, make an "x".

N. What do you think you can do with it, N.A.? Humm?

(A 10 second pause followed as N.A. sat and S.M. said, "Don't do anything.")

N. Are you all finished? (pause) Well, when you're finished, when you've put down everything you can then you put your name on the side, ok? But if you can think of anything else to do with it then go ahead and do something.

S.M. T.....P.....

N. Do you know what? That looks sort of like a street corner. Can you think of anything else to do with it? No? Ok, put your name on it, on the side.

(N.A. printed her name in 22 seconds.)

N. And this is what? Two. Can you put a two, a number two? Make your two over here.

(N.A. made a reversed two.)

N. Ok, now....you've got a big "x" for you to take home.

(When N.A. had difficulty ripping the paper, she turned it around and began ripping it from the other end.)

N.A. (27/1/77)

April 28, 1982

Symbol 3

- N. Do you want a big or little piece of paper? N.A., can't hear you.
- N.A. Small.
- N. Ok, N.A. is going to need the pencil. Thank you. (N. made the symbol and handed it to N.A.)
- S.M. Valentine.
- N.A. (Whispers) Valentine (as she repeated the symbol moving from top to bottom).
- N. It looks like a valentine. Could be the side of a valentine, couldn't it?
- W. Are you guys making a valentine?
- N. What else can you do with that? You made lots of lines inside. Can you do anything to the top or the bottom of it?
- (During the 8 seconds that followed, S.M. demonstrated how to make a valentine as she said, "Go out go.")
- N. Can you do that? Can you do what S.M. showed you?
- (Three second pause)
- N. You can, it's ok. You can do anything to that you want to.
- S.M. (To N.A.) Go like straight up.
- N. Do you want to try and make a valentine out of it? Hum?
- (N.A. continued to repeat the symbol for 16 seconds.)
- N. Can you do anything else with it? You can't? Can you turn it around and look at it like that and see if you can do anything to it?
- (Seven second pause)
- N. Anything? What about upside down?
- (Three second pause)

N.A. (27/1/77)

April 28, 1982

Symbol 3 - Continued

N. What about this way? Not a thing. Not a thing came in here to do with it, eh? Ok. Not yet. She's got to put... What do you have to put up here?

S.M. Name.

N.A. (Whispered) Name.

N. Ok, put your name there. Can you put your name there?

(N.A. printed her name in 26 seconds as S.M. laughed and said, "That one. Let's try that one.")

N.and right here we need a number three.

S.M. Three?

N. Can you tell me anything about what you've done?

S.M. Valentine.

N. (To N.A.) What do you say?

N.A. Valentine.

N. It's a valentine? Ok. Look, you've got another valentine.

(N.A. and S.M. laughed as N. handed the copy to N.A.)

Symbol 4

N. Now do you want a large or a small piece of paper? Oh, you're going to make your name on it first (referred to the carbon of symbol 3). Ok, now do you want a large or a..... Oh, that's pretty dark isn't it? There, you made it darker. Do you want a large or a small piece of paper?

N.A. Big.

N. Big.

S.M. Big.

N. Put this one right there. Alright, and (put the carbon in) ok, ready? This one goes like (made the symbol) that.

N.A. (27/1/77)

April 28, 1982

Symbol 4 - Continued

(N.A. repeated and enclosed the symbol using a left-right direction during the 49 seconds that followed.)

N. Is there anything else you can do with that? Hum? You're making the same lines over and over. You're making lots of lines, aren't you?

(N.A. stopped drawing after 8 seconds.)

N. Ok, what if you turn it like this (as N. turned the paper)? Anything you can do with that?

(N.A. continued drawing for 32 seconds.)

N. You know, when you turn it like this it looks as if it could hold something. That part right there looks as if it could hold something. Suppose it could?

(N.A. continued enclosing the figure for 26 seconds.)

N. Ok, can you put your name right there? And what goes here?

N.A. A four.

N. A four. You're right.

(N.A. made an inverted four.)

N. Up we go. Look at all those dark lines you made. You made lots of them, didn't you. Ok, I'll take this piece.

Transcription of the First Session

H. (15/9/76)

February 26, 1982

Dot-line

N. We're going to draw some lines and dots, ok? I'll show you how to do it. (pause) Ok. I'm going to draw a dot here and I'm going to draw a dot there. What I want you to do is draw a line between that dot and that dot.

(H. drew a line from the first to the second dot.)

N. Ok. Now, can you draw a line from this dot to this dot? (Pause) All the way. Right. Ok. (N. made the fourth dot and H. connected the third and fourth dots.) Ok. (Pause) What are you making, do you suppose?

(H. gave no response.)

N. Hum. One more dot. (pause) Ok. What do you think you made? (pause) Don't know, eh? Can you spell your name? Can you write your name? Yeah? Would you like to write your name on there?

(H. printed her name in 16 seconds.)

Symbol 1

N. Now we're going to draw some pictures. What size paper would you like to use?

(H. pointed to the small paper.)

N. That one, the little one? (pause) Ok. I'm going to draw a shape on here and then I want you to make something out of it, ok? (N. drew the shape on the paper and handed it to H.) What can you make out of that? (pause) Have any idea? Why don't you go ahead and draw something and then we'll see?

(An 8 second pause)

N. Well, maybe if you turn it all the way around like that and see what happens.

(H. turned the paper around during the next 12 seconds.)

N. You can do anything to it you want to, ok. You can make

H. (15/9/76)

February 26, 1982

Symbol 1 - Continued

N. any marks on it you want to.

(H. turned the paper around on the desk while looking at N. for 8 seconds.)

N. Around.

(H. continued to turn the paper without speaking for the next 8 seconds.)

N. Make you think of anything at all?

(H. nodded.)

N. Well, what can you do with it? (pause) Can you do anything with it at all? Hum?

(H. shook her head.)

N. Would you like to try another shape? (pause) We'll put that one aside and try that one later, ok?

Symbol 2

N. What size paper?

(H. pointed to the small paper.)

N. The small one again? Can you say "the small one"?

H. Small one.

N. Yeah. I thought you could, ok. Now, I'm going to make a line like that. What can you make out of that?

H. Triangle.

N. Ok. Go ahead. Ooh. Ok. What else can you do to that triangle? Can you do anything else to it?

(H. shook her head.)

N. Oh, I bet you can. (pause) No? Why don't you turn it all the way around and see what else you can think of?

H. (15/9/76)

February 26, 1982

Symbol 2 - Continued

(H. drew an oval at the bottom of the triangle.)

N. Anything else? No? Can you tell me what you've done?

H. Witch hat.

N. Hum?

H. A witch hat.

N. Looks like a witch's hat. I'll just write that down here. Where's the witch? (pause) She's not in the picture, eh? Not wearing her hat today? Ok. Can you write your name on there?

(H. printed her name.)

Symbol 3

N. Ok. Now, would you like a big or small piece of paper?

H. Big.

N. Big. Ok. You ready. This one.....(drew the symbol and handed it to H.).

(A 16 second pause occurred as H. added to the symbol.)

N. I wonder what you're making?

H. Heart.

N. What else can you do with that heart?

(An 11 second pause)

N. Can you do anything else to it?

(H. shook her head.)

N. No? When do you have hearts like that, when do you see the hearts? (pause) I bet you made some of these in class, right, in school with Mrs. K. Did you?

H. (15/9/76)

February 26, 1982

Symbol 3 - Continued

(H. nodded her head.)

N. Where did you make them, remember? Were they Valentines? Are you making a Valentine? (pause) Ok. Can you write your name on there?

(H. printed her name.)

N. You know what they're doing? They're writing down whatever you make. When you made this mark, they drew it on there so that we could, we could tell what you did later. And they're also writing down what you said in the tape recorder. That's why I need them here. Ok?

Symbol 4

N. Alright. Big or little paper?

H. Big.

N. You ready? (N. handed H. the paper with the fourth symbol on it.)

(H. looked at the symbol and N. for 10 seconds.)

N. You can turn it around any way you want to and see what you can think of to do with it.

(A 15 second silence followed as H. considered the symbol.)

N. Just do something with it and see what you can do. Ok?

(H. made a motion with her pencil.)

N. Go ahead. That's fine.

(H. closed one side of the symbol.)

N. Ok. What else can you do with it?

(H. closed the other side of the symbol with a line starting from the outside of the shape to the middle.)

N. Can you do anything else with it?

H. (15/9/76)

February 26, 1982

Symbol 4 - Continued

(H. shook her head.)

N. No. Are you sure? Look at it and turn it all around and see if you can think of anything.

(H. made a motion with her pencil.)

N. Go ahead.

(H. made a square beneath the triangle.)

N. Oh ok. What else can you do with it now? (pause) Can you tell me what you've done?

H. House.

N. A house. Who lives in that house? Do you live in that house!

(H. shook her head.)

N. Does M. live in that house? No? What else does your house need?

H. Window.

N. Ok. Can you put them in? M. did this with me last year. She drew pictures like this for me last year. (pause)
Ok. Do you need more than one window or just one window?
(Pause) I wonder if it's day or if it's night?

H. Night.

N. Is it? How do I know that, how do you know it's night?
(Pause) How can I tell it's night by looking at your picture? (pause) Can you tell me about this? (pause)
No? I wonder if anybody is in that house. Do you know?
Nobody's in that house? Can you do anything else with it?

(H. shook her head.)

N. Ok. What about your name?

(H. printed her name on the paper.)

H. (15/9/76)

February 26, 1982

Symbol 1 - Second attempt.

N. Ok. Now, do you want to try that one again? See what you can do with that? Oh why don't you try it. Just look at it again cause you turned this one all the way around last time and then you figured out something to do with it, didn't you? (pause) Can you try it? This is the last one I need for you to do. (pause) Look at this and see what..... Well put your pencil on the paper and see what you can do with it.

(H. placed the pencil on the paper on its side.)

N. Well I meant holding it. I didn't mean laying it down. No? (pause) Ok. Can you write your name on there then, H.?

(H. printed her name.)

N. Ok. Thank you. Now we need..... Do you know how to write numbers? Can you put one or can you put two? Do you know how to make a two?

(H. nodded her head.)

N. Ok. Can you put two on that one?

(H. put a two on the paper.)

N. And can you put three on this one?

(H. put a three on the paper.)

N. Can you put four on this one?

(H. put a four on the paper.)

N. Ok. And then you can make a one on that one.

(H. made a one.)

N. Oh good. Ok. Can you think of anything you can do with that? (pause) Then.....you can put a one on this one. Put a one on that one. Thank you very much. Ok. Would you like to draw with us again another time? Yeah?

Transcription of the Third Session

H. (15/9/76)

April 28, 1982

Symbol 1

N. Ok H., do you want a large or a small paper for this?

H. Small.

H. Small paper. Oops, you said small and I started to get a large one. Ok, you ready? (N. made the symbol and handed it to H.)

(H. looked at the symbol for 3 seconds and then closed the figure in a right-left direction.)

N. What else can you do with that?

H. Two rock (pronounced "wok").

N. Ok, go ahead. It's two what?

H. Two rock.

N. Where do you find those? Where do you find them?

H. Outside.

N. Outside? Two rocks? Ok well, how would I know that those are two rocks? What could you do with them to make them
.....

H. You get two circles.

N. There are two circles. And what else can you do with those rocks so that I know that they're outside?

H. Get water there?

N. Hum?

H. Get water there.

N. There's water? Ok, where's the water? Do I see the water? Can you make the water in there so I can see it?

H. No.

H. (15/9/76)

April 28, 1982

Symbol 1 - Continued

N. Why not?

O. I could.

N. Well, let H. I bet she can figure out a way to make the water in there.

(H. added a wavy line to the bottom of her picture.)

N. Ok, so the rocks are in the water. What else is there around the rocks? What else?

H. Nothing.

N. What else is outside that's usually found around rocks? There's water. Are the rocks in the water or are they right at the edge?

H. Right at the edge.

N. They're right at the edge? So are they sitting on the ground?

H. Yeah.

N. What's on the ground around them?

H. Small rock.

N. A small rock. Ok, where's the small rock?

(H. drew in the rocks.)

N. There are small rocks all around it. Ok, what else is on the ground besides the small rocks and big rocks? (Pause) Is there anything growing on the ground?

(H. shook her head.)

N. No? Alright, so the only way I can tell this is outside is because of the water. Is there anything else that's outside that would let me know? Is there anything sitting on those rocks? (pause) No? Ok, what else can you tell me about rocks?

(A 5 second pause)

H. (15/9/76)

April 28, 1982

Symbol 1 - Continued

N. Well, what do they feel like?

O. Hard.

H. Hard.

N. Ok, they're hard and what else can you tell me about them?
(Pointed to the large rocks) Are these light or are they heavy?

H. Heavy.

N. And what about these little ones?

H. Light.

N. They're lighter, eh? Ok, can you put your name there?

(H. printed her name using a combination of upper and lower case letters.)

N. And what goes there?

H. Number one.

N. Right. Ok, is there anything else you can do with your picture?

(H. separated the papers.)

Symbol 2

N. Ok, for the next one do you want a big or a little piece of paper?

H. Bigger.

N. Ok, ready (drew the symbol and handed it to H.).

(After looking at the symbol for 3 seconds, H. made a triangle.)

N. Go ahead.

(H. made a semicircle at the base of the triangle and

H. (15/9/76)

April 28, 1982

Symbol 2 - Continued

added a flag to the top.)

N. What else do you need?

H. Sail boat.

N. Hum?

H. Boat.

N. It's a boat? Where is that boat?

H. Water.

N. Ok, I don't see any water though.

(H. drew the water.)

N. Ok, what else can you tell me about your boat? Is it going somewhere? (pause) I wonder where it's going.

(H. laughed.)

N. Where do you suppose it's going?

(H. laughed.)

N. Huh?

H. Hong Kong.

N. Hum?

H. Hong Kong.

N. Hong Kong, ok. So your boat is going to Hong Kong and who's on the boat?

H. People.

N. Anybody that you know that's on that boat? No? What are they going to do once they get to Hong Kong? (pause) I wonder what they're going to do when they get there.

H. I don't know. Going to play.

H. (15/9/76)

April 28, 1982

Symbol 2 - Continued

N. They're going to play? So are they kids or are they older people?

H. Kids.

N. Kids, I see. Where are they coming from?

H. From Hong Kong.

N. They're going to Hong Kong, right? Did they come from anywhere?

H. Don't know.

N. Where did they get on the boat? Where were they?

H. Vietnam.

N. Vietnam. So they went from Vietnam to Hong Kong? They're going to Hong Kong to play and..... Ok, anything else you can tell me about what they're going to do? (pause)
Ok, I don't see any of those people, any of those kids. Where are they?

(H.'s friend whispered to her, H. laughed and drew in one figure.)

N. Ok, there's one child. Where's the rest?

(H. used 25 seconds to draw one more person.)

N. Ok, two. Are there only two children on the boat? Who's driving it, who's guiding it?

O. (Whispered) Your daddy.

(H. drew in another person as everyone laughed.)

N. Who's that person with the big hands and the big arms?

(H. laughed.)

N. Who is that?

H. His daddy.

H. (15/9/76)

April 28, 1982

Symbol 2 - Continued

N. Ah, I see. So the daddy's taking his two kids. What can you tell me about those two kids?

(H. and her friend whispered.)

O. Where's the mother?

H. Mommy (as she drew the mother).

N. That the mum?

O. With no eyes.

(H. and her friend laughed as H. drew the eyes.)

N. Ok, so it's a family. There's a mommy and a daddy and two kids. Is it a boy or girl, two girls?

H. One girl and a boy.

N. Ok, do they have names?

H. No.

N. Ok, when these kids are playing in Hong Kong, what are his parents going to do?

H. Spank his bum.

N. (Laughed) Why spank his bum? That means the kids have done something they weren't supposed to do. What have they done?

H. Make a mess.

N. What were they doing that they got spanked?

H. They make a mess and dirty up place.

N. They made a mess in the boat, eh? Ok H., can you put your name?

(H. printed her name.)

N. And.....

H. (15/9/76)

April 28, 1982

Symbol 2 - Continued

H. Two.

N. Two.

Symbol 3

N. Alright now, what do you want this time--small or large paper?

H. Small.

N. Small, ok. Ok, ready? This one is like (made the symbol) that.

H. A heart.

N. A what?

H. A heart.

N. A heart, is that what you said? Oh, an apple. Ok, what else does that apple need?

X. Leaves.

N. Ok.

X. Do like that.

N. Well, she can finish that. She knows how.

(H. and X. laughed as H. made the leaves.)

N. Ok, anything else the apple needs?

H. No.

N. No?

(H. laughed and drew two semicircles attached to the top of the apple on either side of the stem.)

N. Well, what's that on the apple? What part of the apple is that?

H. (15/9/76)

April 28, 1982

Symbol 3 - Continued

H. Snake.

N. It's what?

H. That snake tail, that snake head.

N. A snake hat or a snake hand?

H. A snake tail and snake head and snake tail.

N. Oh, a snake tail and a snake head. Well what's the snake doing with it's head in the apple?

H./X. Eating.

N. Is it outside the apple or you said it's going. Where's it going?

H. Going to eat the apple.

N. From the inside. So where's the rest of the body?

H. In here.

N. Oh, in the apple. I see, ok. Anything else you can tell me about that?

(H. shook her head.)

N. Alright, what goes here?

H. My name. (H. proceeded to print her name in upper case letters.)

N. And.....

H. Three.

N. Yeah. Ok, we'll do one more and then X. you do one. Ok, this is yours.

Symbol 4

N. Ok, large or small paper?

H. (15/9/76)

April 28, 1982

Symbol 4 - Continued

H. Uhm, larger.

N. Large. Ok (drew the symbol).

(In 4 seconds, H. closed the circular portion with a right-left motion.)

N. Ok, what else can you do?

(In the next 9 seconds, H. closed the inverted "v" and added a triangle at the bottom).

H. (Laughed) Ice cream. Ice cream store.

N. Ice cream store, ice cream? Is this the store.....where you buy the ice cream?

H. Uh hum.

N. What's this?

H. Those people.....ice cream.

N. This is the ice cream and this is the ice cream store? Ok, how do I know this is the ice cream store?

H. Go in. You go in there and then you buy some.

N. You go in? Show me where you go in. Oh, you go in here?

H. Yeah.

N. This is the store?

H. Yeah.

N. And where's the door to the store?

(H. used 12 seconds to make the door.)

N. Oh, a little tiny door at the bottom.

(H. laughed.)

N. How do I know that this is an ice cream store?

H. (15/9/76)

April 28, 1982

Symbol 4 - Continued

- H. You just get (the rest of her statement was indecipherable).
- N. But I go in and I find out they sell ice cream but how would I know before I went in that store? What could tell me it's an ice cream store?
- X. (Whispered to H.) You have to make a picture.
(H. drew an ice cream cone in the circular portion of the figure.)
- N. Oh, so this is on the outside of the store, is it? So I would know it's an ice cream store because I would see the picture. What else can you tell me about it?
- H. Lots of ice cream.
- N. Lots of ice cream? What kinds of flavours?
- H. Chocolate.....
- N. What different tastes?
- H. Orange and chocolate.
- N. Oh ok, and what else?
- H. And red.
- N. Red, would that be straw.....
- H. And green.
- N. What flavour would green be?
- H. Green be.....pear (pronounced "per").
- N. Be what?
- H. Pear.
- N. Per?
- H. Pear.
- X. Pear!

H. (15/9/76)

April 28, 1982

Symbol 4 - Continued

N. Oh, pear. Green would be pear. Ok, and what flavour would red be?

H. Uh.....strawberry.

N. Ok, and so you've got chocolate and strawberry and pear and.....

H. Apple.

N. Well, what colour is apple?

H. Red.

N. Red, ok. Can you uh put your name.....

(H. printed her name.)

N. And then what?

H. Four.

N. Hey, ok. So you've got lots of.....

(H. proceeded to rip the paper.)

N. Ok, now you get to keep that one and take these home with you.

Transcription of the First Session

M. (29/8/76)

February 26, 1982

Dot-line

N. Ok. M., what we're going to do now, I'm going to do two different kinds of games with you, ok? One I want you to, I'm going to draw some dots and I want you to draw lines with them, ok? And another one, I'm going to draw some marks on paper and I want you to make a picture of it. The first one.....I'm going to draw a dot here, I'm going to draw a dot here. I want you to draw a line between them.

(M. connected the first and second dots.)

N. You know what they're doing, they're watching how you move your pencil and how you hold it. So that's what they're marking down, ok? (pause) There's another dot, start..... that's it.

(M. drew a line between the second and third dots.)

N. Have you done this with Mrs. K. before?

(M. nodded.)

N. Have you? I thought maybe you had. I'm going to make this a long way away.

(M. looked at the paper.)

N. Which one, do you remember? The last one you drew? The one furthest away. (pause) Which one is furthest.....the one that's far away?

(M. drew a line from the third to fourth dot.)

N. Ok, and one more.....no here. We'll put it in there. From this one.

(M. drew a line from the fifth to the sixth dot.)

N. Ok. Do you know how to spell your name?

(M. nodded.)

N. Ok. Can you write your name on here?

M. (29/8/76)

February 26, 1982

Dot-line - Continued

M. (M. made an M.) Don't know anymore.

N. You don't know anymore? You can't - ok. Well you made a nice "M". (As N. printed the remaining letters for her)
A circle and a line, a line and a little curve and two lines like that.

(M. watched as N. printed her name.)

N. Ok. You want to hand the paper to S? Oh first you can put a number one on it. That's right, I forgot to add.....
Make a one, just make a one right there. Ok. Can you put a two there? (pause) Right beside the dot.

(M. made a two by the appropriate dot.)

N. Oh hey. What about that. A three right there.

(M. made a three.)

N. Ok. A four there.

(M. made a four.)

N. Do you know where the next dot is that you made? Right there. Can you make a five?

(M. made a five.)

N. What's this number? What would this number be?

M. Six (pronounced "seex").

N. Six. Ok.

(M. made a six.)

N. And then what would this number be?

M. Eight.

N. I think it's seven. Can you make a seven?

(M. made a seven.)

N. Then what's this number?

M. (29/8/76)

February 26, 1982

Dot-line - Continued

M. Eight. (She made an eight.)

N. Right. And then what's this number?

M. Nine.

N. Ok. Can you make a nine?

(M. made a nine.)

N. Ok. Now can you give it to S.? Give that paper to S.

(M. started to get up from the chair.)

N. Oops no. Uh uh. I'm not ready for you to get down yet. I need.....M., we still have some more drawings. That was your dots. Now we need to do some drawings, ok? And for that, you can either use a big paper or a little paper. Which one would you like?

(M. pointed to the big paper.)

N. The big paper?

Symbol 1

N. Ok, now for this what I'm going to do, I'm going to make a shape on here and then I want you to look at it and see what you can do with it, ok? (N. made the symbol and handed it to M.) What do you think you can do with that? (pause) Turn it around and maybe you can get an idea. You can do anything with it that you want. Any kind of drawing you want to do on that, ok?

(A 19 second pause occurred as M. looked at the symbol.)

N. Ok. Maybe if you turn it like that. What does that look like? Does it look like anything? (Turned the paper around)
Ok. What about this?

M. Three.

N. Hum?

M. Three.

M. (26/8/76)

February 26, 1982

Symbol 1 - Continued

N. What could you do to that three? What could you make that into? (pause) Nothing? Ok. What if you put a number one here. Can you put a one on there? And then can you put an "M" on this side?

M. I don't know.

N. An "M" for your name.

(M. printed an "M".)

Symbol 2

N. Ok. We'll try this one later, ok? I've got another one for you now. You want a big or little paper?

M. A little paper.

N. This time what I'm going to do is.....make a line like that (handed paper to M.). What can you do with that? (pause) Well, look at it and see what you can do.

M. A line.

N. You can turn it around and look at it and see if it makes you think of anything.

M. Triangle.

N. Ok. Can you make a triangle out of it then?

M. (Unintelligible. M. made the line into a triangle.)

N. Ok. Can you do anything else with your triangle?

(M. shook her head.)

N. You sure? (rause) Can't think of anything else you can do with it, eh? Look at it that way, that way. (pause) Any idea? Ok. Would you put a two on that on the corner and then M.?

(M. printed "M" and made a two.)

N. Now where shall I put this? I'll put this right up here.

M. (26/8/76)

February 26, 1982

Symbol 3

N. Now, would you like a little or big paper?

M. Big paper.

N. Big paper?

(A conversation was held with the observers.)

N. Alright. Now let's see which one this is. This one goes like.....(made symbol). Well, look at it. You can go ahead and draw on it. You don't have to think of what it is, ok? (pause) Turn it around and see. Well, if we look at it this way..... Does that look like anything?

(M. nodded.)

N. Yeah, what?

M. A heart.

N. A what?

M. A heart.

N. A heart. Ok. Well, can you make a heart out of it?

M. I can't make it.

N. Aw, I bet you can. You try. Come on, go ahead and try. (pause) Well what would you need to do to it to make it a heart? Can you show me with your hand? (pause) What part of the heart is that line? (pause) Did you make hearts in Mrs. K.'s class earlier? (pause) Did you make any hearts a while ago? Not for Valentine's day? You didn't, eh?

M. Huh?

N. Haven't you ever cut hearts..... Have you ever used paper like this (folded it in half) and cut along it to make a heart like that with scissors?

(M. nodded yes.)

N. Do you think you could try that with your pencil? Hum? You go ahead and see if you can. (pause) No? Ok. Can you put your name on it then, put a number three, ok?

M. (26/8/76)

February 26, 1982

(M. made an "M" and a three.)

Symbol 4

N. Ok. You want a big or little paper?

M. A little paper.

N. Little?

M. Uh huh.

N. This shape (made the fourth symbol on the paper and handed it to M). Well look at it some more. (N. turned the paper.) What does it look like now? Ok. Do you think you can do anything with it at all? (pause) I bet if you put your pencil on the paper and start moving your pencil then you'll think of something.

(A 9 second pause)

N. Why don't you try it. Why don't you put your pencil on the paper and just move it around and see what you can do? No? Well look at it for just a little bit longer, ok? (pause) Can you look at it and turn it around like that? What does that part look like (covered up all but the inverted v of the symbol)?

M. Triangle.

N. Ok. Can you make a triangle out of it, ok?

(M. closed the inverted v.)

N. (Pointing to the hump) Can you make it, this out of anything?

(M. closed in the rounded part of the symbol.)

N. Ok. Can you do anything else with it now? You've got your triangle and.....

M. A circle (pronounced "sucko").

N. It looks like a circle, doesn't it? Can you do anything else at all with that picture? Is that a "no" or you don't know?

M. (26/8/76)

February 26, 1982

Symbol 4 - Continued

(M. shook her head.)

N. Ok. Well can you put your name and number four on that?

(M. put an "M" and a four on the paper.)

Symbol 1 - Second attempt.

N. Ok. Let's try this one again.

M. I don't know. (M. made a downward motion with her pencil.)

N. Go ahead.

(M. extended one side down.)

N. Ok. Go ahead.

(M. extended the other side down.)

N. Ok. Now what can you do with it? (pause) You know what
.....that looks like it could be hills or a ghost or
something tall. Does that look tall to you? Did you make
it tall? No? Can you tell me about it? No? (pause) I
think I'm going to try one more thing with you.

Transcription of the Fourth Session

M. (29/8/76)

May 12, 1982

Symbol 1

N. M., do you want a large or a small paper?

M. Big.

N. A big, ok. Can you put that in there (referred to the carbon)? What can you do with (made the symbol) that?

(M. looked at the symbol for 6 seconds and then closed it using a right-left motion.)

N. Ok, what else can you do with that? Yeah, you can turn it around (as M. turned the paper in a circle). Ok, what else can you do with that?

(M. shrugged her shoulders.)

N. Oh, I bet there's something else you can do with that.

M.H. Eye.

N. That's one suggestion. Did you hear what M.H. said?

M. Eye.

N. Yeah, do you want to put eyes in it? Ok, go ahead.

(M. made the eyes in 6 seconds.)

N. Oh, little teensy eyes. Ok, and what goes with eyes?

M. Nose.

N. Ok, where's the nose?

M.H. Nose.

N. Yeah, that's what she said. Oh, a pointy nose. And what else goes with.....

M.H. Mouth.

M. Mouth.

N. Ok.

M. (29/8/76)

May 12, 1982

Symbol 1 - Continued

(M. proceeded to draw a mouth.)

N. Oh, that's a special kind of mouth. What's it doing?

M. Smile.

N. It watches, is that what you said?

M. It watching somebody.

N. It's watching somebody? Oh, who's it watching? Who is that person watching? (pause) I wonder if he's watching M. No? Ok, anything else this person needs? He's got eyes, nose, a mouth. What else does he need?

M.H. Hair.

M. Hair.

N. Ok, can you put hair on?

(M. added the hair in 13 seconds.)

N. Ok, does he have long hair or short hair?

M. Long.

N. Long hair. Does long hair stop right there or does it go further?

M. Further.

N. It goes further. Ok, go ahead.

(M. extended the hair.)

N. Oh, I see. He's got a lot of hair. Ok, what else does he need? Is it a he or a she, boy or girl?

M.H. Ear too.

M. Boy.

N. It's a boy. Ok, what else does that boy need?

M/MH Ears.

M. (29/8/76)

May 12, 1982

Symbol 1 - Continued

(M. used 8 seconds to add the ears.)

N. He's got one ear.

M.H. Two ear.

N. And he's got how many ears now, M.?

M. Two.

N. Ok, so he's got ears, hair and eyes and a nose and a mouth. What else does he need?

M.H. No more.

N. Oh, now wait.

M. A (unintelligible).

N. A what did you say, M.?

M. I don't know.

N. Well then, can you show me on you?

(M. pointed to her neck.)

N. Is that what he needs? You don't know the name of that. That's a neck. Can you draw a neck?

(M. added a neck.)

N. There's a neck. Now what does his neck need? What do you need besides a neck?

M.H. Hands.

M. Hands.

N. Ok, where you going to put the hands?

(M. used 14 seconds to draw the hands which she attached to the side of the head.)

M.H. (Laughed) Little tiny hands.

M. (29/8/76)

May 12, 1982

Symbol 1 - Continued

N. Ok, what can you do with those little tiny hands?

(M. shrugged her shoulders.)

N. Well, what do you do with your hands?

M.H. Big hands.

N. She's got big hands. Well, you've got bigger hands than she has. What do you do with your hands?

M. Feet.

N. You need feet? Ok, where are you going to put his feet?

M.H. Over here.

(In 15 seconds M. attached the feet to the bottom of the head at the place indicated by M.H.)

N. Look at his feet.

M.H. No more.

N. Here's his neck, your neck and your feet are down here and his feet are coming off his head.

(M. laughed.)

N. What else does he need?

M.H. No more.

M. No more.

N. No more at all? Then what do you need to put on your picture?

M. Name.

N. Ok.

(M. printed her name in 14 seconds using upper and lower case letters.)

M.H. M... ...

M. (29/8/76)

May 12, 1982

Symbol 1 - Continued

- N. Ok M., and what do you need to put over here? A one. Is this going to come out? You're going to have two of those, are you? (pause) Oh, look and see. What happened?
- M.H. The same kind.
- N. Uh hum, the same. This part's all, look, you've got part of it on there and part of it down here. Can you tear it apart?
- M.H. One's ups side down and one's not ups side down.
- N. One's what?
- M.H. One's ups side down and one's not ups side down.
- N. You're right. One's upside down and one's not upside down.
- M.H. My turn to make it. My turn.
- N. No, it's still M.'s turn for one more.

Symbol 2

- N. What size do you want now?
- M. Little.
- N. Little one, ok. Oh, I ripped it. Ok, what can you make out of that one (as N. handed M. the symbol)?
- M. Triangle (said before she drew it).
- N. Ok, go ahead.
- (M. closed the figure with a left-right diagonal line and a right-left horizontal line.)
- M.H. Tree.
- N. What else can you do with that triangle?
- (M. proceeded to turn the paper around.)

M. (29/8/76)

May 12, 1982

Symbol 2 - Continued

N. You can turn it around. Can you make that triangle into anything?

M. Huh?

N. Can you make this triangle into anything? What can you make it into? Go ahead. You've got an idea. Oh, you made a little triangle inside. Ok, anything else you can do?

(M. used the next 29 seconds to make additions to her drawing.)

M.H. That is a house to something.

N. A what?

M.H. A house to somebody. A house to Indian.

N. I didn't understand you.

M.H. I'm making a house to an Indian.

N. Oh, I see, a house to an Indian. (To M.) What else can you do with that. You've got a little ball on top. Can you tell me what that ball is?

M. Football.

N. It's a what?

M. Football.

N. A football. Ok, there's a football on top of.... What's this?

M.H. Triangle.

N. Let M. tell me.

M. Triangle.

N. Why's a football on top of a triangle?

M.H. Because someone.....

N. (To M.H.) Shhhh. (To M.) What?

M. (29/8/76)

May 12, 1982

Symbol 2 - Continued

M. Because someone.....

N. Because someone what?

M. Took the football.

N. Took the football. I see, ok. Ok, what else can you do with that? Is there anything else that your football needs?

(M. continued to make additions to her drawing for 8 seconds.)

N. Ok, and anything else? Ok, anything else you need? (pause) Can you tell me what this is?

M. (Whispered) For the baseball.

N. It's what?

M. Hit the baseball.

N. It's for baseball. What do you do with the baseball with this? (pause) Where you play with the baseball, what does this do?

M. Hit it. Hit the baseball.

N. It hits the baseball? Ok, do you know what that's called? It's called a bat.

(M.H. made the motion of the bat hitting the ball.)

N. Is that what that does? Yeah? Ok, so the person's holding the bat. Alright, do you need anything else for your picture? You've got a baseball bat and a football and a triangle.

M. (Indecipherable)

N. Ok, where does your name go?

(M. printed her name in 13 seconds.)

M.H. M....

M. (29/8/76)

May 12, 1982

Symbol 2 - Continued

- N. Alright and.....
- M.H. One.
- N. No, is it a one? No, what number?
 (M. made a two.)
- N. That's right, a two.
- M.H. Because it's the big paper, right?
- N. Well no, it's a number one because it's the first one that
 M. did. She made dots and that's one, but this is a dif-
 ferent kind so this is a one for this one (pointed to the
 first drawing). So what number is this?
- M.H. My turn again.
- N. Yes, it's your turn as soon as M. does that (referred to
 numbering the page). There she goes.

Symbol 3

- N. Do you want a large or a small paper?
- M. Big.
- N. Ok, now we're going to do (made the symbol) that.
- M. A heart (said before drawing). (M. then closed the figure.)
- N. Ok now, what else can you do with your heart?
 (M. turned the paper around.)
- N. (To M.H.) She's turning it around to get some more ideas.
 (To M.) Ok, you know you made a heart last time. Can you
 do anything else with your heart now?
- M.H. Wait a min. I'm gonna make a heart. It got two heart.
- N. She made a little line on the heart. What else can you do
 with that heart? Did you catch yourself? She did that
 time. What else can you do with that?

M. (29/8/76)

May 12, 1982

Symbol 3 - Continued

(In 10 seconds, M. drew a small heart inside the large one.)

M.H. Same like that big heart.

N. Yeah, you've got two. Ok, what else can you do?

(M. made a ball at the bottom of each heart in 9 seconds.)

M. (Whispered) Kissing.

N. I'm sorry, M., I didn't hear you. Can you say it louder?
You can say it louder.

M. Somebody kissing (the next words were said too softly to
understand) the house.

N. A man.....

M. Kissing.

N. A man kissing.....

M. A boy kissing a girl.

N. A boy kissed a, a boy kissing a girl? (Laughed) Ok, go
ahead. Is that what this is, is a boy kissing a girl?
Oh I see, well which one's the boy? Over on this side?
Where's the girl? But I don't see either the boy or the
girl.

M.H. Because she didn't make it.

N. Oh well, maybe you need to make it, eh? Can you make the
girl?

(M. made both faces in 17 seconds.)

N. Long hair. Ok, there's part of the girl.

M.H. Kiss the boy.

N. And that's the boy, yeah? Ok. You need your name.

M.H. Her name is M.

N. Uh huh. It starts the same as somebody else's name. Who

M. (29/8/76)

May 12, 1982

Symbol 3 - Continued

N. else's name starts the same as..... Who has the same letter?

M.H. Mine.

N. That's right, M.H. does.

M.H. And this one too.

N. Yeah, you have a "y".

Symbol 4

N. Do you want a large or a small paper?

M. Little.

N. Little. (N. made the symbol and handed it to M.) There you go. What can you do with that?

M. A rock and a triangle (said before drawing).

N. I beg your pardon.

M. (Whispered) A rock and a triangle.

N. A rock and a triangle, ok.

(M. closed both parts of the figure with a right-left motion in 12 seconds.)

M.H. A house and a triangle.

N. Oh, a house and a triangle. You changed it, or a house and a rock. (pause) Ok, what else can you do with that now?

(M. turned the paper around for 11 seconds.)

M.H. Turn around, turn, turn, turn, lookin'.

N. Why do suppose she's turning it around, M.H.?

M.H. Cause her want to turn.

M. (29/8/76)

May 12, 1982

Symbol 4 - Continued

N. Ok, can you tell me anything else about your house? Is this still a rock? Yeah? (pause) Ok, what else can you tell me?

(During the next 16 seconds, M. added a smaller circle inside the larger one and placed two dots vertically inside the small circle.)

M.H. Button.

N. It looks like a button, doesn't it?

M.H. Yeah.

N. Oh, there's some smoke coming out of the house. Ok, is there anything else you can do with your house then?

M. (Whispered) Name.

N. Put your name down, ok. Can we have that paper clip?

M.H. That's my turn.

N. And a number four. Well you know what? We need to work with T. right now, ok M.H.? Can you put this one on there? Thank you very much.