THE UNIVERSITY OF MANITOBA

AN INVESTIGATION INTO THE EFFECTIVENESS OF THE ECO LANGUAGE PROGRAM, WITH TRAINABLE MENTALLY RETARDED CHILDREN.

SUBMITTED BY

OLEH IHOR KLYMKIW

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OLEH IHOR KLYMKIW

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CHAPTER I

INTRODUCTION

This research investigated the effects of the E.C.O.; Ecological Communication Opportunities; program as developed by MacDonald and Gillette (1982) on the conversational ability of two mentally handicapped subjects. The dissertation will be divided into five chapters. These are 1. introduction; 2. literature; 3. methods; 4. results; 5. discussion of results.

1. Context of the Problem:

Language is a vital element in the development of a human being and in his/her relationship to his/her culture. The fact that language behaviour among the mentally retarded is characterized by delay or a total lack of expressive language (Chinn, Drew, Logan, 1975) suggests that an effective language intervention strategy be provided for this population.

Language is important in the process of intellectual development. Pyles (1932) stated that verbalization facilitates learning. Brunner (1966) suggested that language is directly related to a child's development. Luria (1961) hypothesized that language is the means through which thoughts are formulated and the means by which individuals are capable of analysis, synthesis and

abstraction.

Language has also been identified as important in the process of social development. Krug, Rosenblum, Almond and Arick (1980, 1981) in summarizing the work of Bloom, Hood and Lightblown, stated that language is the tool through which babies achieve social goals. Without language, a child can't answer questions, express feelings or relate to the feelings of others. Those who don't have language may be isolated both socially and academically from their peers and teachers (Johnston and Johnston, 1984). MacDonald (1982) and Chinn, Drew and Logan (1975) have indicated that the lack of means of expression is a contributing factor to the perception that individuals classified as mentally-retarded are handicapped. They imply the abilities of the mentally retarded exceed their facility for expression. Hence, their knowledge is not readily communicated to others.

Because of the importance of language for the intellectual and social development of children, language training has long been recognized as an essential component of the education program for language-delayed mentally handicapped children. Numerous variations of training programs exist (Harris, 1975) and have been used extensively but the results have not always been encouraging. The reasons given for the lack of success vary but one common criticism is that training is conducted in somewhat

artificial circumstances and children have difficulty in generalizing from the training situation to real-life communication situations. Recently developed programs (Warren and Kaiser, 1986) have attempted to address this problem by ensuring that training occurs in social situations rather than in an artificial training setting (Warren and Kaiser, 1986).

E.C.O., Ecological Communication Opportunities as developed by MacDonald and Gillette (1982, 1985) is a language intervention strategy that is consistent with the latest views on language acquisition (Warren and Kaiser, 1986) and with the growing recognition of the interdependence of language and social development (MacDonald and Gillette, 1982; Gioralametto, 1985). Programs similar to the E.C.O. had been shown to be effective in stimulating communication with language delayed, environmentally deprived children (Warren and Kaiser, 1986). The lack of data demonstrating the effectiveness of programs, like the E.C.O., with mentally handicapped subjects indicates a need for further research in this area (Warren and Kaiser, 1986).

Statement of the Problem

The problem under investigation can be identified in the following question: Will the E.C.O. be an effective instructional strategy for developing conversational skills

in the trainable mentally handicapped? Will these skills be generalizable to new people, settings and situations across time?

Purpose of Study

The decision to evaluate the E.C.O. was made because it is a program that is cited and recommended in the field of mental retardation. Over the years there has been a gradual change in the methods used to instruct mentally handicapped children. The E.C.O. employs many contemporary views on language acquisition and offers promise of effectively changing the language behavior of trainable mentally handicapped subjects. The purpose of this study is to provide data supporting the effectiveness of E.C.O. when it is applied to trainable mentally handicapped subjects.

Statement of Hypotheses

When applied to trainable mentally handicapped subjects Ecological Communication Opportunities will have a positive effect on 1. conversational ability and 2. generalization.

Rationale for the Hypotheses

Many of the strategies that have been found effective in the research are employed by the E.C.O. system. Details of this research and their strategies can be found in the

literature review. Studies conducted with environmentally deprived subjects employing methods similar to those of E.C.O. were shown to be effective in developing conversation and promoting generalization (Warren and Kaiser, 1986). Less extensive research has been executed with the mentally handicapped. Therefore general conclusions about the effectiveness of these programs with the mentally handicapped can't be made even though some initial success has been reported (Warren and Kaiser, 1986). Though the literature does not show a research project dealing specifically with the E.C.O. program, its effectiveness can be insinuated from the research supporting its strategies and from the success of programs with similar methodologies.

Dependent Variables

The variables that were measured to determine changes in conversational ability were derived from the observation tool; the E.C.O.-Map of Communication Targets. (See Appendix I.)

These variables were:

1. interaction/communication;
2. initiation of contact;
3. response to contact;
4. maintenance of contact;
5. taking turns with actions for
   (a) one or two turns,

(b) three or more turns;

6. taking turns with communications for
   (a) one or two turns,
   (b) three or more turns;
7. communication with body language;
8. communication with sounds;
9. communication with single words;
10. communication with two and four word combinations;
11. communication for personal reasons;
12. communication for instrumental reasons;
13. communication for social reasons.

Definition of Terms

1. Conversation: conversation is a joint activity in which the child and significant other exchange messages in a sequence of turns with or without words (MacDonald and Gillette, 1982).
2. Interaction/Communication: a message is sent either vocally or with body language to another.
3. Initiation of contact: one person approaches another for any communicative purpose.
4. Response to contact: a reaction to (other than ignoring) an initiation.
5. Maintenance of contact: contact continues after the initial initiation and response.
6. Turn-taking: to speak one after another, in order.

7. Turn-taking with actions: using gesture or some other bodily movement in a turn-taking fashion.
8. Turn-taking with communications: using vocalizations, symbols or signs in a turn-taking fashion.
9. Body language: the use of gestures or body movement in a communicative manner.
10. Communication with sounds: any vocalization that has communicative intent.
11. Communication with single words: the use of single words in a communicative interchange.
12. Communication with two and four word combinations: the use of two or more words in a communicative interchange.
13. Communication for personal reasons: the use of body language, sounds or words for practice or play with no clear intention to communicate.
14. Communications for instrumental reasons: communication for the purpose of manipulating others.
15. Communications for social reasons: communications for the purpose of mainly being with another.
16. Word: a meaningful unit of expression in the English language; either sound or sign.

Limitations

In reviewing the data from this research it is necessary to be aware of a number of factors which

influenced the results. The researcher in this study was the classroom teacher. Because of this, overall classroom management was his responsibility. Many factors throughout the school year influenced the time and duration of the interventions. As the observations were not completed by an independent observer, research bias may have occurred. The researcher was self-taught in the procedures of the E.C.O. program. Though he attempted to stay within the definitions of the program, this was never confirmed independently. The initial stages of intervention with S_1 closely resemble a behavioral approach. The degree to which this is acceptable without overstepping the boundaries of the E.C.O. program is in question. The E.C.O. program was designed to be used concomitantly with the child and the child's care-givers. The subjects' parents or guardians were not part of this intervention. Their participation may have had a relevant influence on the results. Baseline observations should have taken place over a longer period of time to discount any effects that a new classroom, new adults and new school would have had on the behaviours of the subjects. However, the researcher felt that the need to begin a language intervention program superseded this precaution. Though the video-taping helped substantiate the observations and proved to be a very valuable tool, it had a distracting effect on the subjects.

Delimitations

This study is delimited by the nature of the subjects and the measuring tool employed. As this study involved the use of only two subjects, general inferences to other mentally handicapped individuals can not be drawn. In addition the non-contiguous nature of the subjects' handicapping etiologies further defines the inferences that can be drawn from this study. The measuring device employed confined the strict analyses of data to the areas which it was designed to evaluate. During the course of investigation it became apparent that certain developments that weren't examined by the measuring tool required systematic investigation. These developments were noted in an informal manner.

CHAPTER II

LITERATURE REVIEW

The literature review will consist of the following sections:

1. Introduction
2. Review of Five Perspectives on Language Acquisition
   a) Behavioural
   b) Psycho-linguistic
   c) Semantic-cognitive
   d) Pragmatic
   e) Interactionist
3. Review of 3 types of language programs
   a) Behaviouristic
   b) Incidental
   c) E.C.O.
4. Theoretical and Research Support for the E.C.O. System
5. Summary of the Literature Review

1. Introduction

There were few systematic speech and hearing intervention strategies reported prior to 1960. The retarded or impaired individual was excluded from programming because it was more time effective to instruct those of higher intelligence (Schiefelbusch, 1980).

Two major developments in the study of language occurred in 1957. One was the publishing of Verbal Behaviour by Skinner and the other was the publication of Syntactic Structures by Chomsky (Schiefelbusch, 1980).

In addition to the work of Skinner and Chomsky, there were new developments in the areas of semantic-cognitive, pragmatic and interactionist approaches to language in the sixties, seventies and eighties (McCormick and Schiefelbusch, 1984; Schiefelbusch, 1980).

2. Five Perspectives on Language Acquisition

a) Behavioural Approach

The writings of Skinner 1957 reflected the attitude that language was a learned behaviour. His theories reflected the belief that language was a type of stimulus-response mechanism. The primary mechanism that Skinner described was that of the verbal operant. The verbal operant was explained as a dependency relationship between a verbal response of some sort and an antecedent condition (Carrow-Woolfolk and Lynch, 1982).

Besides stimulus-response, behaviouristic theories describe the learning of language in terms of conditioning and reinforcement strategies. Carrow-Woolfolk and Lynch (1982), in summarizing the work of Braine, state that the behaviourists describe language learning as a passive process in which properties of a verbal string and

correlations between these properties and other events are registered and accumulated. The behaviourist position assumes that verbal responses are controlled by contingent events which assume the properties of either reinforcement or punishment. The behaviourists believe that parents are the models for appropriate utterances, and that they gradually shape the young child's vocalizations.

Behaviourists have contributed to the understanding of language in several ways (McCormick and Schiefelbusch, 1984). They have made important contributions to the instruction of non-speaking persons through the delineation and the development of systematic training designs. They have shown the value of substituting non-speech symbol forms and alternative response modes where conventional auditory-vocal communication are not attainable. They have demonstrated the functional relationships between cognitive, social and communication processes.

b) Psycho-linguistic Approach

The work of Chomsky (1957) is an example of those theories of language development that purport that children have an innate capacity for linguistic knowledge, interact with experience and develop language automatically, naturally effortlessly and quickly (Carrow-Woolfolk and Lynch, 1982) Language is thought to be a phenomenon that has arisen because of biological evolution. This approach to language acquisition has been labelled as the psycho-

linguistic perspective (McCormick and Schiefelbusch, 1982). Theorists such as Chomsky arrived at their conclusions because of the regularities they observed in language behaviour, the complexity of language, the universal features across languages and the creative aspect of language.

In order to explain this innate capacity, Chomsky proposed the existence of a Language Acquisition Device (LAD) that exists in every human being (Carrow-Woolfolk and Lynch, 1982). This theoretical construction (LAD) is capable of taking linguistic input and converting it to an internal grammar. A child innately discovers the relations that exist between the surface structures of sentences and the universal aspects of deep structures. The deep structures are manifestations of the child's own capacities (Carrow-Woolfolk and Lynch, 1982).

The major contribution of the psycho-linguistic approach is a hierarchial description of the structural complexity of sentences (McCormick and Schiefelbusch, 1984).

c) Semantic-Cognitive Approach

The Semantic-Cognitive approach to language acquisition assumes that children have innate ability to develop language (McCormick and Schiefelbusch, 1984). In this approach it is assumed that children have something like an innate cognitive acquisition device. It proposes that language develops gradually from pre-verbal sensorimotor

experiences to more complex verbal exchanges. Citing Piaget, McCormick and Schiefelbusch (1984) state that a child has a propensity to develop cognitively in certain ways. Language is one of many cognitively based developments.

The work of Bloom, Brown, Schlesinger, and Slobin (McCormick and Schiefelbusch, 1984) demonstrated the importance of semantic intent in children's language. They demonstrated that children seem to possess a range of semantic intentions and express their meanings long before they know anything about syntax.

Horstmeier and MacDonald (1978) state that before a child is likely to talk about the actions, objects and qualities in his environment, he will at first have to have had attended to, functionally experience, or attach meaning to those actions and objects. Citing Nelson, McCormick and Schiefelbusch (1984) state that children learn language to talk about sensorimotor experiences.

Johnston and Johnston (1984) offer these key elements as part of a semantic-cognitive perspective.

1. Children pass through stages of development. The same stimulus and feedback does not function in the same way on children at ages 1 month or 1, 3, 7 or 12 years.

2. Language and play-like cognition develop over time. Children are expected to progress through a sequence of levels of language, plan and cognition, doing what is

appropriate at each level.

3. Sensorimotor knowledge is constructed as children interact with their physical environment. Its beginnings must precede other developments.

4. Socio-emotional knowledge is constructed as children interact with others. Social knowledge depends in part on logicomathematical knowledge.

5. Logicomathematical knowledge is built as children reflect on the observations of physical phenomena.

The semantic-cognitive perspective's primary contribution has demonstrated the importance of the earliest child interactions in relation to cognitive development and, hence, language development.

d) Pragmatic Perspective:

The basic hypotheses of the pragmatic approach to language is that children learn language in order to socialize and direct behaviour of others (McCormick and Schiefelbusch, 1984).

Bates (1976) defines pragmatics as: 1. the study of speech acts and the context in which they are performed, and 2. the rules of how language is used in context. The speech act is defined as an intentionally encoded social gesture directed by one person to another (McCormick and Schiefelbusch, 1984). Function and communication are key elements in the pragmatic perspective. Function is the purpose of the desired effect

of an utterance, and communication is the means through which this function is performed (McCormick and Schiefelbusch, 1984).

The development of language is viewed as a social construct. Care-giver child interactions are viewed as one of the key elements in the development of language. It is through these interactions that a child develops syntactic knowledge and semantic categories (McCormick and Schiefelbusch, 1984).

The main contribution of the pragmatic approach is that it demonstrates the importance of social interaction in the development of language.

e) Interactionist Perspective

The interactionist approach has two basic assumptions. These are: 1. infants are born with a general propensity to perceive, organize and interact in certain ways, and 2. the number and variety of experiences provided to the infant significantly affect learning (McCormick and Schiefelbusch, 1984).

The interactionist perspective employs a content-form-use model. Content, or semantics, is the "what" of language. Form is the "how" of language, its shape or surface structure and the all-important linkages with meaning. Use is the "why," "when," and "where" of language; the communication or social aspect of language (McCormick and Schiefelbusch, 1984).

As well, the interactionist model proposes three types of pragmatic knowledge-skill domains. These domains are: 1. performative, 2. presuppositions, and 3. conversational postulates. A performative (speech act) is the intention of the sentence. Presuppositions are judgments about the capacities and the needs of the listeners in different social contexts. Conversation postulates deal with the rules of dialogues. These rules include (a) entering and initiating conversations, (b) leaving or terminating conversations, (c) taking turns, (d) shifting topics, (e) handling digressions, (f) asking questions, and (g) temporal spacing of pauses (McCormick and Schiefelbusch, 1984).

The primary contribution of the interactionist perspective is that it provides a working model for the assessment and remediation of language, as well as a frame of reference from which to understand language development and acquisition (McCormick and Schiefelbusch, 1984).

3. Language Intervention Programs

a) Behavioural Approaches to Language Intervention

Behavioural approaches to language intervention have been described as 1. behaviour shaping through discrete trial training and the use of task analysis (Krug, Rosenblum, Almond and Arick, 1981), and 2. one-to-one mass trial training approach (Warren and Kaiser, 1986).

Harris (1975) offers a synopsis of these operant training programs. Typically, these programs intervene in 4 major areas: 1. attention, 2. non-verbal imitation, 3. verbal imitation, and 4. functional speech, (Harris, 1975).

Attention has been designated as the first prerequisite for teaching speech, i.e., the child must attend to the instructor in order for learning to take place. Harris (1975) states that attention is trained in two ways. The first is by seating the child directly in front of the trainer and the second method is placing the child in a booth. Eye contact is achieved through the use of primary reinforcers along with the command "Look at me." Details and a summary of the variation on these procedures can be found in Harris (1975).

Non-verbal imitation is a training stage which frequently follows attention training but is not employed by all researchers, (Harris, 1975). (There is some controversy with regards to the necessity of non-verbal imitation as a prerequisite to verbal-imitation.) A child is taught a series of gross motor imitations. These imitations are gradually refined to movements around the mouth. Details and variations to these procedures can be found in Harris (1975).

The next stage that is trained is verbal imitation. Harris (1975) states that most researchers adopt some

variation of the four stages that Lovass (1966) developed. These sequential stages are: 1. reward all vocalizations, 2. reward all vocalizations which occur within six seconds of the model's vocalizations, 3. reward all vocalizations that approximate the model's vocalizations and occur within 6 seconds, and 4. introduce a new sound randomly interspersed with the sound from step three. One continues simply by increasing the number of discriminated sounds. Some reinforcing agents that are used are: a. food coupled with praise, b. coloured lights, c. tokens, d. music, e. physical contact, f. games, and g. play with tape recorder, (Harris, 1975).

Following the establishment of verbal imitation, the main thrust of language training is functional language. The training of a receptive vocabulary precedes the establishment of an expressive vocabulary. There is no established rule defining which order morphemes or syntax should be taught. Many different grammatical structures have been taught. The complexity varies from single words to complex sentences (Harris, 1975).

Criticism of these programs revolves around a number of areas. The primary criticism lies with the lack of generalization. It has been found that the mentally handicapped trainee finds it very difficult to generalize language use from the training setting to the more natural environment (Harris, 1975, Warren and Kaiser, 1986, Krug et

al., 1981).

Another problem with the behavioural approach lies in the fact that this approach breaks complex skills into simpler components. Once he/she is trained the simpler components, the trainee finds it very difficult to connect these components into the larger more functional skill (Krug et al., 1981). Students who are taught with this approach develop language which is rote and mechanical in effect (Krug et al., 1981). The reliance on artificial reinforcers interferes with successful functioning in the community (Krug et al., 1981).

Various authors have suggested ways in which the lack of generalization can be overcome. Garcia (1974) suggested the use of more than one trainer. Guess, Keogh, and Sailor (1978) proposed the technique of loose training (1978). As well, Guess, Keogh, Sailor (1978) suggested the use of indiscriminable contingencies in order to facilitate generalization from the environment to the other. Training sufficient exemplars and programming common stimuli are two other strategies proposed by Guess, Keogh and Sailor (1978). Halle, Marshall and Spradlin (1979) suggested that time delay was a simple and effective method through which generalization could be promoted.

A good example of a behavioural program is "A Manual for Parents and Teachers of Severely and Moderately Retarded Children," (Larsen and Bricker, 1968).

b) Incidental Language Teaching

Incidental language instruction is a naturalistic approach to training (Warren and Kaiser, 1986). It refers to the interactions between an adult and child that arise naturally in an unstructured situation, such as free play, and that are used systematically by the adult to transmit new information or give the child practice in developing a communication skill. The child is in control of the situations in which teaching occurs by indicating interest, by requesting assistance from the adult point, and by commenting or directing vocally or non-vocally (Warren and Kaiser, 1986).

Incidental language intervention involves 1. arranging the environment to increase the likelihood that the child will provide incidence for teaching, 2. selecting language targets appropriate for the child's skill level, interest from the opportunities the environment provides, 3. responding to the child's initiations with requests for elaborated language resembling the targeted forms, and 4. reinforcing the child's communicative attempts as well as use of specific forms with attention and access to the objects in which the child has expressed an interest (Warren and Kaiser, 1986). Incidental teaching employs the techniques of modelling, shaping, and reinforcement (Warren and Kaiser, 1986).

Examples of other programs that employ techniques

similar to Incidental Language teaching are: (Warren and Kaiser, 1986), 1. "milieu training" (Hart and Rogers-Warren, 1978), 2. "Naturalistic training" (Hart, 1985), 3. "transactional training" (McLean and Snyder-McLean, 1978), and 4. "conversational training (MacDonald, 1985).

In reviewing the literature on Incidental Language Teaching, Warren and Kaiser (1986) concluded that: 1. generalization occurred in all studies, 2. increases in subjects initiations and responses have occurred in all except for one study, 3. studies that have measured language use have reported at least modest gains, and 4. the effects on specific target language responses have been strong across a range of subject and experimenter populations.

Since most of the work employing Incidental Language Teaching has been done with culturally deprived populations, Warren and Kaiser (1986) recognize a need to show its effectiveness with other populations such as the mentally handicapped.

c) <u>E.C.O., Ecological Communication Opportunities</u>

(MacDonald and Gillette, 1982, 1985)

The E.C.O. system is an eclectic language intervention program. It has amalgamated theories and strategies from a number of theoretical and research perspectives and employs ideas from all five perspectives discussed earlier in this literature review. In describing the E.C.O. program,

MacDonald and Gillette (1982, 1985) discuss it with respect to: 1. communication theory, 2. ecological theories of chid development, 3. pragmatics, 4. functional analysis of behaviour, and 5. systems theory.

Communication Theory

MacDonald (1982, 1985) describes three principles of communication theory.

1. Every behaviour regardless of form or intention can communicate.
2. Communication requires a feedback loop between two members of a dyad who reciprocally affect each other.
3. Expectancy plays a vital role in determining the way others communicate.

Ecological Theories of Child Development

The following three points summarize the important features of Ecological Theories.

1. Clinical treatment must extend beyond the child to include his significant others.
2. Joint activity routines in conversational contexts are necessary for language learning to occur.
3. Intervention requires the establishment of a conversational context between the child and the significant other from which language naturally occurs.

Pragmatics

Pragmatics hold five basic assumptions.

1. Language is purposive and develops from social, instrumental and personal intentions. Language training must focus not on the language or the meanings the child has, but on what he does with them.

2. Linguistic content emerges from prelinguistic communicative uses. Effective intervention should utilize nonlinguistic communication as a bridge to more conventional communications. Linking existing non-linguistic forms with new linguistic forms may facilitate the use of them.

3. Language emerges from early parent-child joint activities and is the model for pragmatic, semantic, syntactic use. Conversations include reciprocal feedback which is posted to be the mechanism responsible for the development of communicative behaviour. Conversations provide a natural forum in which appropriate form, content, and use can be programmed.

4. Normal language develops out of necessity in functional contexts. It is not taught didactically as an academic unit, to be stored in memory; natural sensorimotor and social contingencies should be more successful in building a generalized language system than rote academic skills isolated from context.

5. Language development requires that significant others respond to the child's behaviours non-contingently until a

communicative repertoire is established and then begin to require more conventional performance as the child develops.

Functional Analysis of Behaviour

Intervention requires the simultaneous and incidental application of differential reinforcement, shaping, chaining and various forms of stimulus control.

General Systems Theory

Conversation is a system comprised of critical element which can be mapped in an educational prescriptive format. The communication ecosystem consists of 1. child's communication components, 2. conversational variables, and 3. significant other person strategies.

Other Key Concepts and Strategies of the Ecological Communication System (MacDonald and Gillette, 1982, 1985)

1. It is important for the adult to enter the child's world and participate as a non-judgmental partner who designs the interactions by following the child's lead.
2. Language develops from the rules that govern the interactions between the significant others and the child. The role the trainer is playing is analyzed concomitantly with that of the child.
3. Progressive match is a general rule for governing the interactions with a child. It reflects the minimal

discrepancy principle that a child will best learn if the model is not so close to the child's competence that he is bored or not so far above that he can't perceptually or behaviourally assess it.

4. Turn-taking is the basic structure or strategy of interactions and conversations. Turn-taking involves two persons acting (interactions) or communicating in conversations with each other, each taking his/her turn then yielding to the other person for his/her turn. Turn-taking is the first stage for teaching any new language.

   a) Turn balance refers to an exchange between two persons in which neither takes more than two consecutive turns. One of the primary goals of the E.C.O. model of language intervention is to establish regular spontaneous conversations in which, on the average, there is a balanced exchange of turns between the child and the significant other.

5. Activities should be structured to encourage give and take. To make turn-taking possible, physical factors such as closeness, eye contact, speed of movement and general perceptual match between the participants should be maintained.

6. It is important to follow the child's lead with the understanding that a child will learn language within any activities with which he functionally interacts.

7. The best way to get a child to attend and take turns is to imitate exactly, e.g., facial expression, body movements, and sounds.

8. It is important for the adult to wait for the child to take a turn. The adult should communicate and show that he/she is anticipating a response.

9. When initially instructing language, it is important to give obvious signals to cue a child's turn. e.g., verbal, gestural or visual cues are given.

10. Physically prompting a turn may be necessary if all else fails.

11. It is necessary to be conversational. Communicate with the child as if you expect a response by using facial and informative cues.

12. Be animated.

13. Differentially reinforce more mature behaviours over less mature communications.

14. Translate communications into higher modes. e.g., If a child reaches for an object, the significant other says "give." This strategy is based on the assumption that child develops through several languages: gesture, sound, word, etc.

15. The following behaviours tended to limit conversations (MacDonald, 1984). The significant other:

a) often talks in long sentences far above the range of their child's communicative competence,

b) frequently attempts to communicate without gaining the child's attention,

c) communicates rhetorically without waiting for or cueing a child's response,

d) accommodates to a child's idiosyncratic communication, and

e) makes short, dead end contacts with the child, rather than balanced turn-taking actions.

4. Theoretical and Research Support for the E.C.O. System

Up to this point in time there hasn't been a formal research project evaluating the E.C.O. system. Evaluation of programs such as "Incidental Language Teaching" provide indirect support. There are a number of similarities between it and the E.C.O. system (Warren and Kaiser, 1986). Theoretical and research support for the individual tenets of the E.C.O. system can be found in the literature. This suggests that the overall program would be effective.

In this section of the literature review, the E.C.O. system will be discussed with respect to the following topics:

1. social skills that influence conversation,
2. importance of early social interactions,
3. learning theory and the E.C.O. System, and
4. research that supports the E.C.O. model.

Social Skills

1. Turn-taking

According to MacDonald and Gillette (1982, 1985), turn-taking is the basic structure or strategy of interaction and conversations. Turn-taking involves two persons acting or communicating with each other, each taking his/her turn, then yielding to the other person for his turn. MacDonald and Gillette (1982, 1985) believe that turn-taking is the first stage for teaching any new language.

An important goal of the E.C.O. model is to establish regular, spontaneous conversations in which, on the average, there is a balanced exchange of turns. MacDonald stresses that communication requires a feedback loop and that joint activity routines in conversational contexts are necessary for language learning to occur.

Girolametto (1985) states that the sharing of joint focus, measuring across turns, the redundancy of the back and forth cycle of turn-taking, and the proximity of parental feedback help children make cognitive and linguistic comparisons between their parent's speech and their interpretation of the referent, as well as between their acts and the parent's responses. Comparisons between developmentally delayed children and their normal counterparts indicate that there is impairment on the part of the delayed children to participate in turn-taking. Berger and Cunningham (1983) and Jones (1980) describe the

vocalizations of developmentally delayed children as long, continuous and rapidly repeated. They state that these children don't give their parents a chance to interact. The clash of turns remains as children get older (Tannock, 1985). Vietze, Abernathy, Ashe and Fulstich (1978) maintain that the failure of developmentally delayed children to discriminate between the presence or absence of maternal vocalizations could cause the mothers to respond less contingently to their children and provide fewer successful turn-taking experiences.

Responsiveness

MacDonald and Gillette (1982, 1985) believe that it is important for the adult to enter the child's world and participate as a non-judgmental partner who designs the interactions by following the child's lead. The child will learn language within any activities with which he functionally interacts.

Supporting this position, Girolametto (1985) states that an adult's responsiveness to a child is an important aspect in language development. He expounds the view that a child's cognitive resources are limited. If a child has to focus on its partner's topic, its resources may be overtaxed. The child has to attend not only to a new topic, but has to decode the message and then respond. If, on the other hand, the adult is responding to the child's focus,

the child's cognitive resources can be attuned more specifically to the adult's language input. Snow, (1984) and Lieven (1984) state that the cognitive load on the child is reduced for both process and production modes when the adult's speech is contingent on the child's turns.

Topic control is another factor that is directly related to adult responsiveness and to the need of following the child's lead. Snow, Midkiff-Borunda, Small and Proctor (1984) state that language acquisition is impeded by a high frequency of utterances that change the topic or don't relate to the child's focus of attention.

Mentally retarded children make fewer direct initiations in a free play setting, Cunningham, Reuler, Blackwell, Deck, (1981) and Eheart, (1982). Concomitantly, mothers of handicapped children initiate more interactions and exercise more topic control (Eheart, 1982). Because of the bidirectional interactive quality of language, MacDonald and Gillette (1982, 1984) maintain the need for monitoring the interactive patterns of the child and adult. In this manner, it is hoped that the language limiting pattern or lack of assertiveness on the part of the child and over dominance by the adult will be reduced.

Importance of Early Social Interactions

MacDonald and Gillette (1982, 1984) state and maintain the following: 1. clinical treatment must extend beyond

the child to include his significant others, 2. linguistic content emerges from pre-linguistic communicative uses, and 3. language emerges from early parent-child joint activities.

The importance of early social interactions are supported by the Theory of Homeostatic Control (Bell and Harper, 1977). This theory proposes that the adult's role is to socialize the child. It suggests that the adult has at his/her disposal a variety of strategies for influencing the child's behaviour. The child's behaviour and the adult's attitude towards this behaviour influences the selection of any particular strategy.

Expounding on the Theory of Homeostatic Control, Gioralametto (1985) states that if a child is handicapped, a negative feedback cycle may be created. The parents misread their children's cues and respond in ways that compound the children's difficulties. They inadvertently maintain the child's inability to profit from the environment. Vietze, Abernathy, Ashe and Fulstich (1978) maintain that a mother's contingent responding is responsible for the appearance of turn-taking in the early months. After this initial period the child begins to assume some responsibility for the speaker role.

It is this cycle of negative feedback that MacDonald

and Gillette (1982, 1985) seek to arrest. By analyzing the interactive pattern between child and adult, they hope to re-establish the process through which early language takes place. Gioralametto (1985) suggested that adjusting the rate and amount of speech to the child's developmental levels, coupled with expectations of response, may affect the likelihood of increased conversational participation from the child.

Learning Theory and the E.C.O. Program

The E.C.O. Language Intervention Program uses a number of techniques which can trace their origins to learning theory. These techniques are: 1. training in the natural environment, 2. time delay, 3. the use of prompts, and 4. use of the idea of progressive match shaping. These techniques were shown to be effective in changing the behaviour of subjects (Becker, Engleman, Thomas, 1975).

Strategies that MacDonald and Gillette (1982, 1985) employ, follow a pattern similar to those proposed by early behavioural approaches (Harris, 1975). Both take the child through the stages of attention, non-verbal imitation, verbal imitation and then verbal behaviour. They take into account the need of physical factors such as closeness, eye contact, speed of movement, and general perceptual match between the participants. Unlike the behavioural approaches

which sought to establish discrete language items in a stimulus response fashion, the Ecological Communication System is attempting to make language into a purposive flexible tool.

The Ecological Communication System is based upon training the child in his natural environment. The reason for this is that the difficulty of generalizing from the training setting to the child's natural environment will be overcome. Guess, Keogh, Sailor (1978), demonstrated the effectiveness of this strategy in their discussion of natural maintaining contingencies.

Gillette and MacDonald (1982, 1985) emphasize the need to wait for a child to respond. Halle, Marshall, Spradlin (1979) working with the technique of time-delay, concluded that this simple technique could be used to train behaviour change.

An important strategy of the E.C.O. system is the employment of the technique of progressive match. It is a general rule that is applied to interactions with a child. It reflects the minimal discrepancy principle, i.e., that a child will best learn if the model is not so close to the child's competence that he or she is bored or not so far above that he can't perceptually or behaviourally assess it. This technique reflects the process of shaping (Becker, Engleman and Thomas, 1975).

MacDonald and Gillette (1982, 1985) recommend the various forms of prompting. These are verbal, gestures, visual cues, physical prompting and being animated. Descriptions of these forms of prompting can be found in Becker, Engleman and Thomas (1975).

Research Studies

A number of studies have examined the effect of altering parental interaction strategies on developmentally delayed children's language development. These studies demonstrated that children increased their total number of utterances spoken and increased their linguistic maturity as measured by their M.L.U. (Cheseldine and McConkey, 1979), (McConkey and O'Connor, 1982). Girolametto (1985) found that children improved their dialogue skills but that their language development had not increased significantly when compared to a control group.

Using naturalistic techniques, Haring, et al., (1986); and Beisler and Tsai (1983), demonstrated an improvement in dialogue skills. As well, generalization was reported to have occurred.

Hubbell (1977) in searching for the techniques that either facilitate or limit spontaneous talking, reviewed the following research:

1. Cazden (1970) emphasized the importance of the context in which a child talks. He presented numerous examples

of how the listener and topic influence how a child will talk.

2. Bayles (1974) concluded that questions and directions from the teacher elicit talking of lesser quality and breadth than do conditions of non-constraint.
3. Nelson (1973) found a negative correlation between the amount of direction supplied by the mother to her children and measures of the child's language development (such as comprehension and rate of acquisition of new words).
4. Zorn (1972) found that conditions of high prompts on high conversations increased the child's rate of uttering new words. Also the condition in which both these categories were at a high level produced the highest level of new words in the child.
5. Hetenai (1974) found an increase in a child's talking was related to an increase in the mother's use of models and concomitant decreases in the use of questions and commands.
6. Whitehurst (1972) found that verbal interaction was more important than verbal stimulation in developing language behaviour in young children.
7. Nelson (1973) emphasized the following: 1. commenting on the child's activity, 2. reflecting and expanding the child's utterances, 3. joining in the child's play, 4. following the child's lead, 5. waiting for

a child to respond in an interaction, and 6. enticing the child to join an activity rather than directing the child.

8. Ollson (1970) recognized children develop through what he called participatory acts. A child learns by the feedback generated by his own activity. By following the child's lead and talking with him, this kind of processing is enhanced.

5. Summary of Literature Review

The literature has indicated positive results with programs that employ methods similar to those of the "E.C.O." program. The "E.C.O." program is based on research and theories that have been shown to be effective in stimulating conversation in language delayed children yet there is insufficient research that demonstrates its effectiveness with trainable mentally handicapped populations. More research is required to substantiate the effectiveness of this program with the trainable mentally handicapped.

CHAPTER III

METHODS

Subjects

The subjects in this research were two trainable mentally handicapped children. They were students in an elementary classroom in the Winnipeg School Division. S_1 was five-years old and was diagnosed as autistic. S_2 was eight-years old and was diagnosed as Down's Syndrome.

Four adults were an integral part of this research. The E.C.O. program required that the child/adult interaction be monitored simultaneously. These adults were the classroom teacher and three teacher assistants. S_1 had a personal aide. This personal aide and the classroom teacher became this child's significant others. S_2 was paired interchangeably with the classroom teacher and the other two teacher assistants. These three people acted as S_2's significant others.

Setting

This research took place at Robertson School, an elementary school in the Winnipeg School Division. The subjects were part of a primary T.M.H. classroom. Though the setting was classified as segregated many integrated opportunities existed. There were a total of 7 children in the classroom of various abilities and handicapping

conditions. Four adults were an integral part of the classroom; the teacher, who was the researcher, one classroom aide and two personal aides. The classroom served as the primary area for the intervention; however, intervention took place less frequently on the play ground, grooming room, home economics room, gym, and in other facilities in the school. Generalization observations were made throughout the school. As well, the subjects' parents were asked about developments at home.

Research Design

A single subject, multiple baseline, across subjects design was employed in this research. Details of this procedure can be found in Barlow and Hersen (1976). The results will be graphed and analyzed.

Procedures

A formal training time was set aside for each subject during the school day. During this time video taping and observations were taken. Other opportunities arose during the day when interactions with subjects would be initiated. The length of intervention gradually increased as the subject/significant other relationship evolved. This could last for thirty plus minutes. Length of intervention was affected by the emotional and physical state of the subject, as well as unpredicted classroom occurrences. Analyses of

the observations, video tapes and discussions between the researcher and the significant others were used to set intervention targets.

Data Collection

The E.C.O.-Map of Communication Targets (MacDonald, Gillette, 1982) was used as the observation tool. These were developed by MacDonald and Gillette (1982) for use with the "E.C.O." program. A sample of these can be found in the Appendix 1. The researcher and one classroom aide were the primary observers. Formal observations were made once a week. Periodic video-tapings were made during baseline and intervention. These video-tapings were used to help substantiate data, plan future interactions and help establish inter-observer reliability.

At the onset of the program the researcher felt that the content section of this observation tool would not apply to the subject. In retrospect this was an error. At this point the intervention had already begun and initial observations had not been taken. Because of this it was decided not to make formal observations in this area.

Baseline for S_1 extended for a period of two weeks. Baseline for S_2 extended for a period of four weeks. There were four observations during S_1's baseline. Four observations were taken during S_2's baseline. Observations during intervention took place once a week. There was a three-week break in observations during the Christmas break.

E.C.O. Training Modules

The E.C.O. Training Modules (MacDonald and Gillette, 1982) provide a sequence of training goals (see Appendix II). The researcher attempted to follow these guidelines but found it necessary to stray from the sequence because of the natures and abilities of the subjects. Primarily the research involved Module I with some overlap into the other three modules.

Graphs

Graphs were employed to visually represent changes in the target behaviors. Observations were plotted over a 25-week period for S_1 and a 28-week period for S_2. The scales used were taken from the E.C.O.-Maps observation tool. E.C.O.-Maps were developed by MacDonald and Gillette (1982) for use with the E.C.O. program. Only observations from the E.C.O.-Map of Communication Targets were plotted as these showed comparative changes in the subject/adult interaction, as they related to conversational ability. The vertical axis marked the frequency of target observations while the horizontal axis marked the time frame in weekly observation periods. The vertical axis was divided into ten categories. Zero marked the frequency none of the time. The numbers 1-3 designated a seldom occurrence. The numbers 4-6 designated an occasional occurrence. The numbers 7-9 indicated a frequent occurrence and the number 10 indicates that a

behavior occurred all of the time.

Preparation of Adults

Before the research began, the researcher met with the other participating adults to discuss their role in the intervention. The characteristics of the E.C.O. program were explained. The adult participants were made aware that the E.C.O. program involved the analysis of the interactive pattern that emerged between the adult and the child.

CHAPTER IV

RESULTS

Introduction

The purpose of this study was to determine if the E.C.O. program (MacDonald and Gillette, 1982) would be an effective method for developing conversational skills in trainable mentally handicapped children. The child/adult interaction was observed in tandem. The observation targets found on the E.C.O.-Map of Communication Targets (Appendix I) were used as the bases for data analyses. The data was plotted on graphs to provide a visual representation of the changes that took place between baseline and intervention. The effects of the program will be discussed separately for each child. References will be made to data represented on the observation tool and graphs. Data that was not measured directly by the observation tool but which the researcher felt was pertinent to the study will be discussed separately.

Baseline

S_1 was observed over a period of two weeks and four observation periods. S_2 was observed over a period of four weeks and four observation periods. During the baseline the subjects were observed during play time. Interests were determined, and a plan for intervention was developed.

During baseline the adults freely interacted with the subjects, however no attempts were made to modify the adult's interactive pattern. Video-taping was used to help analyze the interaction.

Baseline S_1

S_1 had been diagnosed as autistic. At the time of this research he was five years old. Information about him stated that he had one sign that he would use infrequently (washroom) and that he would participate in an exchange of a single turn and that he would respond to the command sit down.

During baseline, S_1 did not demonstrate that he could turn-take. He never did use the sign for washroom and he had to be prompted physically to sit down. He did not demonstrate an interest in play objects. He would wander around the room dumping containers and mouthing objects. Other than the mouthing of objects, his interactions appeared to be without purpose. He demonstrated the same pattern with the adults in the room. He would acknowledge their presence by looking at them briefly but would not approach them in purposeful communicative manner. He showed a strong interest in some food items such as chocolate doughnuts, candy, potato chips, soda crackers with peanut butter and Coca Cola. He would vocalize a number of sounds indiscriminately. He had an "ah" sound, a "lee lee" sound

and a "bee bee" sound. When angered he would slap himself on the side of his head or bite his hand and cry out, and stamp his feet. It was undetermined whether or not he responded to his name.

Plan for Intervention

It was determined to use S_1's interest in food as the starting point for intervention. Receiving something at snack was made contingent upon S_1 exchanging a penny for the snack item. In addition to this it was decided that the significant others would non-contingently imitate the sounds that S_1 made. As well, the significant others would try to establish an interest in some play items.

Major Trends

At the commencement of the intervention, S_1 was physically prompted throughout the penny/food item exchange. He quickly became independent at this activity, i.e., two days. At this point it was determined that S_1 should sign and vocalize before he received a food item at snack time. At first the sign was physically prompted and the significant other would state the name of the food item with the intent that S_1 imitate.

Physical prompting was gradually faded. By the six month period a touch on the arm would be enough to signal to S_1 to attempt a sign. However, he would sometimes use the

wrong sign or the sign would be inaccurate. If the sign was wrong or inaccurate the significant other would physically prompt the correct sign. Vocalizations always accompanied the sign, but these were always of the "ah" sound. It appeared that S_1 was trying very hard to imitate the significant other. By the end of the research period, S_1 had the sign for cracker, candy and needed assistance with doughnut, cookie, potato chip.

The effect of the non-contingent imitation was almost immediate. S_1 would become involved in long interchanges of sound. He would say a sound, the significant other would imitate, then S_1 would say a new sound and the significant other would imitate. At the five month period these interchanges would last up to 3 minutes in duration. S_1 would initiate them and appeared to enjoy the "sound play." Mornings would begin with S_1 approaching the significant other even before removing his jacket and boots and initiate sound play. At unpredictable times he would say sounds that the significant others had modelled for him, such as "d" for doughnut, "p" in up. S_1 would produce novel sounds such as the "m" and "n" sound. Though very infrequent, S_1 imitated the "bee bee" sound when vocalized by the significant other. By accident it was determined during the 1st week of intervention that S_1 liked being picked up and twirled on the shoulders of the significant others. It was determined that S_1 would ask for this activity by signing "up" and

vocalizing "up." He would usually vocalize only the "ah," but infrequently add the "p". The "p" became a sound in his sound play activity.

With the commencement of intervention there was a gradual increase in S_1's time on task. By the 20th week period, S_1 would watch a 90 minute movie, participate in 30-45 minute circle time, and interact with a significant other through a variety of activities over a maximum time period of 40-60 minutes. This is in contrast to his apparent lack of attending to task during baseline.

During baseline, S_1 did not demonstrate an awareness of turn-taking. At the end of the 24 week period he would engage in drum playing, ball throwing, sound imitation, wait for his turn during circle time activities, exchange 2 raisins for 2 pennies and 1 raisin for 1 penny, wait for his turn at snack time and begin to interchange in a ball rolling activity with a peer. The drum playing, hand clapping, ball throwing and sound imitation would continue over 3 to 4 turns.

During the 24 observation period of intervention, S_1 became more expressive with gesture. He would acknowledge his significant others by coming up to them and smiling as he left the bus, and begin a "word play." He showed frustration or anger by coming up to his significant others and directly in front of them bite his hand and jump up and down along with a vocalization, a very long string of "ah ah

ah..." He took his significant others by the hand to objects that he wanted, i.e., he would lead them to the closet, put their hand on the door knob, wait for the door to open and then point out the food object he desired. He would have a particular facial expression if he wanted the significant other to participate in an activity, such as twirling on the shoulder, or tickling or coming to the closet for a food item.

S_1 demonstrated that he was acquiring language that was being used in the classroom. He was responding to his name, by looking at the significant other. On one occasion he demonstrated that he had acquired some of the receptive language from a body awareness game that was played during circle time. When the audiologist asked him to touch his nose and then his mouth, he responded correctly to the adult's request.

Data Analyses

Analyses of data will take place in two parts. Initially data recorded with the observation tool E.C.O.-Map of Communication Targets will be discussed. Secondly, data that was pertinent to the study but not measured by the observation tool will be discussed.

E.C.O.-Map of Communication Target

The E.C.O.-Map of Communication Target is divided into

four sections. The first section measures interaction/ conversations. The second section measures mode of production. The third section deals with content. The fourth section measures how the communication is used. Interaction conversation deals with 1. does the subject interact or communicate? 2. does he/she initiate contact? 3. does the subject respond to contact? and 4. does the subject maintain contact? As well, this section measures turn-taking with actions or communications. Mode measures whether the subject communicates with 1. body language, 2. sounds, 3. single words, 4. two and four word combinations, and 5. with sentences longer than four words. As well it measures whether or not these communications are idiosyncratic or conventional. Content measures what the communications are about, e.g. 1. self, 2. anything outside of self, 3. concrete experiences, 4. abstract experiences, or 5. active experiences. The section labelled "Use" measures the intent of the communications, e.g., 1. personal reasons, i.e., makes body language, sounds or words for practice or play with no clear intention to communicate, 2. instrumental reasons, i.e., to manipulate others, 3. social reasons, i.e., to be with another. The numerical scale provided by the E.C.O.-Map rates the observations as (a) 0 = none of the time, (b) 1-3 = seldom, (c) 4-6 = occasionally, (d) 7-9 = frequently, (e) 10 = all of the time.

S_1 Analyses of the E.C.O.-Map of Communication Targets

1. Interacts/Communicates

During baseline S_1 interacted or communicated at the lower end of the seldom level. When the intervention commenced, S_1 showed an almost immediate increase in the numbers of times he would interact or communicate. By the end of the 17 week period S_1 was interacting and communicating at lower end of the frequent level and interacting at the upper end of the frequent level by the end of the intervention. The significant other interacted/communicated at the "all of the time" level throughout the intervention and baseline.

These interactions/communications took the form of "sound play," signs with prompts, signs without prompts, vocalizations, and sound imitations and a single word "up." The signs were usually accompanied by a vocalization. Gestures were often used to express needs such as happiness, sadness or frustration and anger. A smile expressed happiness. Sadness, anger and frustration were expressed, with foot stomping, hard biting and accompanied by crying. S_1 came directly in front of the significant other and displayed the gesture. Come with me was designated by taking the significant other's hand. Open the door was indicated by placing the significant other's hand on the door knob. Use the key was indicated by pointing the significant other's hand in the direction of the key hanging

on the door. I want this food item was indicated by placing the significant other's hand on the food item required in the closet. I want a piggy-back ride was indicated by taking the significant other by the hand and leading him to table, motioning him/her to sit down, where upon S_1 would climb onto the significant other's shoulders.

The "sound play" began early in the intervention and increased in duration from a few short interchanges to interchanges lasting three or more minutes. The word "up" became a frequent daily expression indicating "I want to be picked up." This became part of S_1's communication repertoire after the 2nd week. At first S_1 would require prompting, physical and verbal. At the 11 week period he would communicate "up" spontaneously. At the 12 week period, S_1 would take the significant other's hand and lead him/her to the closet, putting his/her hand on the door knob and, indicating the key and then the food item. Throughout the intervention S_1 became gradually more demonstrative of his emotions, i.e., happiness, sadness, anger and frustration.

At the 10 week period it was noticed that S_1 began to participate in circle time with the other students. His turn would be indicated by calling his name. In some singing games he would volunteer a response spontaneously.

In other games he would be physically prompted. It was assumed that he wanted to participate because he would become agitated, e.g., cry, if his turn was missed. If he was then given a turn the agitation would cease.

It was during snack time that S_1 made his most significant improvements. At the commencement of intervention, S_1 would have to be physically prompted to reproduce the sign for a food item and prompted to make a sound concomitantly. At the end of the intervention, S_1 had acquired a number of signs that he would use spontaneously. Vocalizations would always accompany the sign. The reward of food led S_1 to spontaneously develop the gestural interaction that took place around the closet door, i.e. significant other's hand on doorknob, --> indicate key --> point out food item desired. Exact times for the acquisition of the independent use of a food sign cannot be given as there were many periods of progress interspersed with regression to a less independent state. Visual representation of the changes in the interaction/ communication can be found on Figure I.

Initiates Contact

During baseline S_1 initiated contact in the seldom range. After intervention initiation quickly climbed to the occasional level by week 5. They then rose to the frequent level by week 7 and were maintained here throughout the rest

of the intervention. Initiation of contact involved S_1 approaching a significant other and employing gesture or sound to communicate. As S_1's initiations of contact increased there was a corresponding drop in the significant other's level of initiations. There wasn't a need for the significant other to always initiate contact in order to foster an interaction with S_1 as S_1 began to seek those interactions. A visual representation of the changes in frequency of contact can be found in Figure I.

Response to Contact:

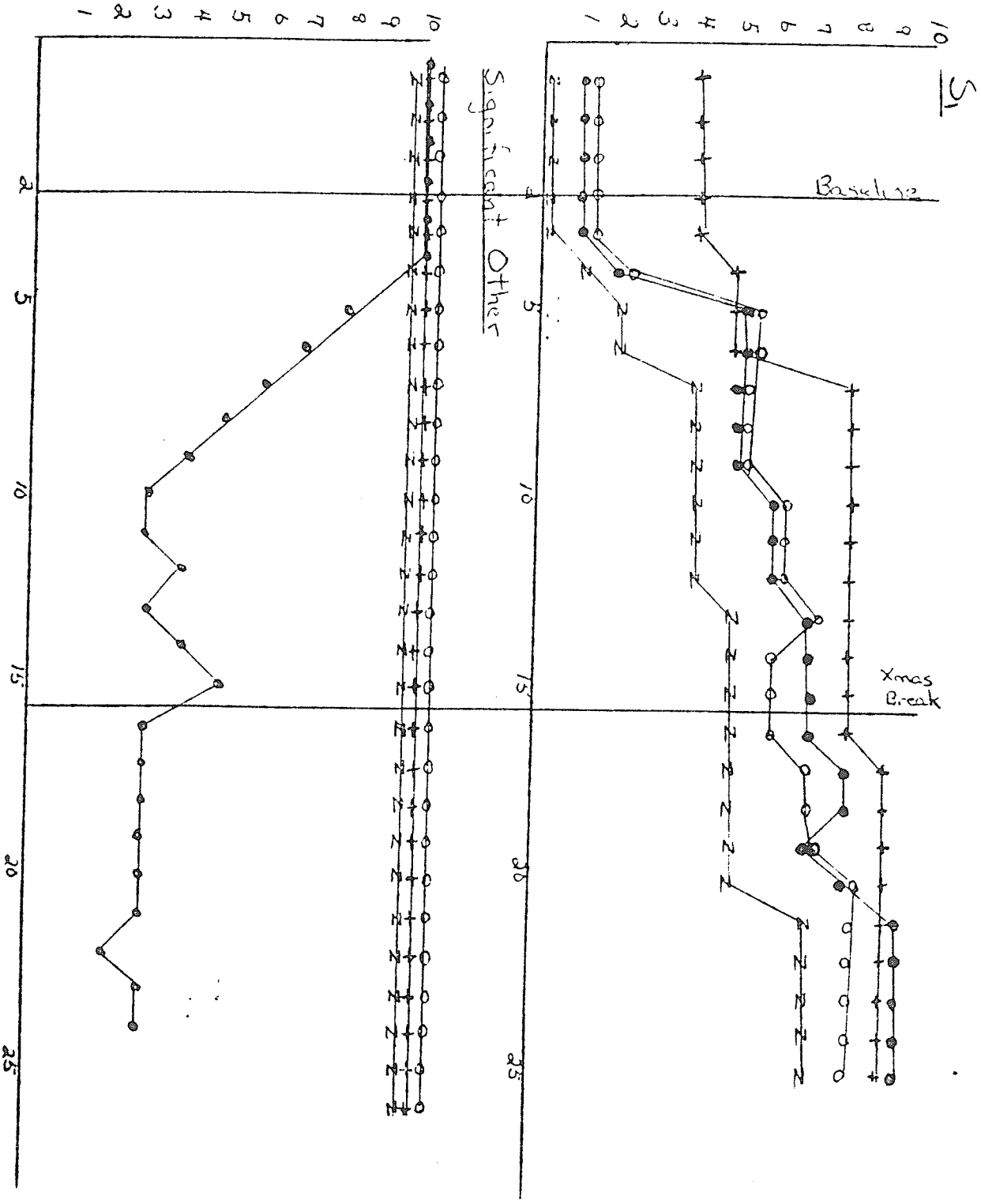
During baseline, S_1 would respond to contact at the lower end of the occasional level. With the commencement of intervention, this quickly rose to the upper end of the frequent level by week 7 and remained at this level throughout the rest of the research period. The significant other's response to contact was always rated at the "all of the time" level throughout baseline and intervention. Visual representation of "response to contact" can be found in Figure I.

Maintenance of Contact

During baseline S_1 did not show that he could maintain contact at any observable level. With the inception of intervention this rose to the low end of the occasional level No. 4. By week 21, S_1 maintained contact at the lower

Figure 1

O interacts/communicates
• initiates contact
+ responds to contact
z maintains contact



end of the frequent level No. 7. Throughout the observation period the significant other maintained contact with S_1 at the "all of the time" level, No. 10.

Turn-taking

Takes one or two turns with actions

During baseline S_1 did not demonstrate an ability to turn-take with actions. At week 5 of the intervention a light improvement was noticed to the extreme low end of the seldom level with a gradual progression to the high end of the frequent level by week 19. Actions that S_1 used in a turn-taking manner were clapping, drum playing, ball rolling, toy truck rolling, and sign imitation of candy, potato chip, drink, doughnut, cracker, and up. Throughout the duration of the research the significant other matched S_1's turn-taking pattern. Visual representation of this interaction can be found in Figure II.

Takes turns with 3+ actions

During baseline S_1 did not demonstrate an ability to turn-take for 3 or more turns. This ability did not begin to appear until the 20th week of intervention and rose to the high end of the seldom level. The significant other matched S_1's level of response throughout the research. Actions which began to appear at the 3+ turn level were clapping, drum playing. Snack time always had the effect of

stimulating turns of signs for food, as the significant other and S_1 practised more accurate approximations of the signs. Visual representation of this interaction can be found in Figure II.

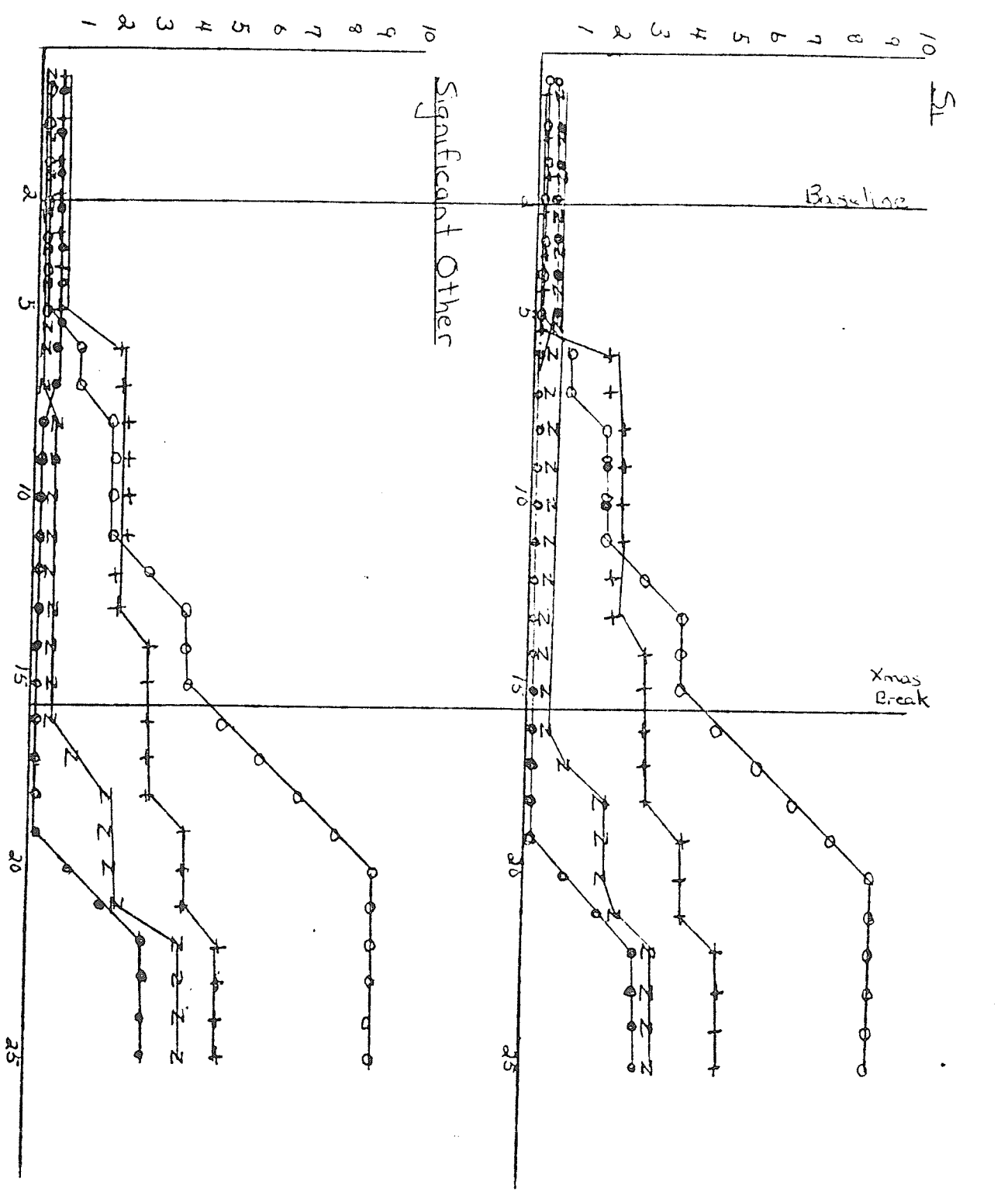
Takes one-to-two turns with communications

During baseline, S_1 did not demonstrate this ability. This ability began to appear at the 6th week of the research project with a jump to the middle range of the seldom level. This reflected S_1's beginning use of signs and vocalizations for being lifted up and requests for food items. Near the end of the study, S_1 began to imitate one sound, i.e., "bee bee." S_1 went through several long plateaus and by the end of the research was at the middle range of the occasional level. The significant other matched S_1's level of turn-taking throughout this study. Visual representation of this interaction can be found in Figure II.

Takes 3+ turns with communications

S_1 did not demonstrate this ability during baseline. This ability began to emerge at week 17 and rose to the middle of the seldom level by week 24. S_1 would use turn-taking at the 3+ level with food signs, and the sign for the activity lift me up. The significant other matched S_1's level of turn-taking throughout this research. Visual representation can be found in Figure II.

Figure 2


o 1 to 2 turns with actions
● 3+ turns with actions
+ 1 to 2 turns with communications
z 3+ turns with communications
Significant Other
Baseline
Xmas Break
1 2 3 4 5 6 7 8 9 10
5 10 15 20 25

Mode

Communicates with body language

During baseline, S_1 would use body language at the seldom level. These would usually take the form of crying, stamping of feet or biting of his hand. These displays were not directed at any special individual. As intervention progressed, S_1 began to use gestures more frequently and with intent. Towards the end of intervention, S_1 was using gestures at the high end of the frequent level. S_1 would use a smile as a greeting in the morning when he stepped off the bus, as if saying hello, good to see you. He would smile and approach a significant other when he would want the significant other to participate in an activity. These occurred shortly after the intervention began. An exact time frame can't be given but began to occur around the 5th week of this study. S_1 continued to use biting of hand, stamping of feet and crying as an expression of sadness, frustration or anger. These gestures were beginning to be used with more of an intent to communicate at around the 12th week of research. S_1 would directly, in front of a significant other, take the significant other by the hand, look directly into the significant other's eyes, and stamp, cry, or bite his own hand; as if to say something's bothering me, come and help me. S_1 would also approach children in the classroom with this display, but the usual reaction would be to withdraw from S_1 or show fear. At the

12-week period, S_1 began taking a significant other by the hand to indicate a want. This might be taking the significant other to the closet that contained food or to the water fountain. S_1 developed a complicated set of gestures around the food closet. He would place the significant other's hand on the door knob, to indicate open. If the closet would not open he would take the significant other's hand and point it in the direction of the key hanging on a nail from the door, and then motion the significant other's hand to the key hold. When the closet was opened, S_1 would scan the contents and then place the significant other's hand on the food items desired. At week 17 of the research, S_1 began taking the hand of the significant other and lead the significant other to a table, indicated that he/she sit down and then would climb onto the significant other's shoulders. S_1 would also develop a number of signs that he used either with prompting or independently. These were drink, potato chip, candy, orange, pop-corn, doughnut, cracker and up. The sign for up was used independently by week 6. Cracker became independently used by the end of the intervention. The exact time frame for these independent uses can't be given as all food items weren't available everyday. This sign was practised only when the item was available. Since the intervention S_1 has used the sign for potato chip independently. Happiness was expressed with a loud laughter

and excited running around the classroom. This was expressed more frequently as the research continued.

The significant other would follow S_1's lead, respond to S_1's gestures and add a word to the gesture that S_1 was using, e.g., come, open door, sad, and sit. As well the significant other would imitate S_1's gestures. This was in keeping with the intent of the program, i.e., that the significant other should model higher forms of communication and imitate the child's communications. A visual representation of these interactions can be found in Figure III.

Communicates with Sounds

During baseline, S_1 did not use sounds in a communicative manner. After the 4th week of the research, S_1 began to use sound in a meaningful fashion. He began to use sounds in a sound play interaction. S_1 would make a sound, the significant other would imitate the sound, and then S_1 would make another sound, and so on. These would take place over a period of 3+ minutes. S_1 would seek a significant other in order to engage in sound play. S_1 acquired the word for up and used it frequently to engage in a pick me up activity. This occurred within 5-8 weeks of the beginning of the research. Whenever S_1 signed he would vocalize. However the predominant vocalization would be the "ah" sound. Towards the end of the research, S_1 began to

imitate the sound "bee bee." As well, S_1 would reproduce it independently.

The significant other matched S_1's form of communication. The significant other would imitate S_1's sounds during "sound play." When the sound was meant to convey a message, the significant other would add a word to the sound, in keeping with need to put words to the child's world and the need to imitate and expand on the child's messages (MacDonald and Gillette, 1982). Graphic representation of communication with sounds can be found on Figure III.

Communications with Single Words

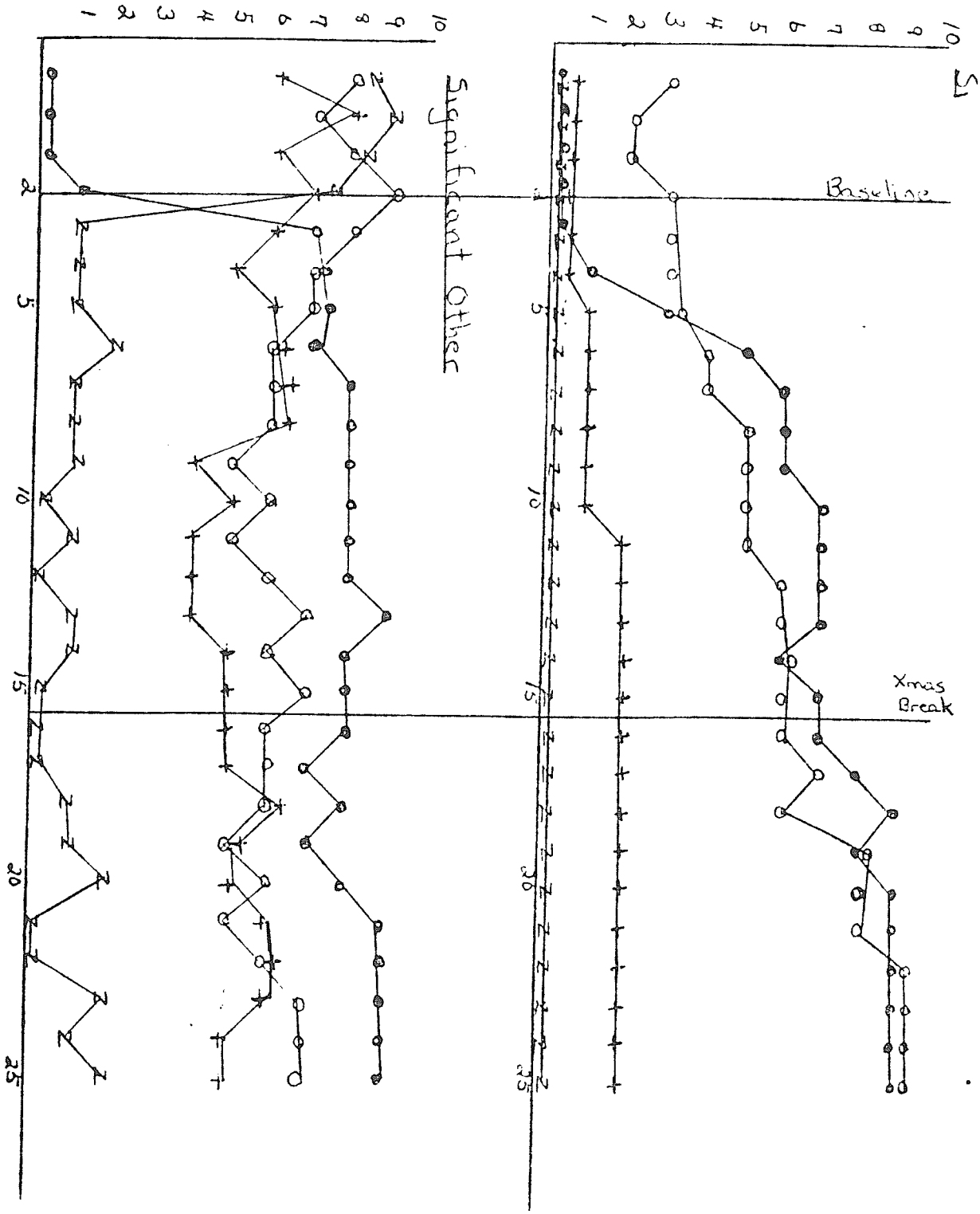
During baseline S_1 did not demonstrate that he had an expressive vocabulary. Between weeks 5-8 he acquired the sign and sounds for the word "up." At week 11 he acquired the sign for the word cracker. Signs that were prompted were not classified as successful communications under this heading. Single word production remained at the seldom level throughout the research.

The significant other's production of single words exceeded these of S_1's in the attempt to provide words to items in S_1's environment, and in the attempt to model communications for S_1. A visual representation of this can be found in Figure III.

Figure 3

Communicates with:

- o body language
- • sounds
- \+ single words
- z 2+4 word combinations



Communicates with 2 and 4 word combinations

Two and four word combinations were never used by S_1 during baseline or during the time of intervention. The significant other used these at the seldom level.

Use

Communicates for Personal Reasons

During baseline, S_1 communicated solely for personal reasons. This quickly dropped to the seldom level by week 11 of the research. S_1 did not interact with anyone in a meaningful fashion during baseline and for two weeks of the intervention. Correspondingly the significant other's communication attempts are at the "zero" level for this form of communication. Figure IV visually represents this data.

Instrumental Reasons

During baseline, S_1 seldomly approached another individual to manipulate or receive something. Shortly after intervention began, S_1 began demonstrating communication for instrumental reasons. Examples of these would be, requesting to be lifted up, request of a food item, come open the door, get the key, sit down and seeking attention by biting hand or crying directly in front of the significant other. The number of the instrumental communications rose gradually to the frequent level by week 16.

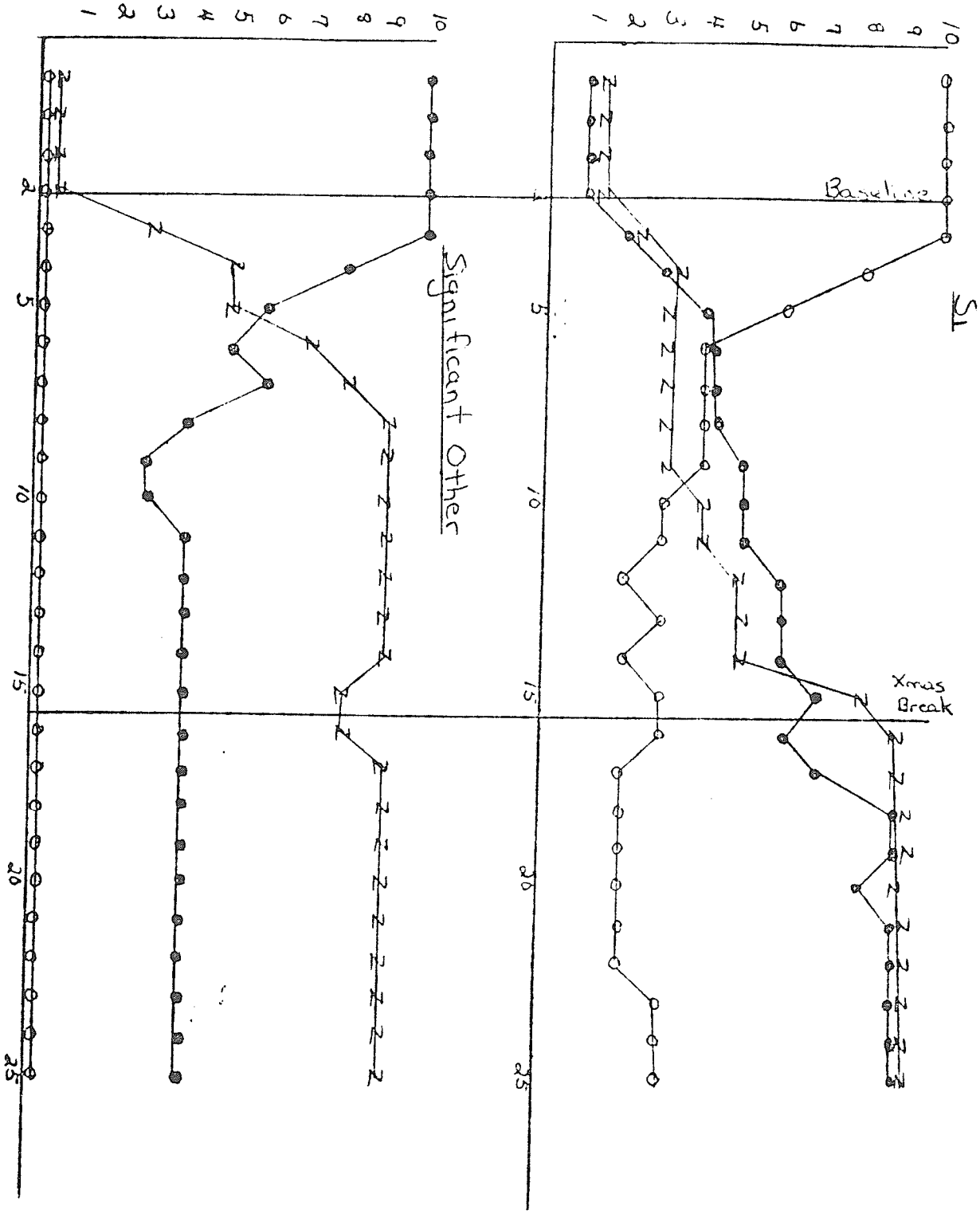
The significant other began by making demands on S_1 during the Baseline and 1st week of intervention at the all the time level. As S_1 became more responsive and demanding the level of the significant other's communications for instrumental reasons diminished accordingly. This was in an attempt to match the level of communication produced by S_1. The results of this interaction can be found in Figure IV.

Communicates for Social Reasons

During baseline, S_1 would interact with another person at the low end of the seldom level. By week 13 of the research, S_1 was communicating at the occasional level (4) for social reasons. At this point there was a large jump to the upper end of the frequent level. This indicated a point when S_1 would engage the significant other in long series of "sound play." As well at this point, S_1 frequently played lift me up or piggy back with the significant other. Other frequent play activities would include tickle me. Less frequent occurrence was drum playing, ball rolling, truck rolling, and hand clapping. S_1 would sit and attend and take his turn through the various circle time activities; many of these circle time activities would have to be prompted but never-the-less he appeared to await his turn. On two occasions he participated in a ball rolling activity with a peer.

Figure 4

Communicates for: z social reasons (be with another)
o personal reasons (e.g. makes body language, sounds or words with no clear intention to communicate.
• instrumental reasons (manipulate others



As the need to manipulate S_1's behaviour decreased there was an increase in the significant other's communication for social reasons. This reflected the need to progressively match the child's responses as stipulated in the E.C.O. program (MacDonald and Gillette, 1982).

Observations not measured by the E.C.O.-Map

There were a number of significant observations that weren't measured by the E.C.O.-Map. These were 1. increase in time on task, 2. increase in length of "sound play", 3. occurrence of the independent use of specific signs and words, 4. production of novel sounds, 4. the development of a receptive vocabulary, 5. the beginnings of social interactions with peers, and 6. generalization of acquired behaviours.

S_1's ability to remain on task increased significantly. He would engage in a 40-40 minute circle time. He would work with his significant other over a period of 40-60 minutes. He would sit through a 90 minute movie. This is in contrast to the general lack of purpose to any of his behaviours during baseline. See Figures I and IV.

Over the course of the study, S_1 increased his length of "sound play" from non-existent to a span of over three minutes. This became a favourite play activity. He would attempt to engage adults other than his significant others in this activity.

Besides the increase in time of sound play, S_1 would produce novel sounds, i.e., sounds that were not observed previously. These sounds were "d," "m," and "p." The "d" sound occurred perhaps in response to doughnut. The "m" sound could not be connected to any specific item. The "p" sound formed the last letter in the word up.

S_1 developed a small vocabulary of independent signs and words. He acquired the sign and word up. He acquired the independent use of the sign crackers. After the research was completed he began using the sign for potato chip independently. As well, he could produce a number of signs with minimal prompting, which suggested that these would be used independently some time in the future.

There was reason to believe that S_1 was acquiring a receptive vocabulary. In a completely different setting from the classroom when asked by the audiologist to touch his nose and then his mouth respectively, S_1 responded correctly. Touching body parts was part of a circle game that had been played in the classroom.

Informal generalization probes were taken throughout the intervention period. S_1 was observed in different settings, at different times and with different people and different objects. S_1 would engage in sound play with unfamiliar adults in the school. He approached other adults in the school to participate in similar play activities, i.e., such as pick me up and twirl me. His attention was

maintained in other settings and times such as music, where a similar type of "circle" procedure was employed. S_1's Mother reported similar changes at home, i.e., increased attention, increased vocalization, and increased communication attempts. He initiated without prompting rolling a Tonka truck between himself and a significant other. It is assumed he generalized this from rolling a ball.

Baseline S_2

S_2 was an eight-year old Down's Syndrome boy. He had been described as selectively mute. He appeared to have a large vocabulary as he would respond to pictures appropriately, could count to 15 and knew the names of most foods that were made during snack and cooking time. He would only offer verbal interchange when asked or prompted in some other manner. When he responded he primarily used single words. He had difficulty with multi-syllable words and with word phrases that were comprised of two or more words.

During baseline S_2 did not interact spontaneously with either the adults in the classroom or other children. He would respond to adults with a whispered tone, when approached. His favourite toys were farm animals, particularly horses and various toy vehicles. As S_1's intervention began and the significant others began to

imitate S_1's sounds, S_2 began to imitate S_1. These imitations of S_1's would be used by S_2 spontaneously as a communication with adults.

A possible explanation for S_2's behaviour lay in a common criticism of strict behavioural language programs (Harris, 1975). Perhaps S_2 had learnt his vocabulary items out of the context of their intended use. Perhaps communication meant for him, a response to a question by an adult who presented a visual stimulus. S_1's play vocalizations received an immediate positive reaction. Perhaps S_2 wanted the same response from the adults and rationalized that similar language from him would net the same results. He did not know how to use his own vocabulary to achieve the same result, i.e., attention from an adult.

Plan for Intervention

As S_2 had an expressive vocabulary but did not use it functionally, it was determined that the focus of intervention would be to provide S_2 with the tools of conversation. Turn-taking within the context of play and functional situations would be developed.

The first target for S_2 was that he develop a play relationship with an adult. The significant other would join S_2 in a parallel play fashion, in a non-contingent manner. The significant other would add one to two word expression to the play activity, e.g., horse run.

Another area of intervention was snack time. It was decided that S_2 would have to verbally request the food item desired by naming it, e.g., cheese and crackers. In addition he would have to count the number of pennies in his possession and exchange these for the food item.

S_2 Major Trends

Initial intervention was not successful. As S_2 was more capable, the significant others felt that he could be made to progress more quickly. Though attempts were made to follow S_2's lead, the significant others found themselves trying to structure the activities. This lead the interchange away from S_2's interests and created dead end contacts. S_2 would become a passive observer rather than a participant. This allowed for little opportunity for the occurrence of turn-taking and the development of a conversational interchange. In becoming directive, the significant others often found themselves violating the minimal discrepancy principle.

Up to the 15th observation progress was slow. S_2 was not making substantial progress. An observation involving a significant other and S_2 made it apparent that the significant others were being overly directive. At this point it was re-emphasized that the significant others would participate only in activities that S_2 initiated. The significant others would engage in parallel play with S_2

taking care not to be directive. From the 15th observation onward, S_2's play began to assume co-operative characteristics with longer sequences of turn-taking, comprised of gestures and vocalizations.

Receiving a food item at snack time was made contingent on S_2 counting out the pennies in his possession and giving these to a significant other. As well, S_2 would have to verbally identify the food item he desired. S_2 required prompting at first and by the 10th week observation would request the food item without prompts. Some modelling of the name of an unfamiliar food item was required and prompted throughout the observation period. S_2 imitated and acquired new vocabulary readily.

S_2 Analyses of the E.C.O.-Map of Communication

1. Interacts/Communicates

During baseline S_2 interacted and communicated at the middle range of the seldom level (2). As the intervention began, S_2 registered only a very small gain by the 15th week to the upper end of the seldom level (3). At this point it was determined that the significant others were being overly directive, didacted and not following the child's lead. They structured activities that didn't reflect S_2's interests. In being didactic the significant others failed to imitate S_2. Corrective procedures were taken and S_2 demonstrated an immediate increase in his interactions and

communications.

Between weeks 23 and 28, S_2 was interacting/ communicating at the lower end of the "frequent" level (7). During the entire research period the significant others were rated as functioning at the "all of the time level." This did not reflect the type of interaction.

A visual representation of this can be found in Figure V.

2. Initiates Contact

During baseline S_2 initiated contact at the lower end of the seldom level. This remained constant through week 15 of the research. At this point there was a dramatic change to more initiations of contact. This was reflected by the rating of occasional (5) at week 18. It remained at this level for the duration of the intervention. The jump can be attributed again to a change in the significant other's interactive patterns. Significant other initiations decreased as S_2's increased.

A visual representation of this can be found in Figure V.

Responds to Contact

During baseline, S_2 responded to contact at the lower end of the occasional and the upper end of the seldom level. This remained constant through the 15th week of the research project. From this point onward there was a steady increase

to "responding" at the upper end of the "frequent" level. This change was attributed again to the change in the interactive patterns of the significant others at week 15. The significant other's response to contact was in the "all of the time" range throughout baseline and intervention. It reflected the significant others' willingness to interact with S_2. Visual representation of this interaction can be found in Figure V.

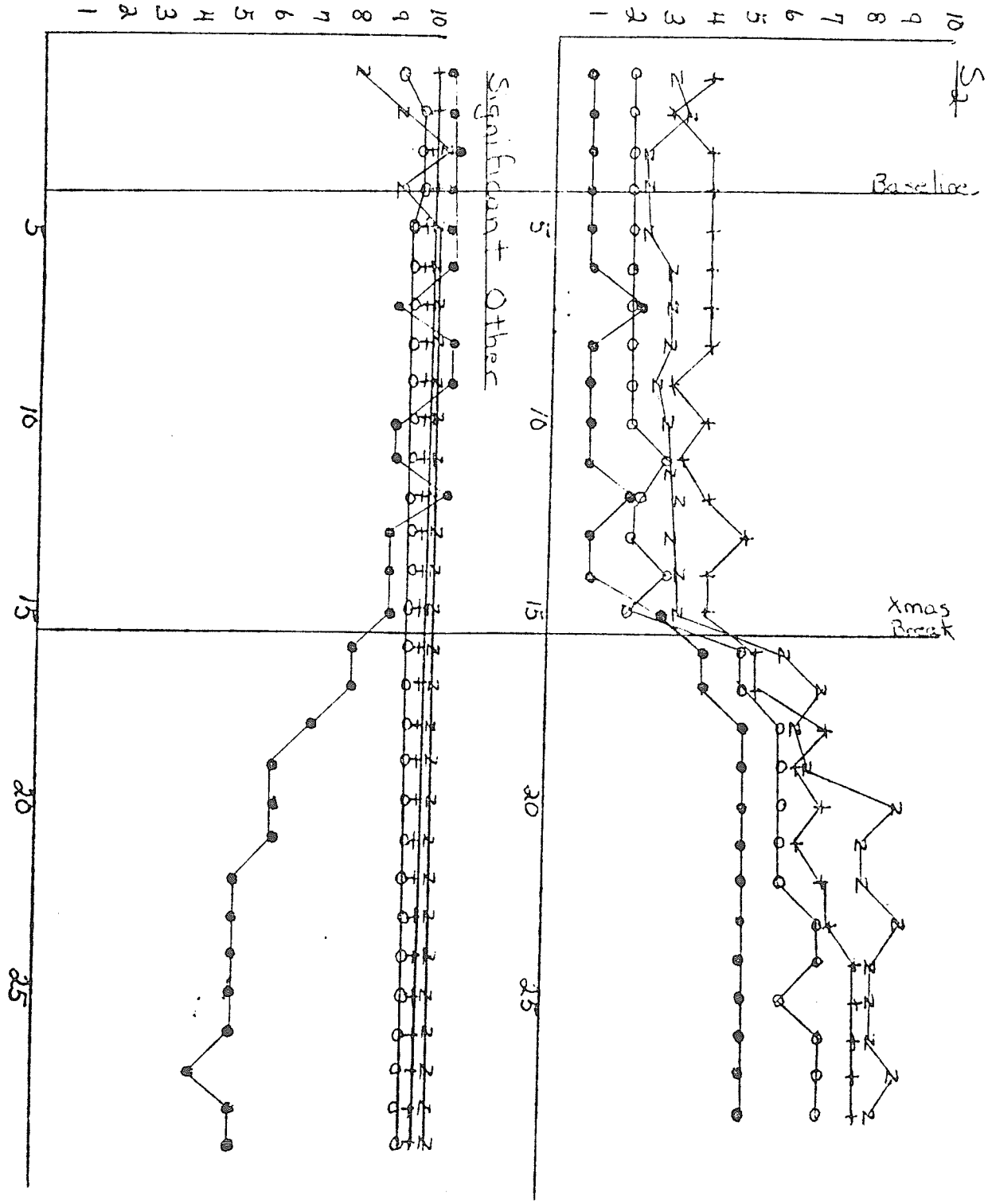
Maintains Contact

During baseline S_2 maintained contact at the seldom level. This showed a slight gain up to week 15 of the research project. At this point there was a large improvement in this area to the upper end of the occasional level. This increased to the frequent level by week 17 and remained at a high level for the rest of the intervention. Again this jump can be attributed to the change in the interactive pattern of the significant others. Throughout baseline and intervention, the significant others maintained contact at the "frequent" and "all of the time" levels. Again this indicated the significant other's desire to interact with S_2.

Visual representation of this interaction can be found in Figure V.

Figure 5

o interacts communicates
• initiates contact
+ responds to contact
z maintains contact



Turn-taking

Takes one or two turns with actions

During baseline S_2 used one or two turns with actions at the lower end of the occasional level. This level remained constant with slight drops and rises up to week 15. At this point there was a steady increase in the occurrence of one and two turn interactions. This quickly rose to the frequent level by week 21. This again can be accounted for by changes in the significant other's interactive pattern. The significant other would participate in imitating S_2's sounds. S_2 would respond with another. The significant other would play along with S_2 in parallel play fashion. Gradually this took the form of co-operative play (e.g., S_2 would take the horse for a ride in a truck, then the significant other would imitate, followed by a turn of the same activity, followed by a turn by the significant other). The significant other would non-contingently add one-two words to describe the activity. S_2 would often respond with a vocalization and action and engage in a series of turns, e.g., The significant other would say "truck crash," S_2 would respond with the truck sound "rrr" move the truck and crash it into another vehicle and say "crash" or "boom." Visual representation of this interaction can be found in Figure VI.

Takes 3+ turns with actions

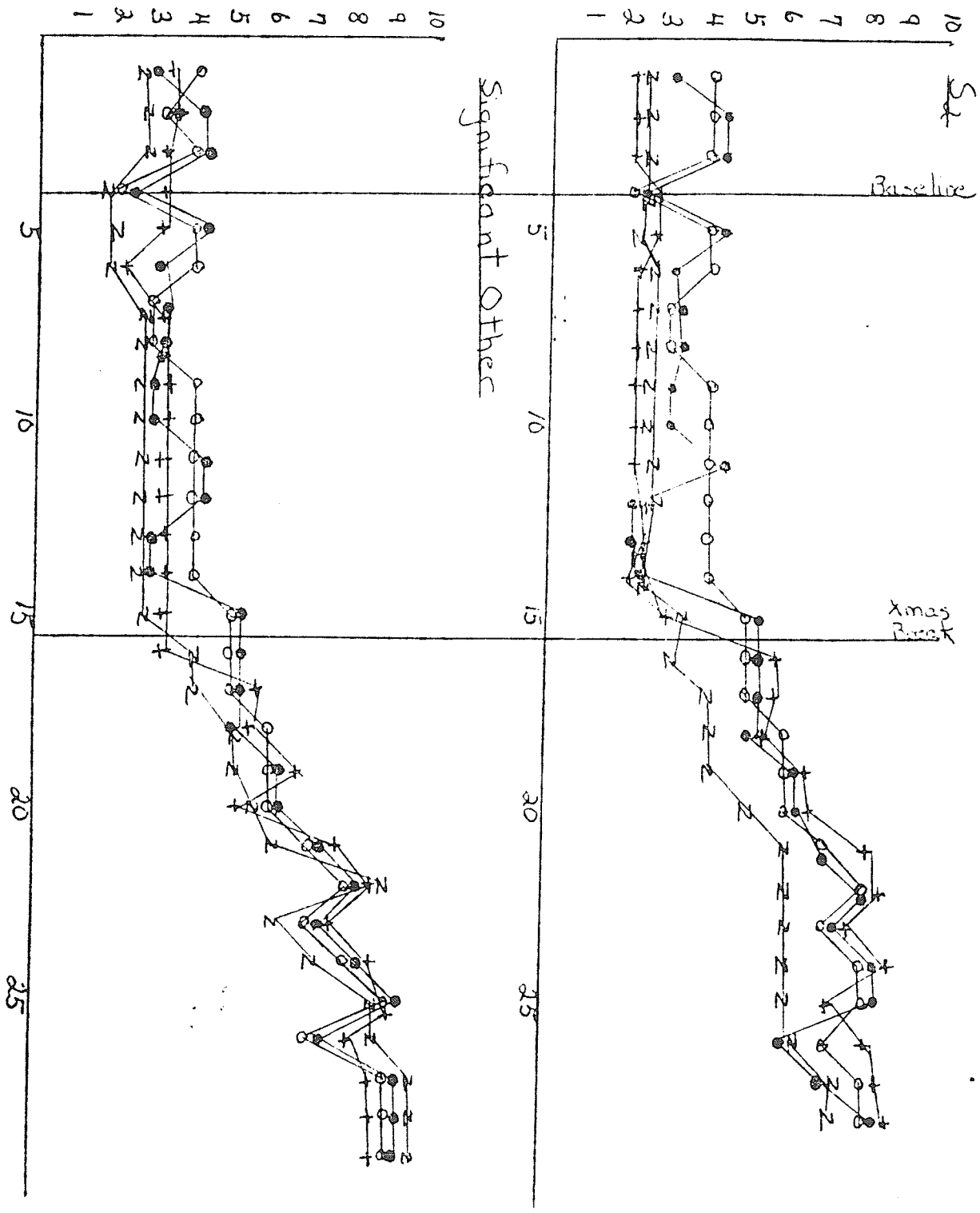
Baseline reflected that S_2 responded at the low end of the occasional level. At the commencement of intervention this fell to the seldom level, with some small rises and falls. At week 15 there was a small jump to the occasional level. From this point there was a gradual increase to the frequent level. Again the sudden rise is explained by the change in interactive patterns of the significant others. The significant others and S_2 would engage in activities similar to those described in the previous heading only continuing these over a period of 3 turns. Other activities that would usually involve 3+ turns were 1. blow air out of lips when lips were pressed against the hand, 2. pursing lips and blowing air between them, 3. chasing round a circle, back and forth, and 4. taking turns following while pushing a truck. Figure VI represents these changes.

Takes 1-2 turns with communications

During baseline S_2 used communications involving 1-2 turns at the seldom level. This remained constant through week 15 of the research. At this point there was an increase in the occurrence of this observation target. By week 21 it was occurring at the frequent level. Again the change in significant other's interactive patterns accounted for the increase in turn-taking, e.g. If S_2 was playing with his horse, the significant other would join in a

Figure 6.

○ 1 to 2 turns with actions + 1 to 2 turns with communications
● 3+ turns with actions Z 3+ turns with communications



parallel play fashion. Often S_2 would be making a sound or saying a word. The significant other would imitate. Usually S_2 would repeat and add another word. If the significant other imitated the horse sound "ee hee hee hee" S_2 would sometimes respond with "horse," or move the horse in some manner and say "horse." The significant other would label the horse's actions with words. The turn-taking pattern involved S_2 making a sound --> the significant other imitates --> S_2 would make a sound and action --> the significant other adds a word to describe the action. Throughout baseline and intervention the significant others kept an equal turn balance with S_2. Figure VI represents the interaction visually.

Takes 3+ turns with communications

During baseline S_2 engaged in 3+ turns at the seldom level. This continued through the 15th week of the research. At this point there was an increase in 3+ turn behavior. It rose quickly to the high end of the occasional level and at the end of the research at week 28 it had reached the frequent level. Interactions, similar to those described under the previous turn-taking headings took place, except that they occurred over 3+ turns. A rise in the turn-taking level was attributed to changes in the significant others' interactive pattern. Again a turn balance existed between S_2 and the significant others.

Figure VI represented the above interaction.

Mode

1. Communicates with body language

During baseline, S_2 used body language at the low end of the occasional level. This rose slightly at the commencement of intervention and climbed gradually to the frequent level. There was a rise in this form of communication regardless of the interactive pattern of the significant other. There was a slight jump at week 15. The level of body language displayed by the significant others remained constant throughout baseline and intervention. There were a few slight increases and decreases. The significant other's attempted to keep the body language at a low level so that he/she could model more conventional forms of communication. Gesture was primarily used while imitating S_2. Some of the gestures S_2 used were 1. smile and laughter, 2. sitting down with arms and legs crossed, accompanied by a pout on the face indicating I'm not going to do it, e.g., refusing to get ready for recess, 3. pulling toys towards himself, indicating go away, 5. roughhousing, indicating enjoyment of the company of others, 6. facial expressions that indicated sadness happiness, disappointment and anger. Figure VII gives a visual representation of the occurrence of gesture.

Communicates with sounds

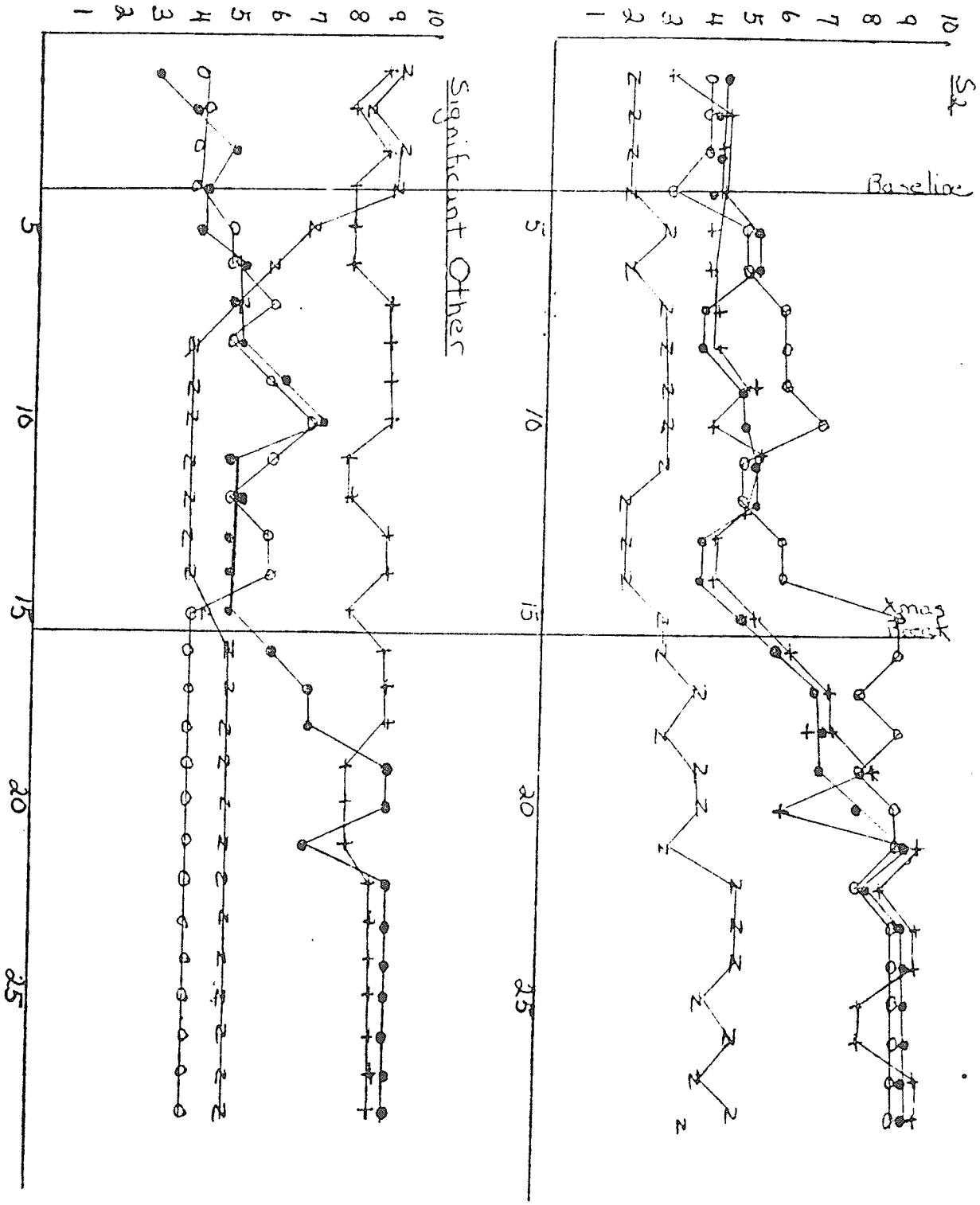
During baseline, S_2 used sounds at the low end of the occasional level. This remained constant with a slight increase at week 9, up to the 15th week of intervention. At this point there was a quick rise to the frequent level by week 18. It remained at the frequent level throughout the rest of the intervention. The sharp rise can be attributed again to changes in the significant others' strategies. The significant others consistently matched S_2's frequency of sound. S_2 used sounds for the various farm animals. He used the sounds that cars or trucks made. He cried or laughed. He made a sound by pressing his lips against his arm and blowing. He made a sound by blowing air through pursed lips. The frequency of sounds are displayed on Figure VII.

Communicates with single words

During baseline, S_2 responded at the high end of the seldom level and the lower end of the occasional level. This performance remained constant with slight variations to the 15 week period. Again at this point there was a jump to a higher level of performance. The incidence of single words rose quickly to the frequent level by week 18 and remained at this level for the rest of the study. The change in significant other strategies accounted for this quick improvement. When S_2 spoke he used a single word

Figure 7

Communicates with:
- o body language
- • sounds
- + single words
- z 2+4 word combinations



accompanied by the sound that the play object made or an action that the play object made. The word and sound or action conveyed greater meaning than the word alone, e.g. "truck" and moves the truck and crashes the truck into another vehicle making a crash sound, or "horse" and makes horse sound and moves the horse in a run or jump manner. During baseline and intervention the significant other used a high level of single word utterances. This was to model and put words on S_2's surroundings. Figure VII illustrates the interaction.

Use

Communicates for Personal Reasons

During baseline S_2 was rated at the upper end of the "seldom" level for this category. This behavior remained constant through the 15th week of the research. After the change in the significant other's interactive patterns, S_2 became noticeably more vocal and communicative. This held true whether S_2 was playing in a solitary, parallel or co-operative play fashion. The increase after week 15 shows S_2's response to the changes in the significant others' behaviours. During baseline and intervention the significant other's level of interaction for this category remained at the zero level. The significant other's intent was to interact with S_2. Figure VIII illustrates this interaction.

Communicates for instrumental reasons

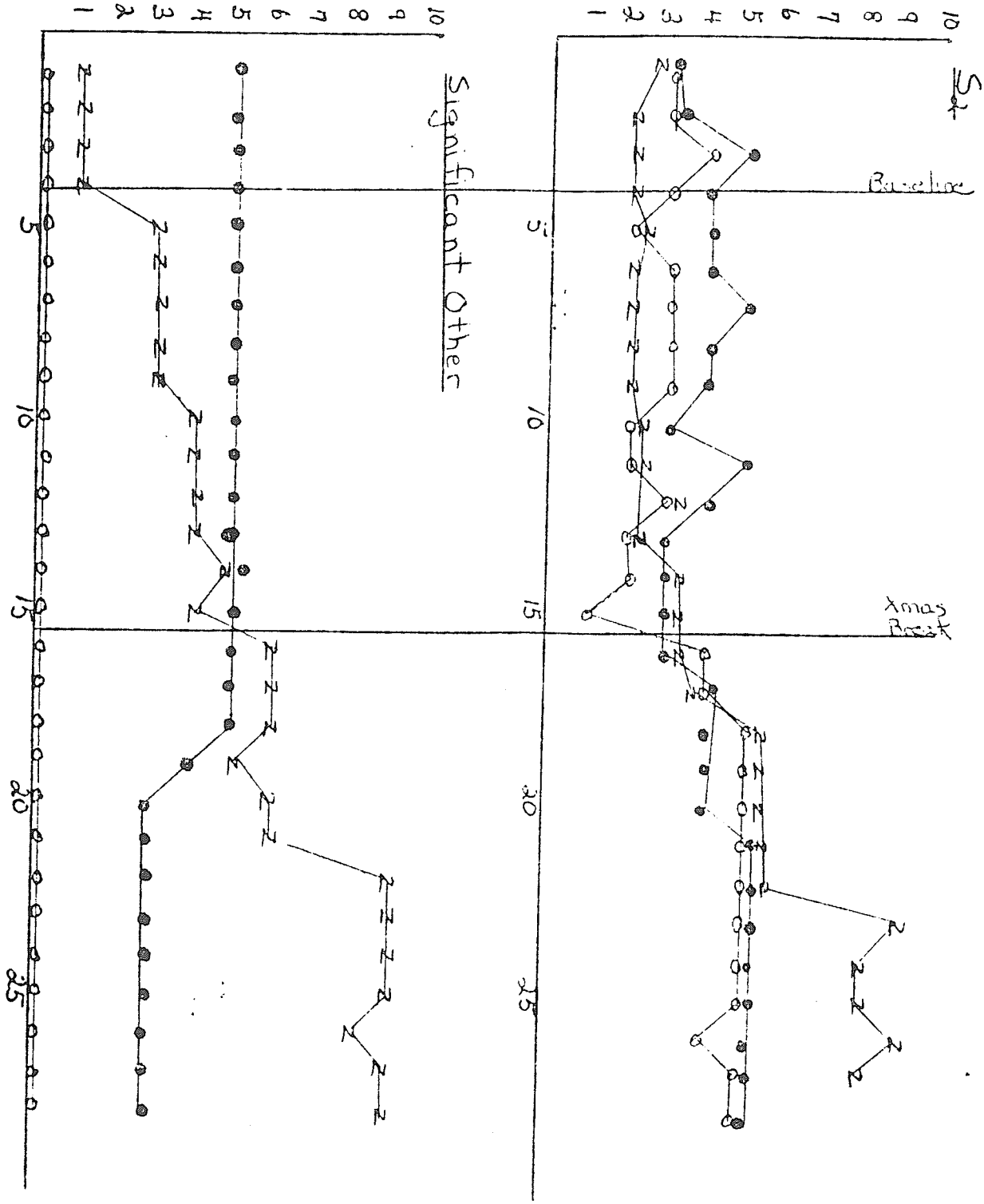
Baseline demonstrated fluctuation from the seldom to the occasional level in this category. This fluctuation continued throughout the rest of the study achieving two series of long plateaus after week 15. Significant other interaction at this level remained constant at the low occasional level. Examples of S_2's communication for instrumental reasons often involved gestures. He sat on the floor crossing his arms and legs with a stern look on his face indicating, I'm not complying, he pushed other children out of his way, turned his back to peers or hoarded play objects. Vocalizations occurred when he requested food at snack time or a toy at recess. As well, he would say the word "up" when requesting to be picked up and twirled around.

Communicates for Social Reasons

During baseline S_2's interaction in this category was at the seldom level. This continued up to the 15th week. At this point there was a change in the increase of communications for social reasons. S_2 became more vocal and demonstrative in his interactions with the significant others. As well, it was noticed that S_2 became more communicative with his peers during play time. Words occurred mainly in the interactions with the significant

Figure 8

Communicates for: z social reasons (be with another)
o personal reasons (e.g. makes body language, sounds or words for practice with no clear intention to communicate
● instrumental reasons (manipulate others)



others. Interactions with his peers involved participating in an activity, e.g., chase or truck play. A minimal number of words would be spoken, but these would be a large number of vocalizations. These vocalizations would include laughter, interchanges of funny sounds, production of vehicle noises when playing with the toy vehicles, monster sounds when playing with toy monsters. The incidence of long interchanges of communication with both significant others and peers increased significantly after the 15th week. Figure VIII illustrates this change in behavior.

Snack Time Intervention

Snack time did not prove to be a good occasion for practising conversational skills. The expectation at this time was that S_2 would exchange pennies for a desired food item; concomitantly stating the name of the food item. If S_2 did not know the food item it would be modeled by the significant other and S_2 would be expected to imitate. After S_2 made a successful imitation; usually the first try, he would receive the food item. It was felt that the nature of the activity did not lend itself to the practising of turns. It didn't make sense that S_2 would have to request a food item 3 or 4 times in order to receive it. Snack time became a dead end interaction in that S_2 requested --> was given --> sat down and ate. The activity did not lend itself to more than a single turn.

Observations not measured by the E.C.O.-Maps

Generalization

The direction of generalization for S_2 moved from significant others to peers. When S_2 became more demonstrative and verbal with the significant others he quickly generalized these interactions to his classmates. Games or activities which were originally played with significant others became part of S_2's interaction with his peers, e.g., chase games, truck and animal play. These interactions were generalized to other times and settings, such as recess and lunch break. However, generalized behavior occurred only with familiar peers or adults. This might be a reflection of S_2's shyness.

Interpretation of Results with Respect to Multiple Baseline Design

During baseline both subjects demonstrated very little change. With the commencement of intervention S_1 began to show a change in his communication behaviours. Observations of the significant other showed a parallel change. S_2 did not demonstrate an immediate response to intervention. Parallel results were noted in the significant others' interaction patterns.

CHAPTER V

DISCUSSION OF THE RESULTS

Introduction

S_1 and S_2 were extremely different children. S_1 began the program with virtually no language and few interests whereas S_2 had an expressive vocabulary but did not use it functionally. Each subject's handicapping etiology was different in that S_1 was termed autistic while S_2 was classified as Down's Syndrome. Because the starting abilities of the subjects were dissimilar different aspects of the E.C.O. program were used as the starting points for intervention. The progress that has been observed will be discussed in reference to the aspects of the E.C.O. program which affected the development of the subjects.

S_1

Generalization/Training in the Natural Environment

Instruction of S_1 took place in the classroom. He would participate in group activities such as circle time. As well, one-to-one interaction with his significant others took place in the classroom setting. It was felt that the classroom approximated what was meant by "natural environment." MacDonald and Gillette (1982) expressed that it was necessary to train the child in the natural environment in order to promote generalization. S_1

generalized his behaviors to other people, places and to other objects as well as across times. Besides using his repertoire of behaviors in other novel school settings and with novel school personnel he took these behaviors home and used them with his parents and sibling.

Following the Child's Lead, Entering the Child's World, Topic Control

Following the child's lead, the need to enter the child's world and the issue of topic control are related factors. They are discussed under the heading of "Responsiveness" in the literature review. These strategies are promoted by the E.C.O. program. In developing the program for S_1 the researcher attempted to determine the interests and abilities of S_1. Food appeared to be the only interest of S_1. Sound production was one of his few abilities. One activity that S_1 enjoyed was being picked up and twirled. In keeping with the need to follow the child's lead, etc., it was decided to use food, sound production and the pick-up activity as the points of intervention. This was shown to be effective, as S_1 developed a repertoire of signs and words around the food and pick-up activity. Simple sound imitation lead to sound play, turns with sounds and to S_1 imitating the significant others' sounds. Based on these positive results this research supports the need to follow the child's lead, etc.

Imitation

MacDonald and Gillette (1982)state that the best way to get a child to attend and take turns is to imitate exactly, e.g., facial expressions, body movements and sounds. This research project would support this statement. The effect of imitation, had an almost immediate effect on the number of vocalizations produced by S_1. This eventually led to turn-taking with vocalizations. And as noted in the results section, S_1's time on task increased significantly during the course of this study. As well, imitation of movements led to the occurrence of turns. S_1 would respond with turns with hand clapping or drum playing.

Cues, Physical Prompts and Time Delay

MacDonald and Gillette (1982) recommend the use of prompts and cues. They state that it is important to give obvious signals to cue a child's turn when initially instructing language. They state that physical prompting may be necessary if all else fails. The researcher employed both these techniques in order to procure a response from S_1. When S_1 was initially developing his signs that related to foods the significant other would physically prompt the entire sign. This gross prompt developed into a touch on the hand. This touch on the hand was enough to signal an independent attempt at the sign. This gradually gave way to simply waiting. This wait was enough to cue a response.

Drum playing, ball rolling and hand clapping were three turn-taking activities which initially were physically prompted.

Progressive Match: Shaping

MacDonald and Gillette (1982) incorporate the use of progressive match. This technique was employed with S_1 as more accurate approximations were gradually required. This technique was successful in teaching two independent signs and close approximations of four other signs. It was also used in the training of the word up. This technique was being used in teaching the word ball. At first high level of prompts were used. These were gradually faded as the subject became more independent in the production of the targeted sound.

Turn-taking

According to MacDonald and Gillette (1982), turn-taking is the basic structure or strategy of interactions and conversations. By the end of this research, S_1 had begun to independently turn-take with both actions and sounds. Cueing and prompting of turn-taking and imitation were determined to be the precursors of this development. The turn-taking occurred during activities that S_1 had learned to perceive as enjoyable, e.g. sound play, hand clapping, drum playing, ball rolling. Its occurrence was related to

the type of activity and the ability of the significant other to participate as a play partner in the activity (following the child's lead, being a nonjudgemental play partner). Whether or not turn-taking with sounds and actions progresses to turn-taking with words or signs is not established at this point of the research. In specific instances of this research turn-taking with sounds or signs preceded turn-taking with actions and sounds. This occurred during "request" type situations at snack and play. Snack time allowed for the practice over a number of turns the name of the food item, because of the promise of the powerful reward that this food item provided. It has been mentioned previously that S_1 enjoyed being picked up and twirled. This activity was made contingent on S_1 saying or signing the word up. This allowed for the practice with turns of this word ensuing in the reward of the activity.

Importance of Significant Other Interactions

Initial interaction with S_1 employed both direct and non-contingent intervention. The snack-time activity was a normal part of classroom functioning. The procedures around snack time were both directive and non-directive. They were non-directive in that food was one of the few interests that S_1 possessed and the use of food was in a sense "following the child's interests." However at the commencement of the snack time activity, frequent use of physical prompts were

used. (The use of physical prompts is a highly directive procedure.) With time these prompts were gradually faded. S_1 had a very loose classroom program which facilitated non-contingent interaction with the significant other. S_1 was allowed to ask for food at any time. This permitted him to practice his signs throughout the day and led to the complex food closet interaction (this suggested a more complex cognitive awareness in S_1 than was at first apparent). The word play activity was a consequence of non-contingent interaction, and reflection of the attempt to follow the child's lead. Initial turn-taking during "play" situations was physically prompted. These prompts were gradually faded as S_1 began to like the activity and sought interaction with the significant other; the object being to lessen the degree of direction as S_1 became more independent in his interaction.

$\underline{S_2}$

Generalization/Training in the Natural Environment

Instruction of S_2 took place in the classroom environment. This included one-to-one interaction with his significant others, as well a group instruction which involved his classroom peers. The classroom functioned as the natural environment. The importance of training in the natural environment for the purposes of generalization has

been discussed in the literature review and as elsewhere in this study. S_2 generalized his language behaviors to other classroom adults, classroom peers and to other times and settings such as recess, lunch time and the school play ground. As S_2's program progressed he became more vocal and demonstrative in all the settings mentioned. S_2 did not generalize his language behaviors to novel adults and novel peers. His natural shyness was probably a primary factor in the lack of generalization in this area.

Following the Child's Lead, Entering the Child's World, Topic Control/Significant Other Interactive Pattern

S_2's intervention was an example of the effects of following the child's lead, the need to enter the child's world and the issue of topic control. Up to the 15th week of the research S_2 was making little progress. At this point it was determined that the significant others were being over directive. As modifications to the significant others' strategies took place there was a significant change in S_2's responding behavior. Up to this point the significant others tried to be instructive. They were judgemental in that they tried to extinguish behaviors that they felt were maladaptive and disruptive, e.g., funny noise making. The significant others ignored S_2's interests and tried to teach what they considered important language items. S_2's interests weren't completely ignored. However,

the focus of interaction took the significant others and S_2 away from the subject's primary interests. These findings corroborate the importance of following the child's lead, entering the child's world and the importance of topic control. Concomitantly they support the need to monitor the significant other's strategies.

Imitation

Non-contingently imitating S_2's language and play behaviors had the effect of stimulating increased frequency of the behavior and increased turns involving the behavior. When the significant other participated in a play activity at S_2's level, imitating S_2's gestures, vocalizations and movements, S_2 became more animated and responded with more gestures, vocalizations, and movements. This would continue over a series of turns.

Turn-taking

According to MacDonald and Gillette (1982) turn-taking is the basic structure of interactions and conversations. Two strategies that were applied to S_2's program were effective in promoting turn-taking. As already mentioned, imitation had a positive effect. The other strategy was following the child's lead. Participating in child directed activities seemed to lead to turn-taking opportunities. These child directed activities allowed S_2 to become more

animated and vocal. The significant other would respond and this would lead to a interchange of sounds, words or actions around the activity. Specifically, practising turns was unnecessary with S_2 as child directed activities naturally lead to turn-taking behavior between the significant other and S_2.

Cues, Prompts and Progressive Match

These strategies weren't employed extensively with S_2. The researcher believes that these strategies will be of use once the intervention moves away from non-contingent interaction with S_2. There will be a need to encourage small changes towards a more conventional use of language, e.g., with S_2 this would mean the use of more single words.

Turn balance S_2:

One of the primary goals of the E.C.O. model of language is to achieve spontaneous conversations in which on the average there is a balanced exchange of turns between the child and the significant other. During the course of this research there did not appear to be a difficulty in achieving turn balance with S_2. If the contact was a dead end, there would be an exchange of a maximum of one turn. If the activity was child directed it consequently lead to a greater opportunity to exchange turns.

Summary of Results

The E.C.O. program was successful in promoting generalization in both S_1 and S_2. S_1 generalized to novel individual, novel settings, novel objects and across time. S_2 generalized to familiar individuals, novel settings, novel objects and across time. As proposed by the E.C.O. program training in the natural environment proved to be an effective way of promoting generalization.

Strategies of the E.C.O. program that proved effective in stimulating conversation in S_1 were: 1. following the child's lead, 2. entering the child's world, 3. topic control, 4. imitation, 5. cueing, 6. physical prompting, 7. time delay, 8. progressive match/shaping and interactive pattern of the significant other, i.e., non-contingent interaction, interaction with prompts and cues with a gradual fading of the cues. There is some question about the necessity to establish turn-taking in the order of action --> sound --> word.

There were two important factors in S_2's intervention. The most significant factor in S_2's intervention was the change in the significant others' interactive strategies. These changed from being directive and didactic to non-contingent. As a result of this the significant other began to follow the child's lead and through his/her interactions entered the child's world. Imitation was the other important factor in S_2's intervention. Turn balance was

achieved whether or not the contact was a dead end or progressive. Turn balance in itself is not an indication of a positive direction in the intervention. However, it is a desirable goal with turn-taking lasting longer than one turn. It is demonstrative of an equitable interchange between individuals.

Evaluation of the Hypothesis

The hypothesis states: When applied to trainable mentally handicapped subjects the Ecological Communication Opportunities will have a positive effect on 1. conversational ability and 2. generalization.

S_1

Based on the results, the E.C.O. program had a positive effect on the conversational ability of S_1. The various strategies employed by the E.C.O. program were effective tools for promoting conversation.

Based on the results the E.C.O. program was successful in stimulating generalization.

S_2

Based on the results the E.C.O. program had a positive effect on the conversational ability of S_2. The various strategies employed by the E.C.O. program where effective tools for promoting conversational ability.

Based on the results the E.C.O. program was effective in promoting generalization.

Discussion of the Multiple Baseline Design Results

S_1 and S_2 responded differently to intervention. S_1 showed an almost immediate response to intervention whereas S_2 showed little gain until the fifteenth week. One explanation of this difference is that the interactive pattern of the significant other hindered an improvement in S_2's communication behaviors. Once this interactive pattern was rectified S_2 began to demonstrate an improvement in his communication behaviors. In effect S_2's baseline extended over fifteen weeks rather than the four, as noted.

Conclusions

The E.C.O. program was shown to be an effective tool for teaching conversational skills to two trainable mentally handicapped children. One child was diagnosed as autistic. The other child was Down's Syndrome. MacDonald and Gillette (1982, 1985) have defined conversation in terms of turn-taking. They state that turn-taking is the basic structure or strategy of interactions and conversations. They assert that turn-taking involves two persons acting or communicating in conversations with each other. Turn-taking evolves in the direction of action to sound to word. Both subjects increased the number of turns they look during

intervention. These turns involved either gesture, sound or word or combinations of these.

The E.C.O. program was shown to be an effective tool in promoting generalization. S_1 generalized his behaviors to novel adults, classroom peers, new settings and to different times. S_2 generalized his behaviors to familiar adults, classroom peers, novel settings and to different times. The fact that S_2 did not generalize to novel adults might be explained by his shyness.

Because the two children in this study were of extremely different handicapping etiologies there is promise that the E.C.O. system will be an effective tool in teaching children generalizable conversational skills regardless of their handicapping condition. However, because the sample size in the study is small general conclusions can't be made. There is a need to replicate these procedures.

As the starting abilities for each subject were different, different strategies were employed with each subject. S_1 required direct intervention in the form of physical prompting and cues. Differential reinforcement was used to shape the production of specific sounds. Time delay or waiting was an effective tool in stimulating a response. The positive results that S_1 demonstrated lend credence to the effectiveness of these strategies when applied to language training. The effectiveness of these strategies as employed in behavioral language programs has been documented

by Harris (1975). This research corroborates the work of Halle, Marshall, Spradlin (1979) by demonstrating the positive effect of time delay in eliciting responses. There is some question whether the use of behavioural strategies during the initial stages of S_1's program is within the limits of the E.C.O. program.

E.C.O. puts to use theories and strategies found in the Ecological and Pragmatic perspectives on language acquisition. These theories and strategies were applied to both S_1 and S_2. They included Following the Child's Lead, Entering the Child's World, Topic Control, and monitoring Significant Other Interactions. This study has demonstrated the importance of all these strategies for language intervention. The techniques of entering the Child's World, Following the child's lead and Topic Control played a significant factor in the initial states of S_1's program. They helped set the starting point, gave a direction and helped develop the manner of interaction. The importance of these techniques were apparent in S_2's intervention. When S_2's interests were ignored and he was not allowed to set the direction in the interaction little progress was made. When this was rectified almost immediate gains were observed.

Because the starting abilities of each subject were different, the significant others had different roles to play during intervention. As S_1 displayed very little

ability to attend, the significant other's initial role required physical prompting, cueing and the use of strong reinforcers such as food during snack time or a desired activity like "up." As S_1's ability to attend improved and his interests increased, the role of the significant other became that of a participant in the child's activities. This combination of interaction patterns was effective. S_2's intervention demonstrated the consequence of over-directiveness on the part of the significant other. When the significant other was being didactic, controlling the topic for interaction and being directive, S_2 demonstrated very slow progress. When the significant other took on the role of a play partner in the activities that S_2 chose improvement in communicative behavior was noted. These findings support the works of MacDonald and Gillette (1982, 1985), Nelson (1973), Olson (1970), Snow (1984), Lieven (1984), and Girolametto (1985).

Imitation had an important effect on both S_1 and S_2. MacDonald and Gillette (1982) found that imitation (adult of child) is an effective means of gaining attention and stimulating turns. These effects were supported by this study. S_1 demonstrated a dramatic increase in his ability to attend. In that turn-taking requires the ability to attend, imitating is an important precursor to this development. S_2 demonstrated a similar reaction when the significant others imitated his actions, sounds and words

during parallel play situations. This had the effect of stimulating turn-taking between the significant other and S_2. Besides gaining attention and stimulating turns, imitation increased the number of vocalizations made by S_1 and S_2. "Sound play" became a favourite activity for S_1. S_2 became more vocal during play situations.

The development of turn-taking is an important aspect of the E.C.O. program. Both S_1 and S_2 developed the ability to turn-take. Turn-taking with S_2 over a number of turns developed almost immediately as a consequence of the type of activity in which he was participating with the significant other. Turn-taking in S_1 developed through the use of physical prompting, cueing and the use of time delay. As S_1 began to respond in a social manner, the turn-taking became a part of his interactive pattern with the significant other. The intervention with S_1 brings into question the belief that turn-taking develops in the direction of --> action --> sound --> word. S_1 developed a turn-taking sequence with the word "up" before he turn-took with sounds and actions. As a consequence of his "sound play" he turn-took with sounds before he took turns with actions.

As the researcher was self-trained in the methods of the E.C.O. program questions can be raised about how accurately the program's procedures were followed and whether, as a consequence of the subjects' abilities and classroom factors the researcher did not follow the exact

instructional sequence recommended in instructional modules of the E.C.O. program. As well, the subjects' developments did not fit the order diagrammed in the modules, e.g., though the intervention did not progress past module I, both S_1 and S_2 were spontaneously demonstrating abilities that were to be trained in Module IV. These were the establishment of social habits, the establishment of instrumental contacts and the establishment of social contacts.

The video-taping had positive and negative outcomes. It allowed the researcher to analyze an interaction more completely; it permitted the researcher and the significant others to discuss the course of an intervention more accurately because of the visual example; it provided comparisons of before and after behavior. The primary draw back of the video-tapings was that the video camera distracted the subjects.

It was found that the observational targets of the E.C.O.-Map developed together rather than as separate units. Practising turns with the significant other or participating in turn-taking activities during circle time would obviously lead to a greater social awareness. An increase in gestural communication would accompany a similar increase in sound and/or single word production.

The multiple baseline design across subjects lends support to the hypotheses. Progress during baseline for

both subjects was flat. When intervention commenced there was an increase in conversation related behaviour.

Implications for Further Study

There are few programs that measure the effect of environmentally based programs on trainable mentally handicapped children. As this research employed only two children there is a need for further investigation.

There is a need to develop a scale which would allow comparisons between a handicapped child's conversational ability with those of a similar aged "normal" peer. This scale could include what percentages of interactions occur with adults; with peers, what percentage of a child's day is spent in solitary play as compared to interacting with another person, what percentage of a child's communication is, gestural, sound or words.

Though not addressed by MacDonald and Gillette (1982, 1985) there is a need to foster interaction not only with adults but with peers. It would be of interest to determine whether the E.C.O. program would promote inter peer interactions.

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APPENDIX I

E.C.O.-Map of Communication Targets

ECO-MAP of Communication Targets
for CHILD (C) and SIGNIFICANT OTHERS (SO)

Child: _____ SO: _____ Situation: _____

Recorder: _____ Date: _____

Key: C = ●; S.O. = X

	N/A	0 None of the Time	1 2 3 Seldom	4 5 6 Occasionally	7 8 9 Frequently	10 All of the Time
INTERACTION/CONVERSATION						
C/SO						
1. interacts/communicates	___	0	0 0 0	0 0 0	0 0 0	0
2. initiates contact	___	0	0 0 0	0 0 0	0 0 0	0
3. responds to contact	___	0	0 0 0	0 0 0	0 0 0	0
4. maintains contact	___	0	0 0 0	0 0 0	0 0 0	0
Takes turns with ACTIONS:						
5. for one or two turns	___	0	0 0 0	0 0 0	0 0 0	0
6. for three or more turns	___	0	0 0 0	0 0 0	0 0 0	0
Takes turns with COMMUNICATIONS:						
7. for one or two turns	___	0	0 0 0	0 0 0	0 0 0	0
8. for three or more turns	___	0	0 0 0	0 0 0	0 0 0	0
MODE:						
9. C/SO communicates	___	0	0 0 0	0 0 0	0 0 0	0
10. with body language	___	0	0 0 0	0 0 0	0 0 0	0
11. with sounds	___	0	0 0 0	0 0 0	0 0 0	0
12. with single words	___	0	0 0 0	0 0 0	0 0 0	0
13. with two & four word combinations	___	0	0 0 0	0 0 0	0 0 0	0
14. with sentences longer than four words	___	0	0 0 0	0 0 0	0 0 0	0
These Communications are:						
15. idiosyncratic	___	0	0 0 0	0 0 0	0 0 0	0
16. conventional	___	0	0 0 0	0 0 0	0 0 0	0
CONTENT:						
C/SO Communicate about:						
17. self	___	0	0 0 0	0 0 0	0 0 0	0
18. anything outside of self	___	0	0 0 0	0 0 0	0 0 0	0
19. concrete experiences (e.g., persons & things)	___	0	0 0 0	0 0 0	0 0 0	0
20. abstract experiences (e.g., feelings, desires & descriptions)	___	0	0 0 0	0 0 0	0 0 0	0
21. active exeperiences (e.g., actions, locations)	___	0	0 0 0	0 0 0	0 0 0	0
USE:						
C/SO Communicates for:						
22. personal reasons (e.g., makes body language, sounds, or words for practice or play with no clear intention to communicate)	___	0	0 0 0	0 0 0	0 0 0	0
23. instrumental reasons (e.g., to get from or manipulate others)	___	0	0 0 0	0 0 0	0 0 0	0
24. social reasons (e.g., mainly to be with another)	___	0	0 0 0	0 0 0	0 0 0	0
	65	0	1 2 3	4 5 6	7 8 9	10

APPENDIX II

E.C.O. Training Module

Table Sequence of Training Goals for SO and Child in the Four ECO Curricular Modules

Module I Interaction/Conversation

Social recognition

Social initiation

Social responsiveness

JOINT ACTIVITY ROUTINE HABITS

Interactive turntaking (no messages)

- progressively increased turns across activities (e.g., teaching, play, caretaking)
- person
- contexts - classrooms, home, therapy

Conversational turntaking (with messages)

- with body language and sounds
- with verbal language
- progressively increased turns across activities, persons, contexts

Module II

Shift idiosyncratic communications to conventional (i.e., acceptable to strangers)

Progressive match of communication between SO and child

Shift non-communicative actions to communications with body language and sounds

Shift communicating from body language and sounds to words

Communicate about child's agents, actions, objects, locations

Expand vocabulary from current nonlinguistic communications

Module III Content/Use

Establish perlocutionary behaviors

Establish a range of personal communications

Establish a range of instrumental communications

Establish a range of social communications

Establish skills in maintaining a conversation

Module IV Generalization to Social Purposes

Establish intermittent habit of social contacts

Establish a habit of instrumental contacts (e.g., for help, information, manipulation, etc.)

Establish a habit of social contacts (e.g., play, attention, feelings, etc.)

Establish a habit of making social contacts into brief conversations