

## Teaching Intraverbal Behavior To Preschool Children

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Four preschool children who were taught to tact a set of Peabody picture cards were unable to emit those same responses under intraverbal conditions. A transfer of stimulus control procedure was used to bring the responses under intraverbal control. A multiple probe design was used to demonstrate experimental control. The results indicate that the transfer procedure was effective in developing the responses as intraverbals, and in increasing the subjects' scores on the Verbal Fluency subtest of the McCarthy Scales. A second study demonstrated that teaching four additional subjects to tact both the items and the class of which the items were members resulted in the untrained emergence of a few intraverbal responses for two of four subjects. For the other subjects and classes, it was still necessary to teach each of the responses as intraverbals, further demonstrating that tacts and intraverbals are separate verbal operants. The implications of these results for the use of Skinner's (1957) analysis of verbal behavior for studying typical language development are discussed.

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Skinner's (1957) analysis of verbal behavior has been shown to be an effective tool for the assessment and treatment of language disorders for individuals with developmental disabilities (e.g., Braam & Poling, 1983; Hall & Sundberg, 1987; Partington, Sundberg, Newhouse, & Spengler, in press; Sigafos, Reichle, Doss, Hall, & Pettitt, 1990; Sundberg, 1990; Watkins, Pack-Teixeira, & Howard, 1989) and individuals with traumatic brain injury (e.g., Sundberg, San Juan, Dawdy, & Arguelles, 1990). However, there has been relatively little use of the concepts from Skinner's book to analyze the language of typical children (e.g., Bijou & Baer, 1965; Howard & Rice, 1988; Lamarre & Holland, 1985).

The lack of research using this analysis with non-delayed children may be due to

the fact that most behavior analysts who have an applied interest in Skinner's analysis of verbal behavior are working with developmentally disabled individuals and, as a result, focus on defective verbal behavior. There are few behavior analysts employed to study normal language development, or employed to develop methods of enhancing the rate of normal language acquisition. In addition, the rapid, and often simultaneous acquisition of multiple verbal operants by typically developing children may make the distinction between individual verbal operants difficult to predict and control.

One finding from the verbal behavior research with the developmentally disabled individuals which might be relevant to non-delayed children is the distinction between the tact and the intraverbal. Research with language delayed individuals has indicated that tacts and intraverbals are separate operants, and that responses which were developed as tacts could also

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be taught to occur as intraverbal responses by transferring stimulus control from non-verbal stimuli to verbal stimuli (Braam & Poling, 1983; Luciano, 1986; Watkins et al., 1989).

Intraverbal behavior is important to typical children for a number of reasons. First, much of a child's social interaction including conversations, songs, stories, and other verbal play, involves intraverbal behavior. It may be that a weak or delayed intraverbal repertoire may affect a child's ability to engage in this type of behavior. In addition, intraverbal behavior plays a key role in the acquisition of a number of academic skills (e.g., reciting the A, B, Cs, counting, answering questions). It might be possible that delays in intraverbal development could affect later academic performance. As a result, it would seem that intraverbal development would be of considerable importance to both clinicians and educators.

The purpose of the current research is to determine if tact and intraverbal responses are separate verbal operants with typically developing children. Furthermore, if this distinction is observed, could the transfer of stimulus control procedures developed for use with individuals with developmental disabilities be effective in establishing intraverbal behavior for typical children. In addition, would a modification of the transfer procedure facilitate the transfer of stimulus control and the development of a generalized intraverbal repertoire.

## EXPERIMENT 1

### METHOD

#### *Subjects*

Eight children of normal intelligence between the ages of four and four and a half were selected for this experiment. All of the children attended a local preschool center five days a week. The children were divided into two groups based on their performance on an initial screening using the Verbal Fluency subtest of the McCarthy Scales of Children's Abilities (McCarthy, 1970). Four children were placed in the experimental group because the results of

this screening procedure indicated that these children had slightly lower intraverbal skills than four other children who were placed in the control group. After this initial screening, the eight children were administered the remaining subtests of the Verbal Performance section of the McCarthy Scales.

#### *Setting and Materials*

The research was conducted in a quiet room at the children's preschool center. Each child was trained on an individual basis. All sessions were conducted with the subject seated in a chair facing the trainer who was seated approximately 2 feet in front of the subject. Sessions were approximately ten minutes in duration. There were one or two sessions conducted per day. On the days when there were two sessions, one occurred in the morning and the other in the afternoon. Twenty Peabody picture cards were used during the training sessions.

#### *Procedure*

*Experimental design.* A multiple probe design was employed (Horner & Baer, 1978) in order to demonstrate experimental control over the acquisition of the intraverbal responses. A probe was administered prior to tact training, before and after training of the intraverbals for each of the verbal stimuli, and six weeks following the completion of the training. The same four verbal stimuli were presented during each of the probes. The intraverbal training was conducted such that the responses were taught sequentially using a multiple baseline across verbal stimuli design. No intraverbal responses were trained for the fourth verbal stimulus in order to determine if generalization would occur.

*Dependent variables.* There were two dependent variables in the study. These included the pre- and post-training scores on the subtests of the Verbal Performance section of the McCarthy Scales for both the experimental and control subjects, and the number of correct intraverbal responses emitted by the experimental subjects during probe, baseline and training sessions.

A probe session consisted of the presentation of four verbal stimuli by the experimenter and the recording of all intraverbal responses to those stimuli by the subjects. The verbal stimuli were four questions regarding objects that are commonly found in the children's environment (i.e., "What are some...fruits, toys, pieces of furniture, things you use to clean a house?"). After each of the verbal stimuli were presented, the experimenter transcribed the intraverbal responses emitted by the subjects. The subjects were allowed 30 seconds to respond to each of the four verbal stimuli. Ten seconds after the children had emitted their last intraverbal response or the child said "I don't know," the experimenter presented the next verbal stimulus of the probe session. Intraverbal responses emitted during probes were not reinforced. The verbal stimuli used during the probe sessions were questions to which there were many potentially correct responses. Therefore, the number of commonly acceptable intraverbal responses were recorded as correct responses, regardless of whether the responses were those which were trained by the experimenter. If a subject gave the same verbal response twice following the presentation of the verbal stimulus, only the first response was counted as correct.

Identical data were obtained during the baseline sessions which were conducted prior to intraverbal training. The baseline phase consisted of a minimum of two sessions and continued until the number of correct intraverbal responses to the particular verbal stimulus was stable. Training sessions consisted of a minimum of two presentations of the verbal stimulus. The number of unprompted intraverbal responses to the presentation of the particular verbal stimulus was recorded during the training sessions. The average number of correct intraverbal responses was calculated by dividing the number of correct verbal responses by the number of presentations of the verbal stimulus.

*Tact training.* Following the initial probe session, a baseline on the subjects' ability to tact the items illustrated in 20 Peabody

picture cards (Level #I) was conducted. There were five picture cards for each of the four verbal stimuli, which were to be used for training intraverbal responses. At the start of each tact session, the subjects were asked to tact each of the 20 pictures. All correct tacting responses were reinforced with praise and occasionally reinforced with an edible reinforcer. Those items which the child was unable to tact were trained during the remainder of the session. The training began with the experimenter telling the subject the name of the items and then asking the children to emit an echoic response while being shown the picture. Each subsequent incorrect response resulted in the implementation of a correction procedure consisting of the experimenter tacting the item and requiring the child to emit an echoic response. Tact training was terminated after the subjects could correctly tact 95% or more of the items without an echoic prompt at the start of two consecutive training sessions.

*Intraverbal training.* The training of intraverbal responses consisted of a procedure initially developed for developmentally disabled individuals to transfer stimulus control from nonverbal to verbal stimuli (Braam & Poling, 1983). A total of five intraverbal responses were trained for each of three verbal stimuli. During the actual training procedure, the children were presented with a verbal stimulus (e.g., "What are some toys?"). Praise followed all correct responses (i.e., "That's right") along with a prompt to emit another response. The first prompt was a verbal prompt for the child to emit another intraverbal response. The verbal prompt consisted of a phrase such as "What else?" or "And a...?" The children were allowed ten seconds to emit another response. If the child was unable to emit five correct responses, or if the child emitted an incorrect response to the verbal stimulus, the experimenter prompted a specific response by showing the child an appropriate picture card. Because the children were able to tact the picture, the picture card served as a nonverbal prompt for a response. After the child emitted a correct tact, the

verbal stimulus was then presented again such that correct unprompted intraverbal responses could be reinforced. Intraverbal training was terminated following a minimum of two consecutive sessions in which the subject emitted an average of at least four intraverbal responses to a particular verbal stimulus. Previously acquired intraverbals were occasionally interspersed during new training as maintenance trials.

#### *Interobserver Agreement Measures*

Reliability checks were conducted for the probe and baseline sessions of the study. These sessions were tape recorded by the experimenter so a second person could listen to the subjects' responses. The trainer's records of the subjects' responses were used to determine the number of correct responses emitted by the subjects. Reliability scores were calculated by dividing the smaller of the two scores by the larger score and then multiplying the result by 100. Reliability scores resulted in 100% agreement for all but two sessions (87.5% and 90.9%).

### RESULTS AND DISCUSSION

Figure 1 shows the number of intraverbal responses emitted during probe, baseline, training, maintenance, and follow-up probe sessions for each of the four verbal stimuli presented to the subjects. The results indicate that the children were able to emit a total of only two or three intraverbal responses to all of the four verbal stimuli (ranging from zero to two per verbal stimulus) presented during the initial probe session. There was a maximum of five tact training sessions prior to meeting criterion for all the subjects. The probe sessions conducted following the tact training showed a total increase of five intraverbal responses (sum of the responses to the four verbal stimuli) for one subject (Julie), no change for another subject (Sam), and a decrease in the number of responses for the other two subjects. Thus, except for the one subject, there was not a substantial increase in the number of intraverbal responses following the tact training. The subjects were mostly unable to emit

intraverbal responses in the presence of the verbal stimuli even though they could emit those same response forms in the presence of nonverbal stimuli.

The transfer of stimulus control procedure was effective in establishing intraverbal behavior. A substantial increase in the intraverbal responding occurred after the transfer of stimulus control procedure was employed for each of the three verbal stimuli. With the exception of Bob's responses to "Fruits," there was not an increase in the number of intraverbal responses to any of the verbal stimuli (over the levels of the pre-intraverbal training probes) until the intraverbals were directly trained using the transfer of stimulus control procedure. The subjects did not learn to emit verbal responses to the fourth (untrained) verbal stimulus by the end of training, indicating that there was no generalization to this untrained stimulus.

The six weeks follow-up data showed that the newly trained intraverbals were still strong for two of the three subjects available (i.e., Julie and Donna). In fact, for those two subjects there was a slight increase in the number of intraverbal responses to untrained stimuli. However, the follow-up data for Sam showed a decrement in the number of responses to each of the three stimuli included in the training.

Figure 2 shows the effects of the intraverbal training on the Verbal Fluency subtest scores of the McCarthy Scales. The mean scores on the pre-training measure for the experimental and control subjects were 7.75 (range = 5 to 10) and 14.25 (range = 12 to 17), respectively. Following the training, the experimental groups mean score increased by 9.75 to a score of 17.5 (range = 12 to 23), while the control group's mean only increased by 0.5 to a score of 14.75. Thus, there was a substantial increase in this standardized measure of intraverbal responding for the experimental group, and virtually no change in the scores for the control group.

It was interesting to note that there was an increase in the number of intraverbal

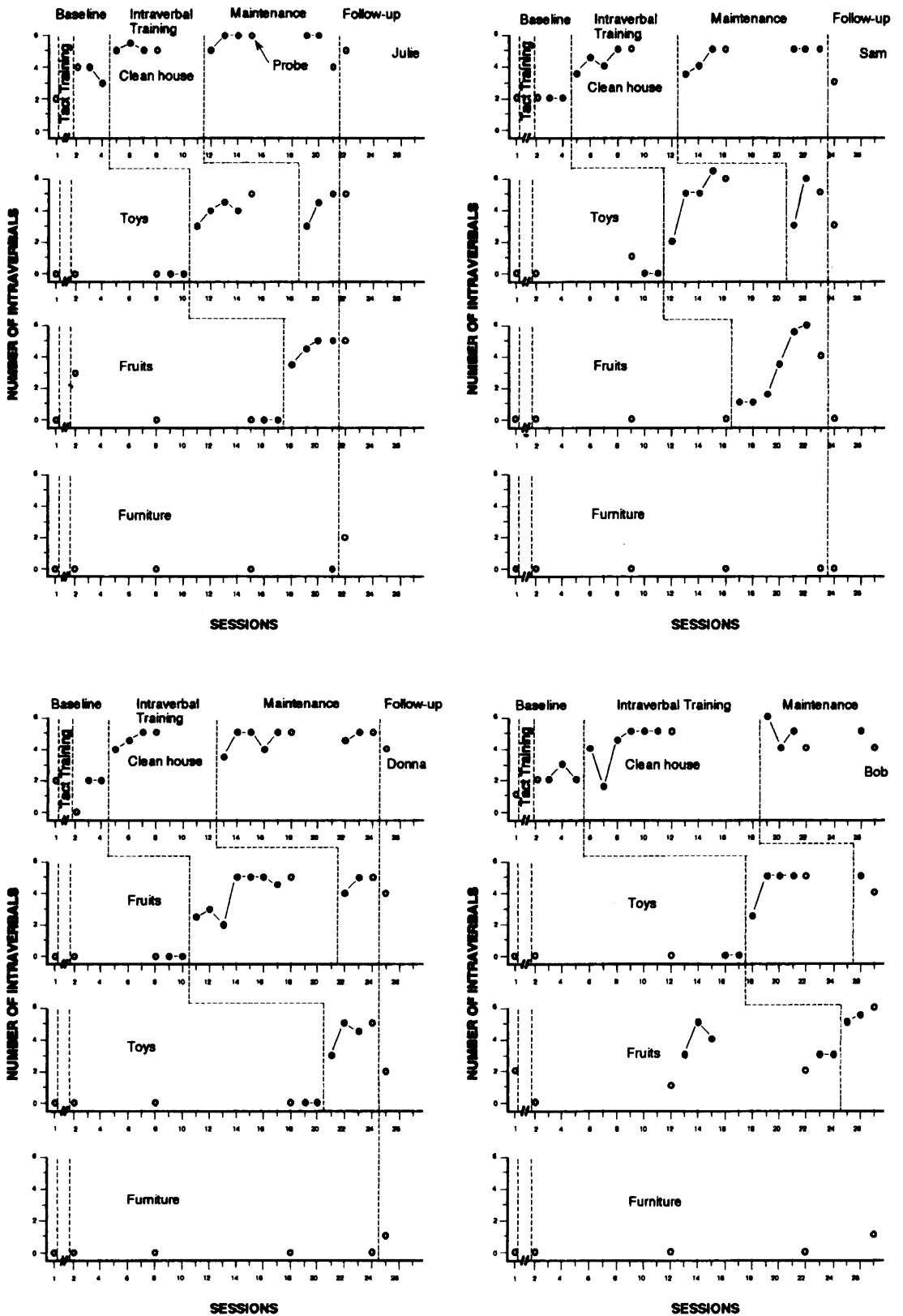


Fig. 1. Average number of correct intraverbal responses for each verbal stimulus per session.

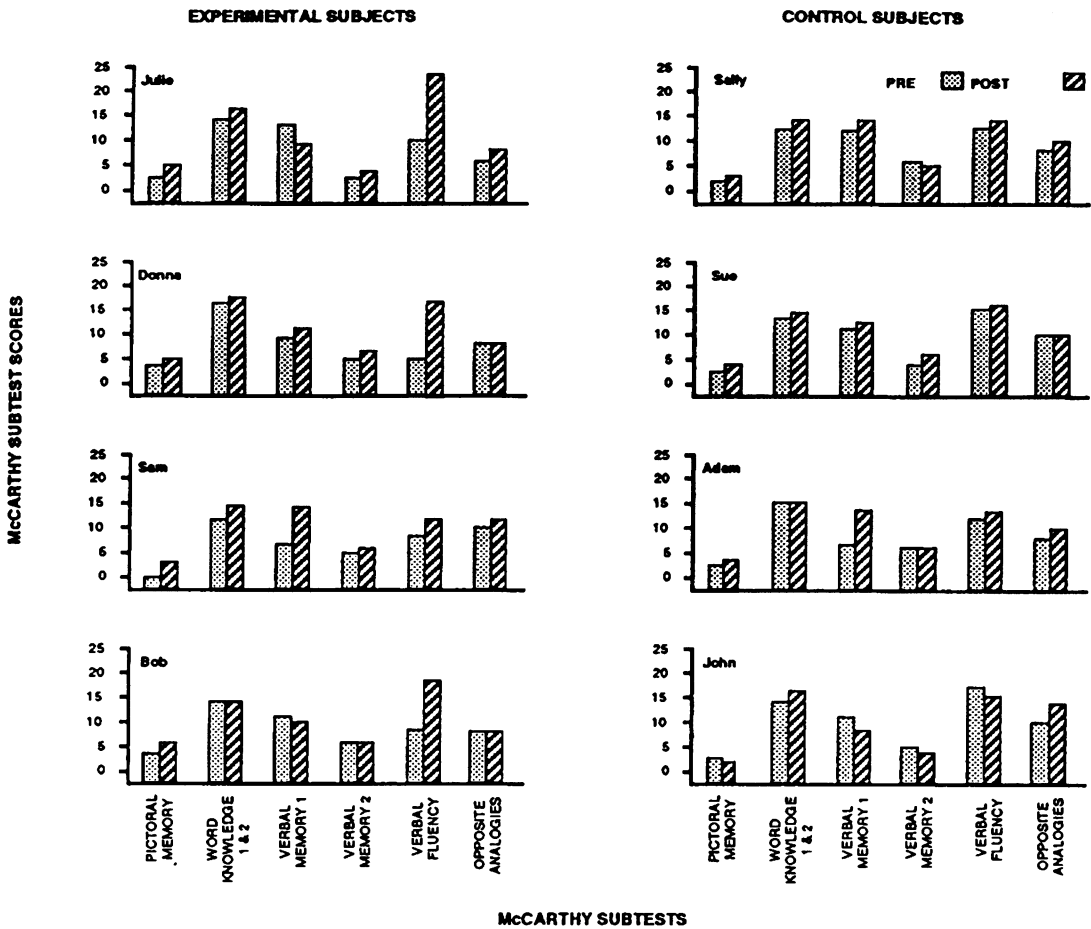


Fig. 2. Pre- and post-intraverbal training scores on the Verbal Performance subtests of the McCarthy Scales for both experimental and control subjects.

responses on the Verbal Fluency subtest of the McCarthy Scales when there was very little to no increase in intraverbal responses to the untrained verbal stimulus used in this experiment. This result may be due to the difference in the level of difficulty of the stimuli used in the verbal tasks (i.e., intraverbal responding to "eat" may be easier than responding to "furniture").

The results of Experiment 1 indicate that the tact and intraverbal responses are separate verbal operants. Teaching a tacting repertoire to the preschool children was not sufficient to bring the responses under the control of verbal stimuli. It was still necessary to train the verbal responses in the presence of the verbal stimuli. The transfer of stimulus control procedure developed with developmentally disabled

children was effective in teaching typical children intraverbal behavior.

## EXPERIMENT 2

In Experiment 1, it was shown that teaching a tacting repertoire to the preschool children was not sufficient to establish intraverbal behavior. Although the transfer of stimulus control procedure was effective in teaching typical children intraverbal behavior, it is possible that transfer of stimulus control may be facilitated in other ways. Rather than directly teaching intraverbal responses, a common approach is to teach the subjects to not only tact the items, but also to tact the class to which the nonverbal stimuli are members. The purpose of this second experiment was to examine the effect of teaching

this second tacting response on the acquisition of the intraverbal responses.

### METHOD

The procedures used in Experiment 2 were identical to those in Experiment 1 with the following exceptions. Four, four-year-old children, of average level of intraverbal responding as measured by the Verbal Performance subtest of the McCarthy Scales, were selected for the study. These children did not participate in Experiment 1. There were no control subjects, and neither the McCarthy Scales nor the follow-up probe sessions were administered at the completion of the study.

*Multiple tact training.* The subjects were first trained to tact the 20 picture cards, then trained to tact the class to which each of the items were members. During tact training the subjects first learned to tact each item. After each correct tact the experimenter then provided the tact for the class to which the item belonged (i.e., "and it's a fruit") and prompted the subjects to tact the class, then faded the prompt. Incorrect tact of the items and the class to which it was a member resulted in correction procedures similar to those used in Experiment 1. Specifically, the experimenter tacted the item or the item's class and required the child to emit an echoic response.

### RESULTS AND DISCUSSION

Figure 3 shows the number of intraverbal responses emitted during probe, baseline, training, and maintenance for each of the four verbal stimuli presented to the subjects. The results indicate that two of the children were unable to emit any intraverbal responses to the four verbal stimuli presented during the probe sessions both prior to, and immediately after the tact training. It was noted that there was an increase in the total number of intraverbals emitted by the other two subjects who had been able to emit at least one intraverbal response prior to the tact training (i.e., Sarah and Stacy). Stacy had a single intraverbal response during the initial probe, but emitted a total of six responses

during the probe session immediately following the tact training (with a range of zero to three responses per verbal stimulus). Sarah emitted seven intraverbal responses prior to the tact training and a total of twelve responses following the training (with a range of two to four responses per verbal stimulus). There was a maximum of seven tact training sessions prior to meeting criterion for all the subjects.

The results of this study demonstrated that teaching the subjects to tact both the items and the class to which those items were members did result in an increase in the intraverbal responses for two subjects (i.e., Stacy and Sarah), but was insufficient for the acquisition of those responses as intraverbals for the other two children. All of the children rapidly acquired the intraverbal responses within a few intraverbal training sessions. Sarah only received training on two stimuli because she was unavailable to receive training on the third stimulus.

Some generalization of the intraverbal skills were observed in this second experiment. Two subjects (Barbara and Carol) emitted one intraverbal response to the untrained stimulus during the final probe session. The other two subjects emitted the same, or fewer number of responses as were observed during the two probes prior to intraverbal training. Stacy emitted a total of six intraverbal responses to one verbal stimulus ("Fruits") during the final probe session. Because there were only five stimuli used in the intraverbal training, she had provided a novel response to this stimulus.

### GENERAL DISCUSSION

The results of Experiment 1 indicate that teaching preschool children to tact picture cards did not result in these same responses being emitted as intraverbal responses. These data support Skinner's (1957) analysis and the previous research demonstrating the functional independence of tacts and intraverbals with developmentally disabled individuals (Braam & Poling, 1983; Luciano, 1986; Watkins et al., 1989), and with persons with traumatic

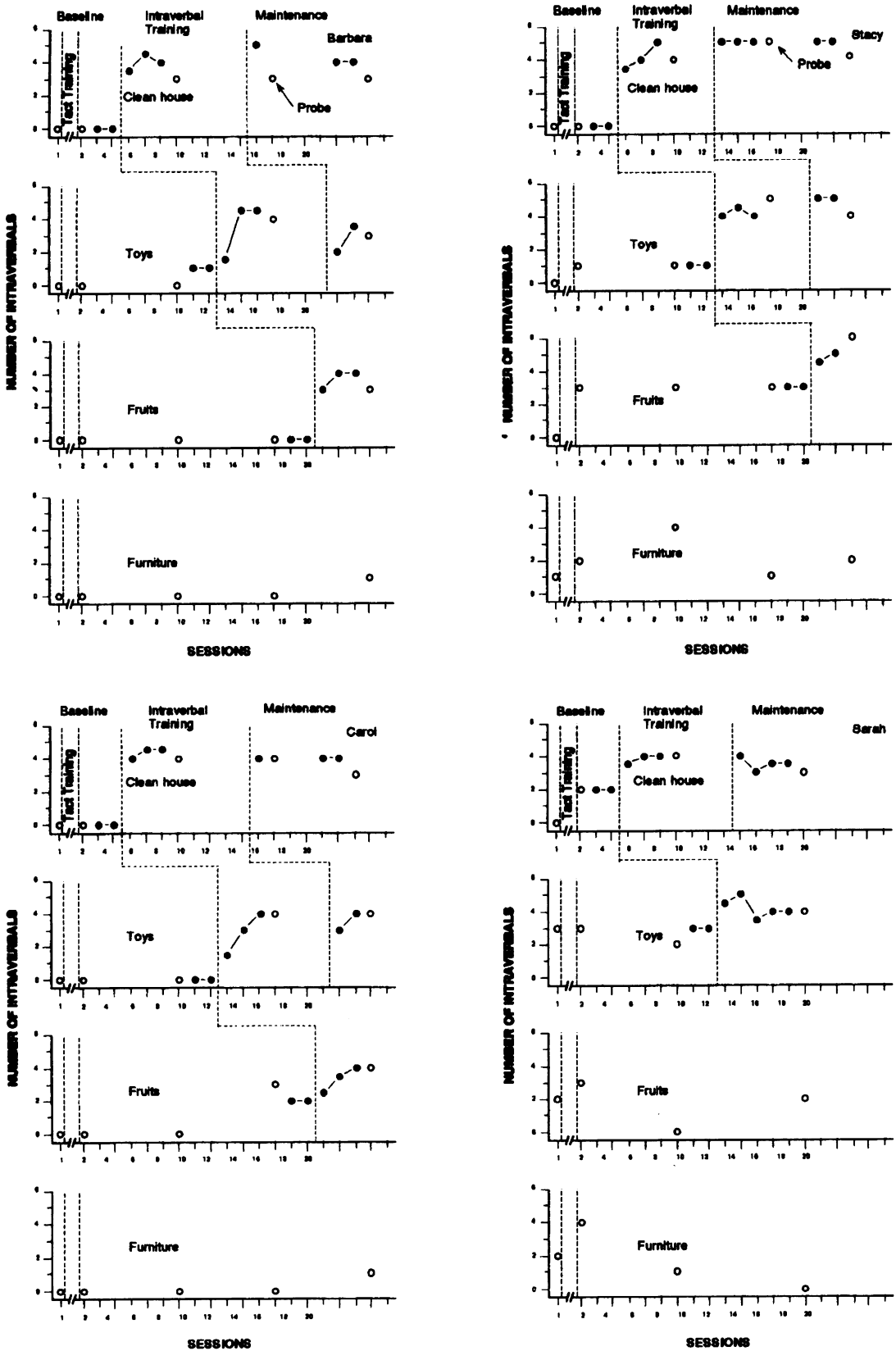


Fig. 3. Average number of correct intraverbal responses for each verbal stimulus per session.



brain injury (Sundberg, San Juan, Dawdy, & Arguellas, 1990). These data also extend the previous research by demonstrating the effectiveness of a transfer of stimulus control procedure with typically developing children. This functional independence of tacts and intraverbals may be overlooked with normally developing children because of the rapid transfer of stimulus control between nonverbal and verbal stimuli, and the apparent simultaneous acquisition of the verbal operants.

The findings from Experiment 2 indicate that teaching children to tact both the item and the class to which the item belongs may facilitate the acquisition of the intraverbal repertoire for some children. In this experiment, two of the four subjects emitted more intraverbal responses to some stimuli following this variation in the training procedure. However, this effect was not observed across all of the stimuli, or for the other two subjects. It is possible that teaching the subjects to tact the class to which the item was a member may have been effective with these two students because they already had at least one intraverbal response for those stimuli prior to the tact training. Neither of the subjects who failed to demonstrate any change in intraverbal responses after being taught to tact the class to which the items belonged, had any intraverbal responses to the verbal stimuli prior to the tact training. Another possibility was that the training actually contained an intraverbal component. Specifically, the children emitted both tacts in sequence (e.g., "an apple...it's a fruit") which may have resulted in an intraverbal connection being established between the tacts; the response product of the first tact serving as a verbal stimulus for the second, multiply controlled (i.e., tact and intraverbal) response. Still, however, even this intraverbal component of the training procedure did not result in strong intraverbal performance. This effect may be due to the multiple control involved in training (verbal and nonverbal stimulus control) and the single verbal stimulus control required for pure intraverbal behavior as was assessed during the probe sessions.

There may be several reasons why the

acquisition of intraverbal skills (in addition to the number of words in a child's vocabulary and the length of utterance) should be closely monitored by parents, pediatricians, and preschool teachers before children enter Kindergarten. It is possible that the failure to acquire an intraverbal repertoire at a typical rate may be related to the development of some abnormal social behavior. For instance, a child who has not developed an effective intraverbal repertoire may not be reinforced for attempts to socially interact with their peers. Hence, the child may fail to initiate interactions resulting in others identifying the child as being "shy" or "withdrawn." It is also plausible that such children who do not receive attention for appropriate verbal interactions may engage in other behaviors which are effective in attaining attention (e.g., acting silly, or engaging in physically disruptive behavior). Perhaps socially maladaptive behaviors which are often observed in Kindergarten classes may be lessened by directly shaping intraverbal skills at an earlier age.

Another reason to consider the specific monitoring of intraverbal development at an early age is that it may have a significant impact on the development of future academic achievement. The verbal skills of a child are clearly a major portion of the assessment of their intellectual functioning as measured by standardized tests. As suggested by the results of Experiment 2, it seems highly probable that those children who have more advanced verbal skills would be able to acquire new information from their environment faster than those individuals with lesser verbal skills.

There are several areas related to the development of intraverbal skills which may be appropriate for future research. It would be desirable to investigate the generality of the current findings with a larger number of children with different levels of verbal abilities, using a wider variety of verbal stimuli. It would also seem to be desirable to more closely determine the typical rate of intraverbal skills development with normally developing children, and to then determine whether there is a correlation between the level of these skills

and intellectual and social development of children.

It would also appear to be beneficial to determine the most effective methods of teaching intraverbal skills. Early childhood educators devote a considerable amount of time constructing educational lessons to teach skills to children. Many of the skills they teach require the students to emit intraverbal responses related to a particular topic. Thus, it would seem desirable to use the most efficient method of teaching these skills. For example, it may be more effective to require the students to tact the class for an item rather than merely having the parent or teacher tact the class for the children. It would also be important to know whether intraverbal skills develop better if the nonverbal stimulus is removed from the teaching situation such as to develop a pure intraverbal response rather than a multiply controlled response. Investigation of these teaching issues should lead to improved methodology for the development of intraverbal repertoires, as well as a better understanding of language development in normal children.

A final point is that in teaching language skills to developmentally disabled children, educators often use the skills of typically developing children as a guide for teaching strategies. The failure to acquire verbal skills by language delayed children often requires educators to dissect the learning process in order to ensure the acquisition of the skills. Thus, through the analysis of the specific stimuli and responses required in such tasks, the research with the language delayed individuals may ultimately lead to improvements in our ability to educate the typical child.

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