FORMATION OF A RECEPTIVE VOCABULARY AND ITS EFFECT
ON THE RATE OF ACQUISITION OF ITS EXPRESSIVE
COUNTERPART IN AN AUTISTIC CHILD

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Language development and the variables that affect it have so far been studied from an explicit viewpoint. The immediate consequences that a particular verbal response produced in a particular stimulus setting have been found to be important explicit variables. However, there is evidence that vocal acquisition is affected by implicit or nonspecific variables. One such variable is receptive pretraining. Evidence for an implicit relationship between receptive and expressive vocabularies is apparent when considering verbal articulation and its rate of acquisition (Baer and Mann, 1971; Sinitz and Pruester, 1965). Guess (1969) obtained a nonrelational outcome when dealing with grammar, and particularly with receptive and expressive uses of plural phonemes.

The purpose of this study was to examine the relationship between receptive and expressive vocabularies. It was hypothesized that receptive discrimination pretraining has a greater influence on the rate of acquisition of its expressive vocal counterpart as compared to the rate of vocal acquisition of words without receptive pretraining.
The subject of this study was an eight-year-old autistic girl who had very little spontaneous speech, but a good imitative repertoire. The procedure consisted of four phases. In Phase I and Phase II, the child was taught a receptive vocabulary of thirty words. Five of these words which the child could not pronounce were the experimental words for Phase III and Phase IV. Each of these receptively trained words were phonetically matched with a nonreceptive word. The rates of vocal acquisition of receptive and nonreceptive words were compared.

The data indicated that in all cases the receptively pre-trained words reached criterion faster than their individual, nonreceptive control words. Thus, the data supported the hypothesis that receptive pretraining does influence the rate of expressive acquisition and that there is an implicit relationship between expressive and receptive vocabularies.
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Man possesses a highly complex linguistic system. This intricate system appears to be unique to the species man. In fact, man's language is generally assumed to be the primary factor which differentiates him from the other species of animals. No other known animal has a language which in any way approximates the breadth and depth of man's language. Language enables man to engage in uniquely human activities such as thinking, reasoning, predicting, and so forth (Burry, 1969; Woods, 1969). In other words, language makes man "human."

Since language is the primary differentiating feature of man's behavior relative to other animals, all those disciplines concerned specifically with the study of man--anthropology, sociology, psychology, linguistics, medicine, education, economics--have become involved in the study of his language. Scientists and theorists in these areas discuss and analyze man's symbolic system. Consequently, many diverse theories have evolved concerning the manner in which man acquires language.

Since children raised devoid of human contact acquire no language (Itard, 1962) or limited language (Davis, 1947), most theorists involved in the analysis of language development
agree that an interaction between the individual and other speaking human beings is necessary for language to develop. However, each theory emphasizes differentially the role of environmental versus innate neurological and physiological factors in language development. Some theorists stress the neurological basis of language development (Chomsky, 1966; Lenneberg, 1967; Lenneberg, 1966). These theorists postulate that specific environmental stimuli selectively trigger innate neurological mechanisms. These neurological or physiological changes then account for the acquisition of language. Thus, particular neural structures are vital in determining the form, sequencing, and timing of the development of language behaviors.

Other theorists called learning theorists (Dollard and Miller, 1950; Mowrer, 1960; Osgood, 1964; Skinner, 1967) contend that the environment is the primary factor in language acquisition and maintenance. Learning theorists believe that language is learned; that is, it develops as a result of the differential way in which the environment interacts with the individual's language behaviors. The specific role that environmental stimuli play in the development of language varies from learning theory to learning theory. Perhaps, the most comprehensive learning theory regarding language acquisition has been developed by Skinner (1967).

Skinner prefers to speak of language activities as verbal behavior. He defines verbal behavior as any behavior whose
reinforcing consequences involve the mediation of another person. He considers verbal behavior to be a specific class of operant behaviors. Like all operant behaviors, verbal behaviors are acquired and maintained as a function of the effects of "consequences" these behaviors produce in the environment. Those verbal behaviors which have no effect on the environment or produce aversive effects will not be acquired. Furthermore, Skinner maintains that the development of language can be best explained by specifying the relationships between each verbal response and the antecedent and consequent stimuli controlling the emission of that response.

Skinner's operant methodology has been successfully applied in the clinical setting to the treatment of many deviant behaviors (Ayllon and Azrin, 1964; Ayllon and Haughton, 1962; Clement, 1968; Lindsley, 1960). This application of operant principles to the treatment of clinical problems is called "behavior modification." Recently, behavior modification techniques have been applied to the treatment of disorders in verbal behavior (Goldiamond, 1965; Isaacs and Goldiamond, 1960; Lovaas, 1968). Lovaas (1968) demonstrated the feasibility of teaching completely nonverbal children verbal behavior using the operant paradigm. Lovaas taught several nonverbal autistic children to speak by differentially reinforcing the children with tidbits of food for imitative vocal reproductions. Other investigators have subsequently successfully used his techniques with nonverbal autistic children (Hewett, 1965; Wolfe, Risley, and Mees, 1964).
Infantile autism is one of the three main classifications of childhood psychoses (Copel, 1967). Characteristics which have been designated as typical of autism are an inability to relate in a meaningful way, the failure to use language appropriately, an obsessive desire for the maintenance of sameness, and fascination for objects (Kanner, 1943). Probably, the most salient distinguishing feature of the autistic child is disorder in verbal development. Although the anatomical apparatus for speech is apparently without fault, nearly fifty percent of the autistic population are mute (Simard, 1964). Those autistic children which are not mute seem to have various degrees of language development. Generally, however, their language is in some way unusual or disordered. Lovaas' techniques have been very successfully applied to remedying speech disorders in one segment of the autistic population—the non-verbal or echolalic children.

Lovaas' training technique involves very specific sequential steps. First, eye contact is established by differentially reinforcing the child for looking at the trainer when the trainer presents the prompt, "Look at me." Then, a generalized imitation regime is introduced. The child is taught to imitate motor responses. Each motor imitative response is taught by systematically reinforcing the child with food when he makes the same response as the trainer presents. Shaping and prompting procedures are necessary initially to bring forth the desired response. This training continues until generalized
imitation occurs. That is, on one imitative response is learned, another one is introduced and taught until the child imitates any new response the trainer presents without any prior training. Once generalized imitation has been learned, vocal imitation teaching is begun. The child is shaped to reproduce the same sound as the trainer presents. These sounds are then chained together to make words. Once a word is learned, the child is taught to apply that word to some aspect of his environment. Lovaas was concerned with teaching these children to describe their environments using verbal behavior. He was teaching expressive language.

However, this type of verbal behavior is only one aspect of language. There are two types of language—expressive language and receptive language. Vocal behavior or speech is synonymous with expressive language. Expressive language is the process of combining units of speech into a sequence to which others in the environment respond. A person's expressive language includes the total number of verbal responses made by that person which produce an effect on his environment. Expressive language involves either writing or speaking. Receptive language concerns a person's understanding of what others say. Reception of the written word is achieved through reading, and reception of the spoken word, through hearing. A person's receptive vocabulary includes all those verbal responses made by others or himself which exert differential control over any aspect of his behavior. Receptive language behavior includes
following directions given by others and comprehending the expressive language of others in a spoken or written form. If a child correctly points to his chair when someone says, "Where is your chair?", he demonstrates facility in receptive language. If the child says, "Look at my chair," he is using expressive language.

As previously noted, expressive language can be taught to children using differential reinforcement (Lovaas, 1968). Receptive language may also be taught using the principles of behavior modification. Bricker and Bricker (1970; 1971) taught retarded children with severe language deficits to point to an object when a word was presented by selectively reinforcing the appropriate pointing response following each word.

Baer and Guess (1971) conducted a study in which mental retardates were receptively trained in adjectival inflections. They taught the retardates to point to the correct object when a certain comparative or superlative adjective was presented—for example, big and bigger, small and smaller or big and biggest, small and smallest. Generalization of comparative and superlative adjectives to new settings was obtained. Thus, it is evident that behavior modification principles can be used to teach both receptive and expressive language.

However, observation and experimental evidence suggest that the acquisition and maintenance of receptive and expressive language are not mutually exclusive phenomena. Rather, they are interdependent events. It seems that the acquisition of
a new receptive language facilitates the acquisition of that same language in the expressive mode. At the same time, training in expressive language seems to determine the number of receptive language discriminations that can be subsequently made. Considerable research has been conducted demonstrating the specific interactions that occur between these two kinds of language. One facet of this study demonstrated the effects of receptive language training on the subsequent development of the same expressive language.

Research in the field of normal language development has shown that very young children "understand" language before they use it (Frazier, Bellugi, and Brown, 1963; Lenneberg, 1962). In other words, young children acquire receptive language prior to expressive language. Winitz and Preisler (1965) demonstrated that teaching children to receptively discriminate between certain sounds facilitated the remediation of the correct articulation of these sounds. Primsleur (1963) demonstrated that prior auditory discrimination training facilitated the subsequent acquisition of the correct pronunciation of certain French phonemes. More recently, Baer and Harn (1971) studied the effect of receptive training with nonsense syllables on the expressive acquisition of these syllables. First, they taught the children to discriminate several nonsense syllables receptively. Then, they assessed the effects of this training on the children's subsequent ability to pronounce these syllables accurately. The experimental words involved in prior
receptive training were pronounced more accurately than the control words not involved in the receptive training. Thus, the evidence from these studies seems to indicate that receptive language learning engenders expressive language development.

Another recent study involving the teaching of receptive and expressive language to a chimpanzee is relevant to an analysis of the interaction between receptive and expressive language acquisition. Premack (1971) developed techniques whereby a chimpanzee learned a nonvocal receptive and expressive language. Sarah, the chimpanzee, acquired a receptive vocabulary of 120 words including nouns, verbs, objects, adjectives, articles, and adverbs. Each word was symbolized by a metal-backed plastic form. These symbols varied in size, color, texture, and shape. After learning a receptive language, Sarah developed an expressive one. Her mode of expression was to place the word symbols into a variety of structured statements or sentences. Each sentence had an explicit function in her environment. Therefore, through the development of a receptive language, an expressive language was formed which was functional in communication.

A possible contradiction to the general finding that prior receptive training facilitates expressive acquisition in most cases occurred in research conducted by Guess (1969). He found that teaching retardates to receptively discriminate between single and paired objects upon presentation of a single or plural label did not generalize to expressive usage. This
finding suggests the possibility that in certain instances receptive and expressive vocabularies may function independently of one another.

However, in general, the research suggests that receptive training affects expressive productions. At the same time, other research seems to indicate that the inverse is also true; that is, the acquisition of expressive language appears to affect the subsequent acquisition of related receptive language. Whorf (1956) was one of the first to recognize the effects of words or expressive productions on the ability to receptively discriminate concepts. He contended that the number of words that a person had determined the concepts he developed and discriminations he made. Thus, persons from cultures with different linguistic communities experience and perceive the world in very different ways because their languages have different words and different grammatical structures.

Erickson (1958) demonstrated that certain discriminations are impossible if the language does not have a label for that discrimination. He postulated that the number of discriminations that a person from a certain culture can make is dependent on the number of response options or words in that language. Consequently, persons coming from the culture that has the most words can make the finest discriminations. As a result, these individuals will have the best control over their environment and their own behavior.

Further experimental evidence demonstrates that expressive labels facilitate a person's ability to discriminate one
stimulus class from others. The label increases the dissimilarity between those stimuli in the stimulus class to be discriminated and those stimuli outside it. Research concerning the effects of expressive labels on receptive discriminations has also been done with retardates. Hamilton (1966) showed that appropriate verbal pretraining with retardates resulted in faster original learning, greater task generalization, and an improved ability to verbalize solutions. Furthermore, learning distinctive names for stimuli during pretraining trials improved performance on subsequent discrimination tasks involving those stimuli (Canter and Holtel, 1957; Dickerson, Girardeau, and Spradlin, 1964; Smith and Means, 1961).

Thus, experimental evidence in the study of language behavior demonstrates the existence of interrelationships between receptive and expressive languages. Training in receptive language seems to facilitate the subsequent acquisition of these same expressive labels. In turn, training in the expressive arena seems to affect the learning of receptive discriminations. This study explored the specific effects of prior receptive language training on the acquisition of the same expressive language.

This experiment studied the effects of the acquisition of a receptive language on the rate of acquisition of its expressive vocal counterparts with an autistic child. Printed words were the stimuli that were receptively discriminated. These same words were then taught in the expressive
mode. The rate of expressive acquisition of those receptively pre-trained words was compared to that of similar words which did not have receptive training. It was hypothesized that receptive pretraining facilitates the rate of acquisition of vocal acquisition of words without receptive pretraining.

Method

Subject

The subject was an eight-year-old girl who had exhibited autistic behavior since birth. Speech was very slow to develop, and at the beginning of this study, the subject used about thirty one-syllable words appropriately. She had a much better developed receptive vocabulary than expressive vocabulary, responding appropriately to various commands. She could also receptively identify almost any common object when told to point to it. Participating in an operant conditioning program for six months prior to this study, she had developed an imitative repertoire which made her a good subject with which to study acquisition of both receptive and expressive vocabularies.

Apparatus

In Phase I of this study, an apparatus was built to encircle a small computer built by Mycom, Incorporated. The computer was equipped with a selection dial which could be turned to any one of six possible selections. The Mycom was programmed so that a certain series of answers was correct. The experimenter was then required to present a sequence of
prompts which had particular correct answers that correlated with the program of the computer. The subject was to select an answer by turning the dial, and then pushing a button next to the dial. If the subject responded correctly, a green light on the computer flashed. At the same time, the response was cumulatively recorded in the "Total Correct" column shown on the face of the computer. If the answer was incorrect, a red light flashed on the computer, and the response was added to the "Total Attempted" column. An incorrect answer did not affect the total correct column. After a session was completed, the data could be read from the computer, and the system reset.

The light gray wooden frame that encircled the Mycom computer was in the form of a semi-circle with a radius of nine inches (Figure 1). The center of the apparatus was situated at the selection dial which was fitted with an adapter. The adapter was a red pointer that extended almost to the edge of the circle. The perimeter of the semi-circle was situated with a wooden piece extending six inches upwards and perpendicular at all points on the semi-circle. This extension was divided into six equal segments, each of which was used to mount an index card with a printed stimulus word on each card (Figure 2).

The third major piece of equipment was a cassette tape recorder, also built by Mycom, Incorporated. This tape recorder was specially programmed to shut off when the sound of a certain frequency was presented on the tape. Cassette tapes
were made following a certain logic required for each particular computer program. If three choices were presented, a specific logic consisting of only three choices was used; if four choices, a particular arrangement of prompts was followed that was set to correspond with the specific four-choice computer logic. A special button was made that triggered the cassette to continue if the response was wrong. If the correct response was chosen, pushing the button on the computer would trigger the cassette to continue to the next prompt.

During both expressive Phases III and IV, a Bell and Howell Language Master was used. Cards with a piece of recording tape along the bottoms were used to present the vocal prompt of the word to be learned as the card traveled through the machine. The Language Master could record the experimenter's prompt on the tape of each card by turning a switch and saying the word into an internal microphone while the card was traveling through the machine. Thereafter, every time the card was sent through the machine, the experimenter's prompt was presented.

Procedure

Phase I. This phase was an explicit operant program to develop a receptive vocabulary. The subject had previously been trained to operate the apparatus. Prior to teaching the child to discriminate printed words, pictures illustrating particular words were presented, interspersed with neutral pictures. Pointing to the correct picture when a word was
orally presented tested the subject's ability to receptively discriminate pictures illustrating certain words. Only the printed words representing these pictures which already could be receptively discriminated were used in the receptive training phase. Thirty printed words were selected as stimuli to be receptively trained. These words were divided into five groups, each containing six words.

Baseline: The six written words to be discriminated were arranged on the display panel. One block of sixty trials was presented by a cassette tape recorder each day. Each trial consisted of the presentation of a vocal prompt of one of the six words by the cassette tape recorder. Prompts were presented at ten second intervals. If the response was correct, the tape recorder advanced to the next prompt and the subject was socially reinforced; if incorrect, there was a slight pause of five seconds. Therefore, the entire chain of events was:

1. a prompt was presented to the subject by the cassette;
2. as soon as the prompt was presented, the cassette stopped;
3. the subject turned the pointer to a stimulus card and pushed the button on the computer; 
4. the pushing of the button recorded the response and triggered the cassette to continue; and
5. social reinforcement was presented to the subject if the selection was correct. For word groups 1, 2, and 3 of the five six-word groups, baseline procedure continued for three days, while in groups 4 and 5, only two days of baseline data was collected.
Experimental: Stable baseline data was obtained after two or three days, depending on the particular word group, and the experimental stage for that group was then introduced. During all experimental stages in Phase I, both social praise and tiny bits of food or drink were presented contingent on the correct response.

With the exception of the first group of six words, the entire six words in the group were presented on the display panel from the start of the experimental stage. However, during the experimental stage of the first group of six words, the presentation was handled differently. At first only three words were presented on the display panel. When the criterion of three consecutive blocks of over 90% correct responding was reached, the fourth word was added to the other three on the display panel. When these four words reached criterion, the fifth word was added in the same manner, and finally, the sixth word was introduced. This procedure was used to reduce the number of possible answers, thereby increasing the probability of making the correct response. The six words in each of the four remaining groups were displayed on the panel from the beginning of the experimental stage. These six words were continued until criterion of three continuous blocks of over 90% correct responding in the presence of all six words in the group was established.

Phase II. When all thirty words in Phase I reached criterion, a new receptive phase was introduced. This procedure
entailed randomly selecting six of the thirty words to present on the display panel. The procedure was identical to the experimental stage of Phase I, except that the prompts were given by the experimenter instead of by the automatic cassette device. This phase was continued periodically throughout the remainder of the experiment.

Phase III. This phase was the first part of the expressive program. The first step was to find those written words which the subject could discriminate receptively, but could not expressively vocalize. Of the thirty words receptively trained during Phases I and II, two words were chosen to which the subject correctly responded expressively zero per cent on a block of twenty-five trials. A correct response was defined as the subject's pronouncing each sound in the word without adding any other sounds. These receptively trained experimental words were then paired with control words which were phonetically similar and were also found to be expressively responded to correctly zero per cent on a block of twenty-five trials. Care was also taken to insure that the subject could not discriminate a picture or the written word represented by the control word.

Control words were matched as closely as possible considering voicing, relationships between tongue and inner mouth, functional areas of the mouth during formation, gliding, and rounding of phonemes. For example, the word "down," which was an experimental word, was broken into three sounds—"d," "ou,"
and "n." Each of these sounds has similar possibilities. For instance, "d" and "t" are voiced and voiceless counterparts, "ou" and "oi" are similar glides, and "I" and "n" are similar in formation with the tip of the tongue contacting the hard palate of the gavage. Rules from Linguistics, English, and the Language Arts (1970) were used as a basis for finding phonetically similar control words.

In addition, other words were constructed by combining sounds from each experimental and control word pair. These additional nonsense words were also responded to receptively and expressively zero per cent correctly in a block of twenty-five trials.

During Phase III, the subject was trained to say two groups of words. Each group contained three words. In the order in which they were learned, the first group of words in Phase III consisted of an experimental word (down), a control word (toil), and a nonsense word (doin) constructed of combined sounds from "down" and "toil." The second group of words consisted of a control word (jeer), an experimental word (chair), and a nonsense word (jair) constructed of combined sounds from "chair" and "jeer." This design counterbalanced for effects of order of presentation.

Baseline: Three blocks of twenty-five trials were presented each day. Baseline procedures lasted for three blocks for the first group of three words and only two blocks for each of the words in the second group of three words. The card
containing the preprogrammed vocal prompts was placed into the Language Master, and was then pushed through so that the prompt was given. The card then stopped and the subject attempted to imitate the prompt. If the subject's response was correct, social reinforcement was awarded and the card was again sent through the machine. If an incorrect response was given, the experimenter responded, "No." After a short pause, the card was again sent through the machine.

Experimental: After baseline data were obtained on the particular word being learned, the same procedure was used with the addition of presenting tiny bits of food or drink contingent on the correct response. Therefore, social and primary rewards were given immediately after a correct response. This stage continued with each word until a criterion of three consecutive blocks of over 90% correct responding was obtained.

Phase IV. The second part of the expressive program was presented in a slightly different manner. These words were different from the words in Phase III, but were established by the same criterion as those in Phase III. Instead of presenting the words one at a time to criterion as in Phase III, all six words were randomly presented in one block each day. Each block consisted of sixty trials. Experimental and control words were matched as in Phase III, but no nonsense words were used in Phase IV. Three receptively trained experimental words were chosen, each matched with a nonreceptive control word.
Before each block, the order of presentation of the six words was randomly decided by shuffling the cards. These words were then presented until a block of sixty trials was completed, presenting each of the six words ten times.

Baseline: Baseline procedures were followed for two days. After the order of presentation of the six cards was decided, each card was sent through the Language Master one at a time, and the prompt was given. The subject then attempted to imitate the prompt. A correct response was followed by a social reward, while an incorrect response was followed by the experimenter's saying, "No," as in Phase III. Each of the six words were sent through the Language Master one at a time, and then the order was repeated again and again until sixty trials were completed.

Experimental: The procedure during this stage was identical to the baseline procedure with the exception of presenting not only social rewards, but also tiny bits of food or drink contingent on the correct response. All six words were presented in each block until each word had reached criterion of three consecutive blocks of over 90% correct responding.

Results

The data obtained from Phase I of this study, dealing with receptive conceptual training, are shown in Figures 3 - 7. Figure 3, the data for the first group of words trained receptively, show that after a group of three words met criterion of three consecutive blocks of over 90% correct responding,
a fourth word was added and presented until the same criterion was met. As shown, the fifth and sixth words were then added one at a time in the same manner. Even with the stimulus complex simplified and the number of options slowly increased, the number of days to criterion was greater when compared with later word groups. The data points labeled "probe" shown during the fifth and sixth option segments represent non-reinforced probes using all six options. These data show a gradual improvement in the total six-word discrimination task.

Figures 3 - 7, shown in the order of presentation to the subject, demonstrate the increase in the rate of receptive acquisition of the six-word complex. As the number of different groups of words increased, the rate of acquisition evidenced slight variances. The number of days to criterion, although only three in each case, appeared slightly higher and more stable in Figures 6 and 7 than in Figures 4 and 5. Baseline performance also gradually improved in Figures 6 and 7 as compared to Figures 4 and 5. As the number of word groups receptively trained to criterion increased, the faster and more stable was the performance.

Phase II, as indicated in Figure 8, was a continuation of receptive training. Randomly drawn groups of six words from the entire thirty-word pool were presented in each block. As noted, there was a high correct rate of responding. This section was begun prior to, and was periodically presented during, Phases III and IV.
Phase III, as shown in Figures 9 and 10, was the expressive acquisition of two groups of words. Each word was presented, one at a time, until a criterion of three consecutive blocks of at least 90% correct responding was met. Figure 9 contains data of a receptively trained word, a nonreceptive word, and a second nonreceptively pre-trained word made of combined sounds from the first two words. The words were learned in that order.

In Figure 9, the receptively trained word "down" reached criterion much faster than its nonreceptive control "toil." The second nonreceptive word "doin," a phonetic combination of "down" and "toil," reached criterion even faster than the receptively trained word.

Figure 10 shows somewhat the same pattern as in Figure 9. The receptively trained word "chair," although presented after its control word "jeer," reached criterion slightly faster. The second nonreceptive word "jair," a phonetic combination of "chair" and "jeer," reached criterion still faster.

Phase IV, Figures 11 - 13, entailed expressive acquisition of three pairs of words. All six words were randomly presented in each block instead of presenting one word at a time to criterion as in Phase III. As noted in Figures 11 - 13, in all cases the receptively trained words met criterion faster than their nonreceptive controls.

The words in Phase IV, all six of which were presented together, showed the effect of prereceptive training more than the words in Phase III, which were learned one at a time to
criterion. Therefore, order of presentation of the words seemed to have an effect on the magnitude of the difference in rates of acquisition between the receptively trained words and those which were receptively pretrained.

Discussion

Previous research dealing with the acquisition and articulation of words has been concerned mainly with the effects of consequences when a certain verbal response occurs under particular stimulus conditions. This study indicated that there can also be antecedent conditions that have an effect on the acquisition of verbal responses. The data supported work done by Winitz and Preisler (1965) and Mann and Paer (1971). Receptive discrimination pretraining can influence the rate of acquisition of its expressive counterpart, at least when dealing with articulation of words.

Throughout this study, both in the receptive and expressive sections, Harlow's (1965) phenomenon of learning to learn was evident. The more a particular task was presented, be it learning receptive language or expressive language, the faster learning occurred for that particular task. In Phase III, the receptively trained words were learned faster than the nonreceptive words, regardless of the order in which they were presented, although order of presentation might have accounted for the magnitude of the difference in rates of acquisition between receptively trained and nonreceptive words. An interesting point, however, was that nonreceptively trained
words that were nonsense words of phonetic combinations of the first two words were learned even more rapidly with each novel word presented. Therefore, even though receptive training did influence the rate of acquisition of its expressive counterpart, once these certain sounds had gained stimulus control, the more quickly they were learned in later words even though these later words were not receptively trained.

Data from Phase IV indicated a more pronounced and clear-cut effect of prereceptive training. This result was probably a function of presenting all of the words together to criterion. This method of presentation possibly decreased the carry over effect of stimulus control obtained on a particular sound sequence. These data suggested other variables that may influence the rate of expressive acquisition and accuracy of articulation. The amount of receptive training, the imitative advancement of the subject, the ability of the subject to make certain sounds, the past history of reinforcement with a particular verbal response, and the amount of covert rehearsal of prompts during receptive training may all be important variables.

Guess (1965) found no relationship between receptive and expressive language when dealing with the acquisition of the plural morpheme with retardates. However, his analysis does not consider that his subjects had a certain history when presented with singular and plural objects. They probably were not made to discriminate verbally between singular and plural objects, and no matter what array of objects they were
presented, these subjects were probably reinforced by giving the singular pronunciation, even in the presence of the plural objects. Therefore, the subjects probably had been previously reinforced many times by giving the singular pronunciation in the presence of the plural objects.

The imitative state, the ability to make certain sounds, and the presence of covert behavior seem also to have an influence. The fewer sounds that can be imitated, the less imitative control there is, and therefore, the less receptive training will help or the more receptive training is needed to produce a certain expressive effect. The more imitative the subject is, to a certain point, the more receptive training may help in itself. This point is probably where covert rehearsal of receptive training is begun, and therefore, the effect of receptive training in itself cannot be analyzed.

Thus, in some instances, it may be that receptive training does not influence expressive acquisition. However, if all variables are controlled, receptive training and expressive acquisition may be found to be related. This study did not attempt to disprove a nonrelational effect between receptive and expressive vocabularies, but presented evidence for a relationship when dealing with articulation of words. In general, the greater the ability to discriminate what others say, the greater the ability to discriminate what is said to others. Therefore, by teaching a receptive vocabulary, the more generalization there should be to the rate of acquisition of an expressive vocabulary.
Figure 1—Top view of apparatus used in Phases I and II.
Figure 2—Front view of apparatus used in Phases I and II.
Figure 4—Phase I—receptive acquisition of second word group.

Figure 5—Phase I—receptive acquisition of third word group.
Figure 6—Phase I-receptive acquisition of fourth word group.

Figure 7—Phase I-receptive acquisition of fifth word group.
Figure 8—Phase II—receptive practice of words from Phase I.
Figure 9—Phase III-expressive acquisition of three words presented one at a time to criterion.
Figure 10. Phase III expressive acquisition of three words presented one at a time to criterion.
Figure 11—Phase IV—expressive acquisition of receptive and nonreceptive pair of the six words presented together to criterion.
Figure 12—Phase IV-expressive acquisition of receptive and nonreceptive pair of the six words presented together to criterion.
Figure 13—Phase IV: expressive acquisition of receptive and nonreceptive pair of the six words presented together to criterion.
References


Ayllon, T. and Naughton, S. Control of the behavior of schizophrenic patients by food. Journal of the Experimental Analysis of Behavior, 1962, 5, 343-352.


