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The Use of Classroom and Home-Based Reinforcement to Increase Verbal Responses to Questions in Preschool Children

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THE USE OF CLASSROOM AND HOME-BASED REINFORCEMENT TO INCREASE VERBAL RESPONSES TO QUESTIONS IN PRESCHOOL CHILDREN

by

Katherine Anne Muir

A Thesis
Submitted to the
Faculty of The Graduate College
in partial fulfillment
of the
Degree of Master of Arts

Western Michigan University
Kalamazoo, Michigan
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Katherine Anne Muir
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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>Method</td>
<td>8</td>
</tr>
<tr>
<td>Subjects and Setting</td>
<td>8</td>
</tr>
<tr>
<td>Subject Descriptions</td>
<td>11</td>
</tr>
<tr>
<td>Observation Procedures</td>
<td>14</td>
</tr>
<tr>
<td>Baseline</td>
<td>15</td>
</tr>
<tr>
<td>Normative Peer Data</td>
<td>20</td>
</tr>
<tr>
<td>Observer Training</td>
<td>21</td>
</tr>
<tr>
<td>Reliability</td>
<td>22</td>
</tr>
<tr>
<td>Target Behavior</td>
<td>23</td>
</tr>
<tr>
<td>Experimental Design</td>
<td>24</td>
</tr>
<tr>
<td>Dependent and Independent Variables</td>
<td>24</td>
</tr>
<tr>
<td>Experimental Phases</td>
<td>25</td>
</tr>
<tr>
<td>Baseline</td>
<td>25</td>
</tr>
<tr>
<td>Individual Sessions</td>
<td>26</td>
</tr>
<tr>
<td>Classroom and Home-Based Reinforcement</td>
<td>27</td>
</tr>
<tr>
<td>Results</td>
<td>31</td>
</tr>
<tr>
<td>Individual Sessions</td>
<td>32</td>
</tr>
<tr>
<td>Verbal Compliance</td>
<td>33</td>
</tr>
<tr>
<td>Normative Peer Verbal Compliance</td>
<td>34</td>
</tr>
<tr>
<td>Nonverbal Avoidance, Nonverbal Compliance, No Response</td>
<td>35</td>
</tr>
<tr>
<td>Teacher Consequences</td>
<td>36</td>
</tr>
</tbody>
</table>
For a child to receive maximum benefit from instruction in school, verbalization is a necessary skill. Several studies support this contention, although the precise role of verbalization is not clear. Weir and Stevenson (1959) found that children who named the stimuli presented to them performed more accurately on a discrimination task than those who did not name the items first. Wheeler and Dusek (1973, p. 257) agree that "...overt labeling forces or allows the young child to use a verbal encoding strategy to facilitate learning." Superior retention on recall and recognition tests was found for Ss who named the stimulus at the time of presentation, compared to those who merely circled the name of the stimulus on paper (Kurtz and Hovland, 1953). Kingsley and Hagen (1969) state that overt labeling facilitates recall on the most recently presented items, but they caution that this relationship may be mediated by rehearsal of the labels, either overtly or covertly. In an earlier study (1968), these authors noted the same increase in the recency effect for labeling, but added that the overall difference between labeling and non-labeling groups was slight. They found no differences among preschoolers.

The reader must remember, though, that these studies only simulate the classroom situation. The stimulus materials were familiar to the Ss; they were tested for their

1

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memory, not their original acquisition of knowledge. In most cases, the children were tested immediately after seeing the stimuli; the longest delay was two weeks.

For preschoolers, who cannot yet write, verbalization is the primary way they have of showing teachers what they know. When these children do not respond to questions, it may be because they do not understand the question, they do not know the answer, or they will not say the answer. When the teacher cannot discern the reason for the child's silence, s/he cannot assess the child's current level of functioning and will not know where to begin teaching.

Preschool children who seldom verbalize in class receive little feedback on either their verbal skills or their knowledge. Consequently, they may not learn to speak clearly and they may not learn if their answers are correct.

In the classroom, it may be relatively easy for teachers to ignore quiet children and devote their time to more disruptive children. The quiet child often causes little disturbance and plays alone. Thus the teacher does not have to answer questions for this child or settle arguments between him or her and other children. In addition, many teachers may want to "leave well enough alone," fearing that if the child becomes more talkative, s/he will at the same time become less manageable.

When teachers do attend to children who are mostly non-verbal, they may get impatient waiting for a verbal response.
Therefore, for the sake of expediency, they may attend to non-verbal cues so that the child merely has to point, to gesture, or to make a head movement to get a desired object. Thus, while other children verbally request more milk, the teacher may not require this from the quiet child and may see that s/he is given more milk without asking for it. In this way, the child not only does not have to talk, but is even reinforced for non-verbal interactions.

An extreme form of quiet behavior is elective mutism, in which a person speaks only in the presence of highly specific discriminative stimuli. For example, such children will often speak only at home or only to their immediate family. Although Reed (1963) reports that there is no universal treatment for this condition, the research in this area is fairly uniform. The basic approach is to take a situation in which the child talks and gradually generalize verbalization to other people and settings. At the same time, all verbalization is reinforced, usually with edibles.

Wulbert, Nyman, Snow, and Owen (1973) combined these two components with time-out for not responding. Reinforcement for talking, even with time-out for silence, was not effective unless strangers were gradually faded in. Norman and Broman (1970) used feedback on a 12-year-old boy's voice volume as well as reinforcing all sounds with sips of a soft drink. Conrad, Delk, and Williams (1974), working with an Indian girl, utilized a paraprofessional from her subculture.
to ease the transition from her home, where she spoke, to other environments. Rasbury (1974) similarly began treatment at home and gradually encouraged the child to speak in the car to his father as they travelled closer to school, where he would not speak. In another study (Reid, Hawkins, Keutzer, McNeal, Phelps, Reid, and Mees; 1967), a six-year-old was reinforced with bites of breakfast for talking to her mother while the E gradually moved closer to the child.

In a less extreme case, Reynolds and Risley (1968) showed that teacher attention (which included providing material goods to the child) was more effective than DRO in increasing the verbalization of a preschool child. A follow-up experiment indicated that it was not the attention per se, but the toys and other items which were reinforcing.

These studies, however, are not conclusive. All of them are case studies, with no intra-subject replication. With two exceptions, these reports offer no data before, during, or after treatment, except to give a terse anecdotal report. While Wulbert, Nyman, Snow, and Owen (1973) show several graphs, they did not graph the baseline behavior and show only selected parts of the experiment (e.g., data for certain days only and data for only one of several Es). Reynolds and Risley (1968) give the most complete data, graphing the number of verbalizations and the percentage of intervals in which the S talked.
In one case (Reid, Hawkins, Keutzer, McNeal, Phelps, Reid, and Mees; 1967), the study was conducted in an experimental room with two adults, but never in the natural environment. In some instances, the actual consonant and vowel sounds were being shaped so that it was unclear whether these children were electively mute or whether they never learned to speak.

In a related study (Bornstein, Bellack, and Hersen; 1977), unassertive children practiced appropriate verbal and nonverbal responses to various social situations. The Es used prompts, modelling, and feedback to shape the children's responses. All sessions took place in an experimental room with adults. The children's classroom behavior during the study was not measured.

A similar situation exists in the literature for psychotics who once spoke but are currently nonverbal. All studies used positive reinforcement for talking, usually in a treatment package consisting of a variety of components. Isaacs, Thomas, and Goldiamond (1960) found that shaping, positive reinforcement, and prompting were effective in reinstating speech in two male psychotics. Sherman has used shaping and reinforcement alone (1963) as well as combined with fading and imitation (1965). He found that positive reinforcement was the most effective part of the treatment. Thomson, Fraser, and McDougall (1974) used instructions and imitative prompts with speech-contingent
reinforcement. They found that reinforcement was effective in reinstating speech, but was not necessary for its maintenance. Baker (1971), using a control group, discovered that Ss reinforced for talking and ignored for silence showed greater verbalization than Ss reinforced for silence and ignored for talking.

The major flaw in these studies was the lack of demonstrated control. The case studies made no comparisons of the S's behavior across time or across situations. Even when studies used more than one S, the treatments were not always identical for all of them, so that there were no repeated measures across Ss within a single experiment. Without a staggered introduction of treatments or a reversal, it cannot be concluded that the results were from intervention rather than the passage of time, the special attention given to the Ss, or new elements in the environment. Only one study attempted a replication. Sherman (1965) used a very brief period of DRO, which extinguished the verbalization, and then successfully reinstated the treatment condition.

The most common intervention in these studies was positive reinforcement. In the more controlled experiments, this treatment was the most effective component of the program. Preliminary observation showed that the children used in this study were frequently ignored for talking but held or coaxed to talk when they were silent. Therefore,
making praise and attention contingent on talking in class was the major focus of this program.

In the present study, teachers were asked to ignore the target children when they did not verbally respond to questions and to direct their attention to other students at these times. When the Ss did answer questions, however, they were to be praised and received an activity reinforcer.

In conjunction with reinforcement in the classroom, there was a home-based program. When a child met the criterion for activity reinforcers at school, a note was sent home telling the parents to praise the child and to give the child a special treat.

The major advantage of this study over previous work in this area was the replication of treatment across several Ss. Children were selected on the basis of a single behavior (question-answering); all showed similarly low rates of verbalization. Consequently, the same treatment could be used for all Ss. Using a multiple-baseline design (Baer, Wolf, and Risley; 1968), the intervention was introduced at a separate time for each child. In this way, changes in behavior could more easily be attributed to the treatment program.

In contrast to previous studies, data were taken both before and during treatment and recorded as a percentage of responses verbalized. These are supplemented by data on other facets of the program. Unlike some research, this
experiment examined the behavior in the setting in which it occurred. The intervention took place in the classroom with the teachers asking the questions and delivering the consequences. Ss had minimal contact with the E.

While other researchers used older children or adults, preschool children formed the target population for this study. By working with young children, verbal behavior could be modified early in their school years before they learned better ways of avoiding verbalization. Once they increased their rates of verbalization to the teacher, emphasis could be placed on verbalizing to their peers. Talking to other children and having them respond might make school more reinforcing for them and could teach them useful skills for interacting with others.

**METHOD**

**Subjects and Setting**

The study took place at a child care center connected with a university psychology department. Approximately 75 children aged two to five were enrolled and randomly divided among six classrooms. Children with physical or mental handicaps were not accepted into the program. No one type of parent predominated; they ranged from university professors and other professionals to welfare recipients.

Activities were quite varied; some were done as a
large group and some on an individual basis. Special emphasis was placed on verbal skills, counting, and colors. Psychomotor games, stories, and free play were also integral parts of the program. Each week there was a theme (e.g., transportation, drama, olympics, carnivals) around which several activities were centered. Typically, the teachers explained the theme to the children, read them a story about the theme, and had them draw pictures and make objects relating to the theme.

The center was staffed by certified teachers, one of whom was in every classroom. In addition, each room had aides who assisted the teacher by helping the children with projects, maintaining order in the room, and toileting the children. The aides had no major teaching duties and during group lessons they stayed in the background. Aides were either undergraduate psychology students fulfilling a course requirement or paid high school students. The staff-to-child ratio was approximately 1:6.

All the teachers at the center were asked by the E to name the "quietest" children in their classes. Specifically, they were to look for children who did not often answer when called on, who rarely volunteered in class, or who often did not participate in classroom activities. All the children thus named were observed by the E, who recorded the opportunities the child had to respond (being called on for Show and Tell, asked for the date, etc.) and
the child's response (verbal compliance, verbal avoidance, nonverbal compliance, nonverbal avoidance, no response) as well as the consequences delivered by the teacher (ignore, positive verbal, positive nonverbal).

From these children, Ss were chosen who emitted a verbal response to questions less than 50% of the time. The children who were selected exhibited the lowest rates of verbalization to questions asked by the teacher. The questions were ones to which a nonverbal (motor) response was inappropriate (e.g., "What is your name?") or to which a "Yes" or "No" answer was expected. The type of question was contrasted with one for which a verbal response was not necessary (for example, "Would you pick up the truck?") and which was more accurately labelled an instruction rather than a question. In addition, questions usually asked for some kind of information not contained in the question, while instructions specified the exact response to be emitted. Excluded were children who often verbally refused to answer questions (for instance, saying "I don't want to"), since the behavior of interest in this study was infrequent, rather than inappropriate, verbalization.

Two of the Ss thus selected were girls aged 3.5 and 4.0 years. The third S was the three-year-old brother of the older girl. Two children came to the center at 8:00 in the morning and left at 5:00 p.m. The third was present
from 8:00 a.m. to 2:00 p.m. on Monday, Wednesday, and Friday and from 10:00 a.m. until 2:00 p.m. on Tuesday and Thursday. The children were in three different classrooms and were observed sequentially rather than simultaneously.

The morning was chosen for observation, since activities at this time tended to be more structured than those in the afternoon. In addition, afternoon activities were more likely to be broken up by nap, recess, and free play. The morning also provided a better opportunity for taking data during group activities. For example, the classrooms frequently had a group lesson during which the children practiced saying the days of the week and learned the date. The morning was also the time for Show and Tell, as well as class projects involving cooking or painting. The teachers felt that they could more easily direct questions to the Ss at this time than in the afternoon, since they typically called on the children during these activities. The only change was that the teachers would ask a few more questions of the target children than they ordinarily did, in order to make sure that these children had a sufficient number of opportunities to respond so as to get a more representative sample of their behavior.

Subject Descriptions

Subject 1 was a three-year-old boy who had attended the center for 3.5 months at the time of the study. He
seldom verbalized either in response to a question or in spontaneous conversation. He sometimes talked to the aides but rarely to his teacher or to the other children in the room. On the playground, he would play by himself and would seldom respond when other children talked to him. His teacher reported, however, that he was quite talkative in the hall as his parents brought him to the room or took him home. The parents agreed with this and added that he talked a great deal at home.

When called on in the classroom, he often put his hand in his mouth and/or looked down. If pressed to answer, he shook his head and puckered his face as if he were greatly upset or about to cry. At this point, the teacher usually called on someone else. He was seldom called on, however, even when every other child was asked to participate. He was almost always the last to be chosen to line up for such activities as recess and going to the bathroom.

He was at the center each day from 8:00 a.m. until 5:00 p.m. He was observed each day from 9:15 to 10:00. Preliminary data showed that he had more opportunities to respond at this time than during other morning hours.

Subject 2 was the sister of the first S. She was four years old and had attended the center for nine months. Observations indicated that, during a structured lesson, she answered questions directed to the group as a whole,
although she often waited for someone else to say the an-
swer and then she repeated it. When she was called on
individually in a large group, however, she often did not
answer and sometimes shook her head or sucked her thumb.
She often stayed close to the teacher during free play
and often talked spontaneously to her, even though she
frequently did not answer the teacher's questions in this
situation. She occasionally talked to the other children
in the class, although she told the teacher that she had
no friends other than a neighbor and her brother. An
undergraduate student worked with her a few months prior
to this study to increase her verbalization. Although the
period of implementation was brief and the intervention
unsystematic, a token reinforcement procedure proved some-
what effective in increasing the number of times she talked
during specific activities.

She was at the center the same hours as her brother.
She was observed from 8:30 a.m. to 9:15 a.m., since this
time period provided the greatest number of group activi-
ties in her classroom. This permitted data to be taken
on her performance in both group projects and in one-to-
one situations with her teacher.

Subject 3 was a 3.5-year-old girl, who attended the
child care facility for nine months before the study. When
the teacher called on her, she often made no response.
Whenever possible, she nodded or shook her head instead of
saying "Yes" or "No."

During free play, she participated in a solitary activity, such as stringing beads or sitting and watching the other children. She rarely talked to the other children and they usually left her to play by herself.

Her teacher reported that this girl did not have any special friends. She had talked frequently to a hearing-impaired girl and played with her almost constantly until this other girl left the center. Since then, this S has become more withdrawn, according to the teacher.

Her hours at the center varied, but she was always present from 10:00 a.m. until noon. Therefore, she was observed daily from 10:00 a.m. until 10:45 a.m.

Observation Procedures

There were three observation periods:

- 8:30 to 9:15 Subject 2
- 9:15 to 10:00 Subject 1
- 10:00 to 10:45 Subject 3

These times started with the beginning of class and ended at recess time. Observations were made Monday through Friday, with each S being observed for 45 minutes. Subject 1 was observed during the second time period, Subject 2 during the first, and Subject 3 during the third.

Observers sat in the classroom approximately five to ten feet away from the children. The distance was deter-
mined so as to allow the observers to have an unobstruc-
ted view of the child and to be able to hear both the
teacher and the child. At the same time, they were not
so close as to distract or intimidate the child. The ob-
servers were careful to remain on the outer edges of the
group and to glance at all the children. The purpose of
this was to attract minimum attention and to make it less
obvious which child was being observed. The observers
were in the room periodically several times prior to data
collection so that the children would become accustomed
to their presence.

Baseline

The teachers were given a list of acceptable ques-
tions compiled from those recorded prior to baseline. They
were requested to ask the children these questions or sim-
ilar ones during the period of observation. These ques-
tions had to have the following characteristics: 1) They
required a verbal rather than a motor response (i.e., the
child was asked to name the day instead of being told to
point to it on the calendar, 2) They required short answers,
usually one or two words, 3) They were questions to which
the children knew the answers, 4) They were frequently used
by the teacher and therefore would not seem unnatural to
the children nor be disruptive for the teacher. It should
be noted that questions for which "Yes" or "No" was an
appropriate answer met the above criteria. Excluded were questions directed to more than one child and questions immediately answered by the teacher ("Do you know what time it is? Time for recess."). In cases where the child was not clearly seen by both observers, no response was recorded.

The teachers were told of these guidelines and asked to adhere to them whenever possible. They were also cautioned to let at least one minute elapse between questions, so as not to barrage the child with many questions at once. The teachers were further instructed to make no other changes in their teaching routine nor in their method of handling the Ss. They were told that the E wanted to see how the children typically behaved in the classroom. They were given no indication as to what treatment would be used.

Observers used event recording and began taking data as soon as a question meeting the above criteria was asked to a target child. After the teacher asked such a question, there was a 20-second time period (determined by a stopwatch), during which the observers coded the response. For these 20 seconds, any questions asked by the teacher were ignored, even if they fit the description. This allowed the observers time to record the response to the question and other information with less possibility of forgetting what had occurred or of making an error. Also,
the teachers tended to repeat questions when the children did not answer the first time, and, with this recording system, the original question only was scored in most instances.

Observers recorded the question asked, the child's response, whether or not the response was correct, the number of people present, the person making the request, and the consequences delivered to the child (See Observation Sheet, Figure 1). Following is a more precise description of the information recorded.

The teacher's question was written down verbatim.

The child's response could be categorized as follows:

1. **None**: The child continued the ongoing activity; the child looked at the teacher but made no verbal or nonverbal response (other than eye contact) to the question.

2. **Verbal Compliance**: The child made a verbal response which was in the same response class as the correct answer (when asked for the day, named a day of the week); the child said "I don't know."

3. **Verbal Avoidance**: The child said "I don't want to" or otherwise verbally refused to answer the question; the child talked about something not mentioned in the question.

4. **Nonverbal Compliance**: The child pointed to
an object mentioned in the question; the child nodded or shook his/her head in response to a question where "Yes" or "No" was an appropriate answer.

5. **Nonverbal Avoidance**: The child turned away, sucked his/her thumb, or looked down and did not verbalize a response; the child shook his/her head when "Yes" or "No" was not an appropriate answer.

These categories were not mutually exclusive, except in the case of "None," which could not be marked in conjunction with any other category.

Verbal compliance was further categorized as correct or incorrect. To do this, the observers judged if the response was an appropriate answer to the question. In cases where the teacher gave this kind of feedback to the child ("That's right" or "No, it's not Tuesday"), her judgment determined whether or not the child's response was correct.

Since the number of persons in a group may affect the verbal behavior of shy children, the number of people engaged in the same activity as the S were counted. The number of adults (including the teacher and her aides) and the number of children, were recorded separately. The purpose of collecting this information was to determine if a child responded differently depending on the size of the
group. For example, an $S$ might answer the teacher's questions when one or a few people were present, but not answer questions in front of the entire class.

In most cases, the person asking the question was the teacher. Due to vacations and illness, the teachers were not always present; on these days, the substitute teacher was instructed to ask questions to the target child, according to the procedure used for the regular teachers. During treatment, the substitute teacher was also instructed to deliver the appropriate consequences to the child's response.

Consequences fell into three categories:

1. **Positive Verbal**: The teacher made a further verbalization to the target child after asking the question and before talking to another child. This verbalization could have been praise, repeating what the child had said, or asking another question of the child.

2. **Positive Nonverbal**: After asking the question, the teacher physically touched the child, smiled at the child, or gave the child a toy or other object without saying anything.

3. **Ignore**: The teacher made no response or talked to or attended to another child or to the class as a whole.

The first two categories were not mutually exclusive.
If, for instance, the teacher said, "Let me help you," while giving the child some scissors, the observer would record both positive verbal and positive nonverbal consequences. Since the intervention program stressed giving positive consequences for verbalizing a response to a question and ignoring silence, positive consequences (verbal and nonverbal) were grouped together for the purpose of analyzing the data. Thus, for each question, the consequence was categorized as either "positive consequence" or "ignore." The category "ignore" was never recorded concurrently with either of the other two categories.

Negative consequences (such as scolding or hitting) were virtually absent from pre-baseline observations; therefore, this category was not included on the data sheet. Had this consequence occurred, it would have been noted in the "comments" column, discussed below.

Finally, the recording sheet contained a section for comments, so that unusual circumstances could be noted or so that a more detailed explanation of the child's response or the teacher's consequences could be given, when necessary.

**Normative Peer Data**

Kazdin (in press) has emphasized the importance of social validation in doing clinical research. One aspect of this concept involves comparing Ss to their "nondeviant"
peers" both before and during treatment in order to determine if the Ss differ from their peers in regard to the target behavior. A more subjective aspect of social validation asks how others in the S's environment will view the change in behavior.

For these reasons, data on question-answering were also collected for "control" Ss. In each class where there was a target child, the teacher was asked to select one or two children whom she considered to be average in answering questions. It was stressed that these children should be neither too talkative nor too quiet and should be chosen in the same way that they had chosen the target children.

Approximately once every five days data were taken on these children as well as on the Ss, during a single observation period. Data were recorded in the same manner as for the target Ss. Observers took data whenever an appropriate question was directed to either child. There was the same 20-second period in which to record, so that if a teacher asked a question to an S and then immediately asked one to the normative peer (or vice versa), only the first question was recorded. The teachers were cautioned about this, however, and rarely were data lost in this manner.

Observer Training

Observers were given a blank observation sheet and a list of instructions telling how to code each category.
They then practiced recording in the classroom with the E. Disagreements were discussed, and, when necessary, additional rules or clarifications were made. Each observer trained until he or she obtained a minimum of 80% agreement with the E on all categories.

**Reliability**

Reliability data were taken on the average of two days per week during baseline and treatment conditions. The percentage of days for which two observers recorded were as follows for the three children: 41%, 43%, and 28%. Fewer reliability data were collected for the third child since she was frequently absent when reliability checks were made.

For normative peers, reliability was calculated on the average of once per five sessions, so that there were reliability checks 13% of the time for two peer controls, 17% for another, and 40% for the fourth. Again, the discrepancy can be explained by absence.

During reliability checks, two observers recorded simultaneously. They were seated three to five feet apart and five to ten feet from the child. In this way, they were close enough to communicate with each other if necessary and could also see and hear the child. They were careful, however, to shield their recording sheets, so that the responses of one could not be seen by the other.
When a question fitting the definition given earlier was directed to the target child, the E cued the observer by holding a colored index card up in front of the observer. At that time, both independently recorded the data. If the observer could not see the child's response or the consequences delivered by the teacher, he or she told the E at the time of cuing and neither recorded that piece of information.

Reliability was calculated individually for each observation category. An agreement was scored when the two observers marked the same square under a given category. When one observer marked one square and the other observer another, a disagreement was scored. Reliability was computed by dividing the number of agreements by the sum of the agreements and disagreements and multiplying by 100.

**Target Behavior**

The target behavior was defined as follows: When the teacher asked a question requiring a verbal rather than a motor response of the child, the child would respond verbally with a correct answer within ten seconds the first time the question was asked. Pre-baseline observation showed that the Ss met these criteria 50% of the time or less. The goal was for them to increase this figure to 75% or above, which was consistent with the performance of their peers.
Experimental Design

A multiple-baseline design across Ss was used. This design was especially appropriate for the siblings in that changes in behavior could be compared with the onset of treatment, thus separating the effects of this particular intervention from parental or other influence (e.g., telling the children that they were participating in a study). A reversal design was not indicated because it would have been undesirable to extinguish verbal behavior once it had been established. In addition, once the teachers became familiar with praising appropriate responses and ignoring inappropriate responses, it would have been difficult to change their behavior back to baseline conditions.

Dependent and Independent Variables

The dependent variable was the child's response to questions asked by the teacher. Although all response categories were of interest, verbal compliance was the major focus of this study, since this was the behavior that the intervention was designed to increase.

The independent variable consisted of a treatment package. The components of this package were 1) individual sessions wherein the children were reinforced for talking to the E, 2) a token economy system in the classroom in which the children received reinforcers for an-
swering the teacher's questions, and 3) a home-based pro-
gram whereby the parents reinforced the children at home
for verbal responses in school. Each aspect of this pro-
gram will be elaborated upon in a later section.

A treatment package (rather than a single treatment)
was used for two reasons. First, the literature did not
indicate a single, highly effective intervention; most of
the studies used multiple treatments. Second, one S was
extremely nonverbal and presumably a comprehensive program,
involving both the teacher and the parents, would be more
powerful and more effective than a single treatment.

Experimental Phases

Baseline. During this time, the teachers were told
to direct questions to the target child and to the control
peers as well as to the other children in class, as they
normally did. They were given several sample questions
and told to ask these or similar questions during the ob-
servation period, aiming for an average of six. They were
instructed to do this as naturally as possible so as to
get a typical sample of the children's behavior.

Subject 1 showed a greater amount of verbalization
with substitute teachers than with his regular teacher.
Since his teacher went on vacation for an extended period
early in the experiment, a second baseline was instituted
with the substitute teacher. Since he talked to her and
not to his regular teacher, it was advantageous to start treatment with the substitute teacher since this gave him the experience of being reinforced for talking in the classroom.

**Individual sessions.** Each child was gradually introduced to two unfamiliar adults and reinforced for talking to them. The purpose of this procedure was to "desensitize" the child to answering an adult's questions, and, more importantly, to provide the opportunity to reinforce verbalization, particularly in Ss who very rarely spoke in the classroom.

First, the child was brought to a small room by the E. Ss who refused to go out of the room with the E or seemed afraid of the E were taken instead to a quiet corner of the classroom. In the initial session, the child learned the basics of the token system. Based on the backward chaining procedure described by Homme (1970), the child practiced: 1) sampling the reinforcers, 2) trading tokens for reinforcers, and 3) earning tokens and exchanging them for reinforcers. The purpose of these steps was to determine what reinforcing activities the child preferred, to establish for the child the value of the reinforcers, to show the child that talking was the behavior that would earn reinforcers, and to show the steps needed to obtain the reinforcers. The E also praised the S after each verbalization. Step 3 (earning tokens and exchanging them for
reinforcers) was repeated until the child responded verbally to 90% of the questions asked.

After Step 3 was mastered, a second adult was present for these individual sessions. This step was conducted either in the classroom or in a separate room. Again, the child had to reach the 90% criterion.

For each verbal response the child made, s/he was praised and given a star which could be traded for a variety of activity reinforcers. Once the child accomplished Step 3, only stars were given in the individual sessions; there were no longer any back-up reinforcers for the stars. At this point, the only way for a child to earn the desired activity was by talking in the classroom to the teacher, since this was the goal behavior. The activity reinforcers were selected by talking to the teacher, the child, and the parents. After compiling a list of potential reinforcers, several of them were presented to the child to see which s/he preferred. Most frequently chosen were being the leader (first in line), sitting next to the teacher, making a bead necklace, and listening to a story. Activity reinforcers were chosen since the policy at the child care center prohibited the use of edibles.

Classroom and home-based reinforcement. When Step 3 was mastered, the teacher was given instructions to implement a contingency management program. She was told to praise any verbalization in response to one of her questions.
and to ignore any other responses to questions. Specifically, she was not to repeat the question, to ask another question, or to make any comments unless the child spoke. Nonverbal responses, even nodding, were to be ignored.

To eliminate all sources of reinforcement for inappropriate responses to questions, the classroom aides were instructed not to interact with the child unless the teacher asked them to do so. If a target child asked an aide a question or made some other verbalization, the aide was to praise the child. If, however, the child merely say by the aide or held his or her hand, the aide was to ignore the child and walk away, if possible. This was done because the children often did not talk to the aides, but were nonetheless reinforced by being held. Also, this procedure served to discourage the aides from playing with the children when they were not talking. Otherwise, the aides were asked not to talk to the child or to sit next to him or her. Teachers and aides were given daily feedback at first until they made the appropriate response (reinforce or ignore) 90% of the time for three consecutive sessions. After that, they received feedback on an average of two times per week.

At the beginning of each observation period, the child was told that s/he could earn stars by answering the teacher's questions. Subjects 2 and 3 were then given bracelets made from construction paper, on which the E pasted the stars they earned. Subject 1 was initially given a paper car which
was tied around his neck, but he refused to wear it. Thereafter, he was given a verbal reminder of how many questions he had answered and how many more he would have to answer in order to get his reinforcer. Since he had an extremely low level of verbalization initially, his goals were small, and remembering how many answers he had to give did not seem too difficult for him.

To insure success on the first day of intervention, each child was given a goal which could easily be reached. Subjects 2 and 3 each had to answer two questions; they had accomplished this in a majority of past sessions. Since Subject 1 rarely verbalized in the classroom, his goal was one verbalization. While Subject 1 was reinforced for answering a question at any time during the day, Subjects 2 and 3 could earn reinforcement during the observation period only. This decision was based on their past performance; Subject 1 often went for days without talking to his teacher, while Subjects 2 and 3 typically answered at least two questions during the observation periods themselves.

After the procedure was explained and the child was told the number of stars needed for reinforcement, s/he was given three activities from which to choose that day's reinforcer. Then the child was briefly reminded of the following things: 1) that answering questions in class was the only way to earn stars, 2) that $X$ number of stars was needed to earn a special treat, and 3) that s/he was trying to earn
X activity. The activity reinforcer was awarded by the teacher, usually on the day it had been earned. "Being leader" was awarded the following day, since the job was assigned to someone at the very start of the observation period. The teachers were encouraged to deliver the reinforcers immediately, but it was not always convenient for them to do so. Occasionally, for example, the child would earn the reinforcement just before snack or recess or during a structured activity which could not be interrupted to read the child a story or let the child lead a line. The teachers were also requested to tell the children that they had earned the reinforcer by answering questions, thus clarifying the contingency between the behavior and the consequences.

When a child verbalized to 90% or more of the questions in the presence of two adults, the next child was introduced to the individual sessions. When the child had earned the desired activity in the classroom two days in a row, the criterion was increased so that s/he had to answer one more question per day in order to receive the activity reinforcer. When the goal was five answers per session, the criterion was no longer increased. Since the teachers usually asked six or seven questions, answering five represented a high rate of verbalization (71% or greater).

In conjunction with the contingency management program at school, the parents were encouraged to supplement
it by providing reinforcement at home. This was done by sending a note home to the parents on each day their child met criterion. The note told them that the child had answered many questions at school and urged them to praise the child at home and to provide a special treat for the child. The E told the parents about the study during the "individual sessions" phase; all parents agreed to cooperate by praising and reinforcing their child at home. At this time, possible reinforcers (such as candy, gum, and helping around the house) were discussed.

RESULTS

Although the data are graphed as sessions, the data points do not necessarily represent consecutive days. Occasionally, a child was absent, or, because of a special activity, there was no opportunity for the teacher to ask questions. Consequently, there were no data for these days. On days for which the data were graphed, the teacher asked a minimum of three questions, since data based on only one or two opportunities to respond might have presented a distorted picture of the child's behavior. Percentages were calculated instead of using raw numbers since the number of opportunities to respond varied between sessions. Figure 2 shows the data graphed by actual calendar days to give a clearer picture of the time each child was observed and the time treatment was started for each.
Data for Subject 2 were divided into two parts: her performance in front of the entire class (usually consisting of ten or more people) and her performance in small groups (less than ten people). This separation was made because her rate of verbalization in small groups was much higher than her rate of verbalization when the entire class was present. On some days she had the opportunity to respond in the large group situation only and on some days in the small group situation only; sometimes both of these situations occurred on the same day.

For Subjects 1 and 3, the group size was almost always within a very small range such that there were not enough data points in each of these situations to make this distinction for them.

**Individual Sessions**

Data for individual sessions during this phase showed that all Ss reached the criterion of 90% verbal response to questions asked in the presence of first one and then two adults. Since Subject 1 showed such low initial rates of verbalization with the E, a third adult participated with the E until the S reached the 90% criterion. His mean rate of verbalization with one adult (A) was 80%, with adults A and B 68%, and with adults A and C 70%. Subject 2 responded verbally to an average of 80% of the questions asked by one adult and to a mean of 85% of the questions.
with two adults. Subject 3 had the highest rate of verbalization, averaging 90% with one adult and 95% with two adults. Her lowest single value was 80%.

**Verbal Compliance**

All Ss showed an increase in question-answering after the contingency management program was introduced. Subject 1 had a mean of 9% verbalization during baseline. During treatment, his mean rate was 41%. The values ranged from 0% to 100%. Since this S talked more often in the presence of a substitute teacher than for his regular teacher, it was of interest to look at his rate of verbal compliance with his regular teacher only. In terms of talking to his teacher, he increased from a mean rate of 0% to one of 34%, which is similar to his overall increase. Subject 1's verbal compliance, combining data for the regular and substitute teachers, is depicted in Figure 3.

Figure 4 shows Subject 2's increase in small group verbalization from a mean of 57% during baseline to a mean of 82% during treatment. Values ranged from 40% to 100%. Her large group data went from a mean of 26% verbal compliance during baseline to one of 64% during treatment, with percentages ranging from 0 to 100 (Figure 5).

Subject 3 showed the greatest improvement. Her rate of verbal compliance, shown in Figure 6, sharply increased from a baseline mean of 7% to a mean of 61% during treat-
ment. Values ranged from 27% to 86%.

The percentage of correct verbalizations per session was recorded to see if there was any change before and during treatment. One might suspect that, by encouraging children to speak, they might have verbalized any response so as to get a reinforcer, regardless of whether or not the answer was correct. No S showed this decrease; the modal value in this category for each S was 100%.

Since Subject 1 verbalized on only three days during baseline, his mean percent of correct verbalization (90%) may be misleading. During treatment, he averaged 90% correct verbal responses. Subject 2's percentage of correct verbalizations was fairly constant in small groups (93% during baseline and 90% during treatment), but increased in large group situations from 78% to 86%. Subject 3 had only two days in which she verbalized during the baseline phase, so that her rate of correct verbalization (50%) may not accurately reflect her pre-treatment responses. During the implementation of the program, 88% of her verbalizations were correct.

Normative Peer Verbal Compliance

In each case, the control children had, on the average, a higher rate of verbal responses to questions than did the target child in the same room. The control peer for Subject 1 had the lowest mean rate of verbalization at
50%, but this was much higher than the S's baseline average of 9%. The teacher named two control children for Subject 2. Their mean values were 88% and 82%; Subject 2 had a mean rate of 57% in small groups and 26% in large groups before implementation. The control peer in the third classroom had a mean rate of 78%, compared to the S's rate of 7%. Figure 7 shows the verbal compliance of the peer controls.

**Nonverbal Avoidance, Nonverbal Compliance, No Response**

As the children began to verbalize a larger percentage of the time, there was naturally a decrease in the other categories as a whole. The purpose of looking at these data was to see where the decreases and increases, if any, occurred. Since verbal avoidance was coded on no more than five days for any S, this category was eliminated from the results.

For Subject 1, the greatest difference between baseline and treatment phases was for nonverbal avoidance, which decreased from 43% to 11%. There was little change in nonverbal compliance (23% to 19%); none in no response (21% before and after treatment).

Looking at Subject 2's small group data, there was little change in nonverbal avoidance (6% during baseline, 2% during treatment) or in nonverbal compliance (11% before and 10% during treatment). Her rate of no response, how-
ever, dropped from a mean of 24% to a mean of 5%. Her large group data were somewhat more variable. Her rate of nonverbal avoidance in large groups decreased from an average of 24% during baseline to 10% during treatment. Nonverbal compliance occurred at an average rate of 15% during baseline and 10% during treatment. Non-responding showed a decrease from a mean of 29% to a mean of 14%.

Subject 3 showed large mean decreases in both nonverbal compliance (45% to 25%) and in no response (39% to 15%). Throughout the study, she made no nonverbal avoidance responses.

Teacher Consequences

For the purpose of data analysis, the teacher's consequences were grouped into two categories: positive consequences (including positive verbal and positive nonverbal) and ignoring.

With training, all teachers improved in appropriately consequating the Ss' verbal behavior. "Appropriate consequences" denoted that the teacher gave positive consequences (verbal or nonverbal) in response to verbal compliance or ignored behavior other than verbal compliance. The consequences delivered by the teacher were inappropriate when verbal compliance was ignored or when any other response category received positive consequences.

As shown in Figure 8, Subject 1's teacher delivered
appropriate consequences during baseline on an average of 36% of the time. After implementation, this percentage rose to 70%.

The data for Subject 2's teacher were of interest because of the discrepancy between consequences given in small groups and those given in large groups. In small groups, the baseline mean for appropriate consequences was 56%; this increased to 96% during treatment. In large groups, however, the teacher initially consequated appropriately 31% of the time; this rose to 84%. Figures 9 and 10 show these changes.

Figure 11 shows a similar trend for Subject 3. Her baseline responses met with appropriate consequences 17% of the time. With treatment, her behavior was appropriately consequated 84% of the time.

In breaking down these data, the major change in all cases was in the percentage of inappropriate behavior that was ignored. Throughout baseline and treatment phases, the teachers tended to reinforce verbal compliance.

Subject 1's teacher was consistent in her response to verbal compliance (means of 92% positive consequences during baseline and 90% during treatment). Her ignoring of other behavior, however, increased from a baseline mean of 26% to a treatment mean of 66%.

Subject 2 received similarly consistent rates of positive consequences for question-answering in small groups.
(means of 94% during baseline and 100% during treatment). During baseline, though, inappropriate responses to questions were ignored only 11% of the time. During treatment, this value rose to 69%. In large groups, her verbalization met with positive consequences 75% of the time before treatment and 82% of the time during treatment. When she did not answer the teacher's questions, she was ignored 7% of the time during baseline; during treatment, the teacher ignored behavior other than verbal compliance 64% of the time.

Subject 3 received positive consequences for answering questions 50% of the time during baseline, based on only two days of data. During the contingency management program, this mean increased to 99%. During baseline, responses other than verbal compliance were ignored 4% of the time; during treatment, appropriate ignoring increased to 61%.

Reliability

A mean reliability figure was calculated across Ss for each scoring category except that of the person asking the question, since this person was always the teacher for that day.

For the category of the child's response, the mean reliability was 89%. The values ranged from 67% to 100%.

The reliability for the correctness of the verbalization averaged 89%, ranging from 59% to 100%.
The number of people present was not always easy to determine. Often the children sat on the aides' laps and could not be seen. Therefore, an agreement in this category was scored if the total number of people present (both children and adults) was within two people. The mean value in this category was 91%. Scores ranged from 56% to 100%.

There was 88% mean reliability for the teacher's consequences. Scores varied from 40% to 100%.

The low figures almost always occurred early in the study when the observers had been trained and had met the criterion described earlier but were still slightly unfamiliar with the recording procedure and uncertain as to how to respond to novel situations.

DISCUSSION

This study explored the possibility of modifying non-verbal behavior in the classroom. Too often teachers and parents feel that shyness is a pervasive personality trait that cannot be changed. Another assumption is that parents reinforce shyness to such an extent at home that attempts at modification in the classroom will not be successful and, furthermore, that parents will not cooperate with such a program.

This study found the parents quite willing to participate in the modification of their children's verbal behavior in the classroom. Although the scope of the program was lim-
ited, all Ss showed an increased rate of verbal responses to their teachers' questions. These increases occurred after the introduction of a treatment package consisting of individual sessions with the E as well as a token system in the classroom supplemented by positive reinforcement at home. Changes in each child's rate of verbalization closely corresponded with the teacher's use of consistent, high rates of appropriate consequation for verbal compliance. Thus, this study indicates that shyness can be analyzed into different components, at least one of which can be modified through classroom intervention. In this experiment, the crucial variable seems to be the consequences the teacher applied to verbal and nonverbal behavior; the role of the parents has yet to be clarified.

The data for Subject 1, however, do not give an entirely accurate picture of his behavior. Although he did not talk during many observation periods, he often responded verbally to his teacher's questions later in the day, so that he did earn his reinforcer on several days. Prior to treatment, he had only spoken occasionally to his teacher. In addition, he started to verbalize spontaneously to the teacher and to the other children in the room during the treatment phase. Also during this time, he was observed to verbally participate in Show and Tell for the first time in his 3.5 months at school.

His data underline the importance of tailoring the
treatment package to the child's baseline level of performance. By initially reinforcing any verbalization this S made, the criterion for reinforcement could gradually be increased until he was required to verbalize during the actual observation period in order to receive a reinforcer. Had he been required to meet this higher criterion originally, he might have become discouraged and lost interest.

The teachers could play a large role in maintaining the effects of this intervention. Even though they were not always consistent in delivering the appropriate consequences (especially ignoring inappropriate behavior), all of them commented on the difference in the children brought about by this program. Throughout the study, they had come to realize how often they attended to nonverbal responses and how seldom they required these children to speak. In some cases, the Ss were blatantly excluded from class activities in which all the other children were called on to participate. Prior to treatment, the teachers felt that coaxing these children to talk was the best way to increase their verbalization. While they were familiar with the benefits of ignoring inappropriate behavior, they did not initially feel that verbal compliance could be increased by ignoring inappropriate responses to questions. At the end of the study, these points were re-emphasized to the teachers. While they might want to fade the activity reinforcers, learning to praise and ignore appropri-
ately would require only a moderate effort on their part and would be a useful skill in dealing with a variety of classroom behaviors. Providing the teachers with a card listing the basic steps of this procedure and encouraging them to post it in their rooms might serve as a reminder to them to praise verbalization and to ignore other responses in the target children.

One of the best insurances of maintenance would be the continuation and extension of this project. In the future, efforts should first be directed toward eliminating all sources of reinforcement for inappropriate responses to questions. This could be done by setting up an incentive program for the teachers and their aides, perhaps including public posting of their behavior toward the target children. Teachers might be more meticulous in delivering consequences if they knew their behavior was being observed. Reinforcing teachers who responded appropriately much of the time and posting their names as a social reinforcer might serve as an added incentive to praise and ignore appropriately. In terms of the children, toys and food should be made available upon verbal request and should be withheld for nonverbal gestures. This would not only eliminate some noncontingent reinforcement, but would provide natural consequences for talking. If the entire classroom used this system, these children would not be as likely to feel they were singled out. At the same time, the ver-
bal skills of the other children could be shaped.

When the level of verbalization of the target children is comparable to that of their peers, the topography of verbalization should be shaped. For this study, all verbal responses were reinforced. Some Ss were thus encouraged on occasion to give blatantly incorrect answers and to talk too loudly in the classroom. Also, for one S, irrelevant statements would sometimes follow his answers. When the target children make a verbal response to 80% of the questions asked to them, the teachers should selectively reinforce the answers they find desirable. Thus, answers which are shouted or which do not pertain to the question would be ignored.

Another area of verbal behavior to be explored is social interaction with peers. Not only did these Ss not answer their teachers' questions, they also would not verbally respond to questions from other children. Two of the Ss played by themselves most of the time; the other one stayed near the teacher. Increasing social interaction might be accomplished by using the same kind of token system, rewarding the Ss for talking to another child. In addition, it might be valuable to use a group contingency so that the class could earn a special treat based on the verbal behavior of the target child.

Although it was not encountered in this study, a possible problem in working with this type of behavior is pa-
rental influence. The parents may be reinforcing silence at home either through direct reinforcement or punishment or by modelling the behavior themselves. Some parents may prefer a quiet child to one who is more verbal. In future research, the role of the parents in shaping and maintaining this behavior should be examined. In some cases, working with the parents and the child in the home might be advisable as a prelude to intervening in the school.
REFERENCES


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FIGURE 1

Child: ____________________________
Observer: _________________________
Date: ____________________________

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FIGURE 2

Subject 1

Baseline 1

Indiv. Sess. BL2 Class Rft. Classroom + Home-Based Rft.

Subject 2: Small Gr.

Subject 2: Large Gr.

Subject 3

PERCENT VERBAL COMPLIANCE

SESSIONS

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Subject 3


% VERBAL COMPLIANCE

SESSIONS
FIGURE 7

PEER FOR SUBJECT 1

Classroom + Home-Based Rft.

% VERBAL COMPLIANCE

100- 80- 60- 40- 20-

SESSIONS

2 4 6

PEERS FOR SUBJECT 2

Baseline

Classroom + Home-Based Rft.

% VERBAL COMPLIANCE

100- 80- 60- 40- 20-

SESSIONS

2 4 6 8 10 12

PEER FOR SUBJECT 3

Classroom + Home-Based Rft.

% VERBAL COMPLIANCE

100- 80- 60- 40- 20-

SESSIONS

2 4 6

NOTE: The graphs illustrate the percentage of verbal compliance over different sessions for three subjects. The sessions are labeled and the compliance levels are plotted accordingly.
Subject 3

FIGURE 11

% VERBAL COMPLIANCE

% APPROPRIATE CONSEQUENCES

Baseline Indiv. Session I.S. + Class Rft. Classroom + Home-Based Rft.

SESSIONS

5 10 15 20