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Self-monitoring effects on articulation carry-over in school-age children

Gray, Shelley Irene Larimore, M.S.

The University of Arizona, 1989
SELF-MONITORING EFFECTS ON
ARTICULATION CARRY-OVER IN SCHOOLAGE CHILDREN

by
Shelley Irene Larimore Gray

A Thesis Submitted to the Faculty of the
DEPARTMENT OF SPEECH AND HEARING SCIENCES
In Partial Fulfillment of the Requirements
For the Degree of
MASTER OF SCIENCE
In the Graduate College
THE UNIVERSITY OF ARIZONA

1989
STATEMENT BY AUTHOR

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SIGNED: Shelley Irene Farmorie Gray

APPROVAL BY THESIS DIRECTOR

This thesis has been approved on the date shown below:

Ralph L. Shelton
Professor of Speech and Hearing Sciences

Date 12, 1989
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Without the cooperation of the students who consented to serve as subjects, their parents and teachers, this project would not have been possible. Thank you for your interest and help.

I am in the debt of the Speech and Hearing Sciences students who served as volunteer observers. Thank you Patty McMahon, Sharon Barchfield, Rebecca Berschauer, Bettina Caidenas, Paige Charlton, Johanna Crawford, Anne Hubbard, Stefani Kelso, Raquel Rosen, Kathy Sooter, and Suzette Vaughn, for your time when you had little to spare.

Finally, my love and appreciation go to my husband and sons, who supported me and my efforts when it meant personal sacrifice on their parts, and the end seemed far away. Thank you Larry, Ryan, Matthew, and Evan. I hope I will be able to do the same for you, someday.
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ABSTRACT

The purpose of this study was to identify and field test a successful treatment method for bringing about articulation carry-over. Subjects were 8 elementary school students who misarticulated /s/ or /r/ in conversation outside the therapy setting, but correctly articulated the target phoneme 80% or more of the time in conversation with the speech-language pathologist in the therapy setting. The self-monitoring treatment method of Koegel, Koegel, & Ingham (1986), and Koegel, Koegel, Van Voy, & Ingham (1988) was selected for field testing. Data were collected in the context of a multiple baseline across subjects research design. Results of the study did not replicate the positive treatment effects found in the Koegel, et. al. studies. The results are discussed in relationship to the subject, treatment, environmental, and measurement variables that may account for the discrepancy in treatment effectiveness. Additional data on accuracy of self-monitoring are discussed.
Speech-language pathologists seek treatments that are effective and efficient. One important measure of treatment effectiveness is the client's ability to utilize newly learned skills in every-day life, or the demonstration of treatment generalization. The term generalization may be used to describe a behavioral process or to describe a desired treatment outcome (McReynolds & Spradlin, 1989). The present study is concerned with both aspects of generalization.

Speech and language therapy is considered to include several phases of treatment, frequently referred to as establishment, generalization, and maintenance (Bernthal & Bankson, 1988). New behavior is taught during the establishment phase, which has also been called the acquisition phase. Once the new behavior can be elicited from the client, treatment proceeds to the generalization phase. Stokes and Baer (1977) define generalization as "the occurrence of relevant behaviors under different, nontraining conditions." The terms transfer and carry-over are often used synonymously with generalization in the speech and language literature to represent this phase of therapy. Bernthal and Bankson (1988) state that, in contrast to the establishment phase, generalization cannot be taught. Rather, it is facilitated. The third phase of therapy, maintenance, reflects habituation of the newly learned behavior. Shelton (1978) refers to this phase as automatization. If this phase is successful, clients will perform newly learned behavior with ease in all speaking situations. Therapy is usually terminated at this time.
Many authors have stated that generalization presents particular problems for speech-language pathologists, yet receives less attention in research and in the communication disorders literature than other phases of therapy (Costello & Bosler, 1976; Fey, 1988; McReynolds, 1989; Mowrer, 1971; Sommers, 1962; Warren, 1988; Wing & Heimgartner, 1973). McReynolds, (1989) cites two beliefs on the part of speech-language pathologists responsible for this lack of attention. The first is the belief that if behavior is adequately trained in the clinic, generalization to other environments will automatically occur. The second is that clinicians lack knowledge concerning how to program for generalization.

The present research was initiated in response to clinical concerns about the behavioral process and desired treatment outcome aspects of generalization. Speech-language pathologists (referred to as speech-language specialists) in the Amphitheater Public Schools in Tucson, Arizona, were formulating guidelines for dismissal from articulation therapy. In doing so, they sought to identify children on the articulation caseload who demonstrated adequate establishment of the target sound(s) within the clinic, but lacked carry-over to other environments. This afforded the opportunity to identify a treatment program previously proven effective in facilitating the process of generalization, and to field test this treatment with the identified children to determine treatment outcome.

**Literature Review**

A literature search was conducted in an attempt to identify a treatment method which (1) had successfully promoted articulation
carry-over; and (2) could be utilized in the public school setting. Available research could generally be classified in two ways, those studies associated with motor-learning theory, and those associated with environmental variables (McReynolds, 1987). In some cases, both approaches are combined. In those instances, the literature is classified under the approach which appears to have prompted the treatment method utilized.

**Studies Based On Motor-Learning Theory.** The following studies reflect methods designed to encourage automatization. Bankson and Byrne (1972) tested the effect of timed correct sound production tasks on carry-over. Five elementary school subjects who misarticulated /s/ or /r/ were required to produce words correctly while reading from word lists at increasing rates of speed. Carry-over probes were conducted throughout the study in two ways: (1) by parents, who recorded the child at home, and (2) by the first author, who recorded the child at school while engaging him or her in conversation. At the completion of the study, the second author, who was unknown to the subject, recorded the subject's conversational speech in a novel setting. All subjects demonstrated their most consistent correct production in the latter context; however, they had been told that the prize of their choice would be awarded at the time of this conversation, in exchange for the points earned during the training sessions. In the final probe conducted at school, one subject articulated his target phoneme with greater than 90% accuracy, and one with less than 50% accuracy.

Johnson, Shelton, Rucello, and Arndt (1979) conducted a group study wherein 34 children, aged 5 through 6 years, who
misarticulated either /s/ or /r/, received either sound acquisition training delivered by a clinician, or sound acquisition training in conjunction with automatization treatment delivered by parents. Automatization in connected speech was measured while the subjects described pictures to the examiner in the clinic setting. None of the subjects correctly articulated more than 50% of their target sounds in the final speech sample.

Ruscello and Shelton (1979) studied eleven children who misarticulated /s/ or /r/, aged 7-0 to 8-0, in two treatment groups. During response acquisition training, the first group was requested to plan articulatory movements mentally before producing the target sound and then to assess accuracy of the production. The second group practiced the training units without using the planning and assessment procedures. Articulation improvement was measured in three ways, one of which included correct production of the target in conversation with the experimenter. At study end, subjects in the first group averaged 24/30 (80%) sounds correctly produced during conversation, and subjects in group two, 15/30 (50%).

Studies Based On Operant Conditioning Techniques. In another set of studies, operant conditioning techniques were utilized to encourage carry-over. Wing and Heimgartner (1973) incorporated parents in delivery of carry-over therapy. A carry-over program administered by parents required subjects to use correct articulation during increasingly long speaking tasks. Parents also administered rewards for completion of each criterion level. Six children, aged 8 to 10 years, who misarticulated /s/ or /z/, and /r/, served as subjects. Carry-over was measured in conversational speech at home by the
parents. No reliability measures were calculated; however, the authors reported that children achieved "zero target speech sound errors in ten to fifteen minute unstructured conversational speaking situations after 5 to 10 weeks" of carry-over therapy.

Shelton, Johnson, Willis, and Arndt (1975) attempted to encourage articulatory responses on an automatic level by teaching ten mothers of preschool children to evaluate and reward correct articulation of a target phoneme in conversational speech at home following acquisition therapy in the clinic. The children, ranging in age from 4-0 to 6-0, misarticulated /s/, /r/, or /l/. At the final automatization probe during conversation with the clinician in the clinic, one subject achieved greater than 90% correct production, but eight subjects misarticulated targets more than 50% of the time.

Engel and Groth (1976) studied carry-over in 6 elementary school children. Five were "lispers" and the sixth substituted /d/ for /ð/. Correct self-evaluation of articulation was reinforced during reading tasks in the clinic. Carry-over to the classroom was assessed by a trained classroom aide while the subject read aloud. All subjects reached 0% error production during reading in 4 to 6 weeks, and maintained the change for the remainder of the school year.

The previous studies encouraged carry-over in a variety of ways with similar subject populations, however procedural elements made it difficult to assess the validity of carry-over findings. Recall that generalization requires "the occurrence of relevant behavior under different, nontraining conditions...without the scheduling of the same events in those conditions as had been scheduled in the training condition" (Stokes & Baer, 1977). None of the studies reviewed thus
far sampled spontaneous connected speech utilizing a combination of examiner, setting, and recording technique which the subject would not associate with the training situation. Either some discriminative stimulus was present in the sampling situation, or spontaneous speech was not sampled.

**Studies Which Met Criteria For Carry-Over Assessment.** In a 1970 paper, Engel stated, "a major barrier to assessing the worth of current carry-over procedures and the development of new ones is the problem of measuring the effect of a given procedure on the everyday speech of the client when he is separated in time and space from the clinician." He removed this "barrier" by utilizing a teacher-aide to elicit speech samples for carry-over analysis. His subjects were two female 6 year olds who substituted /s/ for /I/. The aide audio taped conversation with the subjects in the classroom while engaged in story telling, play acting, and picture description. The subjects were not given any indication that their articulation was being evaluated. During the experiment, one peer monitor was selected to record correct articulation for each subject during the school day. Because the subject and peer monitor who recorded the most correct productions received rewards, it was hypothesized that the monitor would deliver social reinforcement for correct articulation. Both subjects markedly reduced the percentage of misarticulation on the measures outlined and maintained their performance two months later.

Kalash (1970) taught peer monitors to tally correct articulation targets for four 8 to 11 year old subjects with "frontal lisps" or /w/ for /r/ substitutions and to record them daily on a chart posted in the classroom. After each subject collected a specified number of correct
productions, the entire class was rewarded. Carry-over was assessed during reading and conversation with an examiner previously unknown to the subject in a school room not associated with speech therapy. Speech samples were audio recorded. The examiner tallied correct and incorrect articulation live during conversation. During the final probe, one subject correctly articulated more than 90% of his target sounds, but the remaining three misarticulated more than 50% of their targets.

Freilinger (1973) conducted a group study with 10 subjects, ages 6-6 through 8-6, who misarticulated either /s/ or /r/. The control group received "traditional articulation therapy based upon Van Riper (1963) strategies," and the experimental subjects received paired-associate training, which involves pairing a key word in which a target sound is correctly produced with other words in which the sound is misarticulated. Spontaneous speech samples were obtained by college students who posed as babysitters in the subjects' homes. In order to obtain secret samples, a tape recorder was concealed within the babysitter's straw purse. At study completion, one subject surpassed 90% correct articulation while the remaining two misarticulated over 50% of their target sounds. A probe conducted six weeks later found all subjects at pre-training articulation performance levels.

Overall, the studies which incorporated operant conditioning techniques achieved no better success than those based on motor learning theory. Some improvement in carry-over was noted in most subjects; however, individual performance varied considerably. The majority of subjects in half of the studies achieved less than 50%
accuracy during carry-over probes. In addition, treatment delivery often required the cooperation of parents, teachers, or peers. Such cooperation is often difficult to enlist.

**Studies Incorporating Articulatory Self-Monitoring.** A retrospective study by Shriberg and Kwiatkowski (1987) found that therapy which included a self-evaluation component was significantly associated with successful articulatory generalization. Two additional studies were reviewed which incorporated self-evaluation in the form of self-monitoring. Both studies had promising results (Koegel, Koegel, & Ingham, 1986; Koegel, Koegel, Van Voy, & Ingham, 1988). Subjects in the first study were 13 elementary school children who consistently misarticulated from 1 to 3 consonants during unstructured spontaneous speech outside of the classroom. The study was conducted using a multiple baseline across subjects design with the addition of multiple baseline across phonemes for 1 child. Carry-over was programmed by teaching the subjects to self-monitor articulation during connected speech. They were required to self-monitor their speech continuously, and tally each correct target sound production on a data sheet. Completed data sheets were exchanged for small rewards. Generalization probes were completed by observers naive to the experimental condition in various school environments. All subjects showed rapid carry-over once the self-monitoring treatment was initiated. Eight of 13 subjects demonstrated better than 90% correct articulation at study completion. Of the remaining 5 subjects, none misarticulated more than 50% of their target sound. Methods of assessing carry-over did not include elements which would serve as discriminative stimuli. While cooperation from parents and
teachers was requested, it was not essential for carrying out the treatment plan.

The second study assessed carry-over following implementation of the same self-monitoring treatment, administered initially within the clinic, then outside. This study also measured each subject's accuracy of self-monitoring within the clinic, to determine if accuracy of self-monitoring was related to rate or amount of carry-over. Subjects were 7 children who misarticulated /s/ and /z/. The self-monitoring treatment again proved successful in promoting generalization in all subjects. The accuracy of self-monitoring was not found to be related to the rate or amount of carry-over.

Research Questions

Following consideration of the methods and results of all studies reviewed, the latter two appeared to best meet the requirements of the school district. This study, therefore, was designed to field test the method of Koegel, Koegel, and Ingham (1986) in a manner compatible with service delivery in the Amphitheater Public Schools. The questions specifically addressed in this study were:

1) Does a therapy program incorporating articulatory self-monitoring result in rapid generalization of correct articulation outside the therapy setting?

2) Does the accuracy of self-monitoring within the clinic during conversation with the speech-language specialist relate to articulatory generalization outside the therapy setting?
3) Do reports from parents, teachers, and speech-language specialists indicate change in the subjects' speech over the course of the study?
METHOD

Subject Identification and Recruitment. This study was conducted in the Amphitheater Public School District, Tucson, Arizona. Speech-Language specialists serving all schools in the district, ten elementary, two junior, and two senior high schools, were invited to participate. Documents were prepared by the district speech-language office to provide each specialist with the following information:

1. name and grade level of each child on their caseload;
2. therapy classification for each child as determined by Individual Education Plan (IEP);
3. special education classification for each child if applicable.

From these lists, each specialist identified children on her caseload receiving speech therapy for articulation at the carry-over level.

Subjects. Fourteen children, 8 boys and 6 girls, who attended 6 different elementary schools in grades 2 through 6, qualified for consideration as subjects. They were all of the children in the school district who met the following entrance criteria:

1. eligible for speech services in the school district;
2. received guardian consent and gave subject assent to participate in the study;
3. functioned within age-appropriate limits academically as evidenced by stanine scores of two or above on the language and total composite scores on the Iowa Test of Basic Skills administered spring, 1988;
4. never received special education for any type of learning.
disability, psychological difficulty, or developmental disability;
5. heard within normal limits bilaterally as determined by audiometric screening at 25dB HL at 500 Hz, and 20 dB HL at 1000 Hz, 2000 Hz and 4000 Hz;
6. misarticulated one or more of the following: /s/, /r/, or /l/;
7. demonstrated eighty percent or better correct articulation of the target sound while engaged in conversation with the clinician in the therapy setting.

One additional child met eligibility requirements, but his parents declined to participate.

Table X describes the characteristics of subjects meeting all entrance criteria. Information presented includes age, grade, gender, target sound, and length of time enrolled in therapy for the target sound as determined by IEP. If a student was receiving therapy for articulation errors other than the target, or for an additional speech disorder, it is noted under "Additional Speech Remediation". No subject met entrance criteria for two misarticulated sounds.

According to IEP documentation, English was the primary language of all study participants.

Assignment of Subjects To Study Conditions. The articulation of subjects meeting entrance criteria was assessed during conversation in the school environment on two occasions. Procedural description of the 30-item measures utilized is included under "Carry-over Measures". Performance on the first two 30-item measures resulted in assignment to study group 1 or 2, or discontinuation from the study.
TABLE 1
SUBJECT CHARACTERISTICS AND RESULTS OF 30-ITEM MEASURES 1 AND 2

<table>
<thead>
<tr>
<th>Subject</th>
<th>Age</th>
<th>Grade</th>
<th>Gender</th>
<th>Target Sound</th>
<th>Months Previous Treatment</th>
<th>Additional Speech</th>
<th>% Correct 30-Item Meas</th>
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<tr>
<td>Study 1</td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>1</td>
<td>10:8</td>
<td>5</td>
<td>M</td>
<td>/s/</td>
<td>28</td>
<td>artic /z/</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>10:0</td>
<td>5</td>
<td>M</td>
<td>/s/</td>
<td>14</td>
<td>artic /z/</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>9:9</td>
<td>4</td>
<td>M</td>
<td>/r/</td>
<td>4*</td>
<td>flu</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>10:4</td>
<td>4</td>
<td>F</td>
<td>/s/</td>
<td>15</td>
<td>artic /z/</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>10:2</td>
<td>4</td>
<td>F</td>
<td>/s/</td>
<td>14</td>
<td>artic /z/</td>
<td>18</td>
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<td>Study 2</td>
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<td>F</td>
<td>/r/</td>
<td>4</td>
<td>none</td>
<td>97 #</td>
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</tbody>
</table>

Note. Meas = Measure. Flu = Fluency.
*Subject transferred from another district therefore entry represents length of therapy in current district.
\(^30\text{-item measure not administered.}
\(^# Subject transferred to another district before second 30-item measure was administered.
Information not available.

Figure 1 illustrates procedures for subject selection and study group assignment. Subjects scoring higher than 80% correct articulation of the target sound on the first 30-item measure were deselected. Remaining subjects were administered a second 30-item measure. Those scoring 60% or less correct articulation of the target sound on both 30-item measures were assigned to study 1. Five of 14 subjects met these criteria. Subjects articulating 60% to 80% of target sounds correctly on one or both 30-item measures, or less than
Figure 1. Subject selection process.

60% on one measure and greater than 60% on the other, were assigned to study 2. Four subjects met these criteria.

Experimental Design. Two studies utilizing the same treatment, but different subject conditions, were conducted simultaneously within a multiple baseline experimental design. The first multiple baseline was across five subjects, the second across three. Subject 9, who was scheduled for inclusion in study two, moved to another school district.

Subjects in study one were randomly assigned one of three consecutive weeks to begin treatment, with two subjects beginning the first week, two the second, and one the third. Subjects in study two were randomly assigned to start treatment the same three weeks,
Observers. Observers were senior or graduate college students majoring in speech-language pathology. All observers conducting measures used to compute reliability percentages were naive to the experimental condition. All were trained to conduct both 30-item and 10-item measures utilizing simulated, audiotaped interviews with schoolage children. Of the 11 observers, five conducted 10-item measures only, two 30-item measures only, and four both 30-item and 10-item measures. Following random assignment of observer to subject, the same observer attended a child's class each week and conducted the 10-item measures. No observer participated in both 10-item and 30-item measures for the same subject.

Carry-over Measures. Articulation carry-over to the school environment was assessed utilizing 30-item and 10-item measures. The 30-item measures were scheduled for administration twice prior to experimental treatment and twice following treatment completion. The first post-treatment measure was conducted while each student had possession of a wristcounter, the second after the wristcounter had been returned to the speech-language specialist.

Thirty-item measures. Two questionnaires were designed to elicit conversation from the subjects. The first was utilized for the pre-treatment measures, the second for the post-treatment measures (see Appendices A & B). The second questionnaire contained some questions which allowed follow-up to responses on the previous questionnaire, making the interview process more realistic. To assure that at least 30 matching response words were collected by the observers, 40 to 44 questions were included in each questionnaire. More than one response word per question could be
recorded as long as the interviewer intervened in the subject's answer by asking an additional question or commenting on the response. Such intervention signalled the other observer to listen for the next target response, which would also be recorded under the initial interview question. Data collection proceeded as follows:

a. two observers posed as university students conducting a survey of the likes and dislikes of elementary school students;
b. each observer was equipped with a notebook, name tag, and desk plaque labeled "Surveys, Etc.";
c. seating was arranged so that the subject could not see information recorded by observers, and observers could not see information recorded by each other;
d. according to prior arrangement with the teacher, a call was made to the subject's classroom requesting that a student be sent to the library (or similar location) to complete a survey (no two subjects were in the same class);
e. the teacher requested that the subject represent his or her class, and sent the student to the designated location;
f. the observers introduced themselves to the subject and read a prepared statement from the questionnaire explaining the purpose of the interview;
g. the first observer read a survey question or requested expansion on a previous answer;
h. both observers wrote the first response word containing the target sound in the space provided on their "questionnaire";
i. if the response word contained more than one target sound, only the first sound in the word was evaluated;
j. misarticulated target sounds were circled;
k. subjects were thanked for their participation and told
   the approximate date of the next survey.

The response words recorded by both observers were
transferred to a scoring sheet by the author. The first 30 matching
words were analyzed for correct articulation. First, the percentage of
correct articulation as judged by each observer was calculated. The
total number of correctly articulated targets was divided by 30, then
multiplied by 100. Next, the percentage of correct articulation for
the measure was calculated by averaging the percentage of correct
articulation for both observers. These 30-item measures represent
percent correct articulation, the dependent variable.

Ten-item measures. The second carry-over measure was a 10-
item weekly probe conducted in the student's classroom. Following
the method of Koegel, Koegel, and Ingham (1986), an observer
unknown to the child and unfamiliar with the experimental condition
was introduced to the subject's class as a new aide. The observer
engaged the subject in conversation and tallied correct or incorrect
articulation by use of her concealed fingers. Data collection
proceeded as follows:

a. the observer engaged the subject in conversation;
b. the first target sound spoken in response to an observer
   question or comment was judged for articulatory accuracy;
c. beginning with opposite "pinkie" fingers, correct and
   incorrect articulation was tallied by bending the appropriate
   finger until 10 occurrences of the target sound had occurred;
d. once out of view of the subject, the observer recorded the number of correctly articulated targets on a score sheet.

Reliability. Thirty-two of thirty-four 30-item measures were conducted utilizing two observers. The remaining two measures were completed with one observer when the second scheduled interviewer did not arrive, and the interviews could not be rescheduled.

As previously described, articulatory accuracy was calculated on the first 30 words containing the target sound recorded by both observers. In order to obtain 30 matches, up to 44 responses were required (range: 30-44). The mean number of responses required for 30 agreements was 36.

The percentage of agreement on correct articulation for 30-item measures was calculated by dividing the total number of agreements by the total number of agreements plus disagreements, and multiplying by 100. The average percentage of agreement on correct articulation for all 30-item measures was 79% (range: 42%-100%).

Table 2 contains information regarding the percentage of observer agreement on correctness of articulation for all 30-item measures. Subjects are listed according to percent of correct articulation on the first 30-item measure. Subject 14 scored the highest.

Self-Monitoring Measures. Subjects were scheduled for weekly clinic sessions during which the accuracy of self-monitoring was calculated in conversation with the speech-language specialist. At least 30 occurrences of the target sound were required per session. The subject was required to identify the occurrence of the target,
accurately evaluate his or her articulation, and push the button on the wristcounter, to receive credit for self-monitoring.

**Social Validity.** To determine whether each subject's teacher or guardian noticed a change in articulation of the target sound during the study, they were asked to respond to a questionnaire (see Appendices C & D) which utilized a five-point equal-appearing interval scale for response to each question. The respondee was asked to judge the subject's articulation in conversation with others, in conversation with the respondee and while reading aloud.

### TABLE 2
**PERCENTAGE OF OBSERVER AGREEMENT ON CORRECT ARTICULATION FOR 30-ITEM MEASURES 1, 2, 3, AND 4**

<table>
<thead>
<tr>
<th>Subject Number</th>
<th>Measure # 1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
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<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>13</td>
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<td>8</td>
<td>73</td>
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<td>-</td>
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</tr>
<tr>
<td>1</td>
<td>93</td>
<td>97</td>
<td>91</td>
<td>79</td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td><strong>85</strong></td>
<td><strong>79</strong></td>
<td><strong>73</strong></td>
<td><strong>71</strong></td>
</tr>
</tbody>
</table>

*Note.* *No reliability calculated, one observer only.*
- *No measure administered.*
A scale value of 1 represented *never* hearing the child articulate the target sound correctly. A scale value of 5 represented *always* hearing the child articulate the target correctly. An additional question sought information about the child's current articulation as compared with two months earlier. A scale value of 1 represented articulation of the target sound correctly *less often* than two months ago. A value of 5 represented articulation of the target *more often* than two months ago. Both teacher and guardian were asked to respond to this questionnaire two times - immediately prior to the initiation of self-monitoring, and immediately following study completion.

To determine whether each subject's speech-language specialist noted a change in articulation of the target within and outside the therapy setting, a questionnaire which utilized a five point equal appearing interval scale for response was distributed (see Appendix E). A scale value of 1 represented markedly decreased correct articulation of the target. A scale value of 5 represented markedly increased correct articulation. Specialists were asked also to cite any observations which affected their answers and to predict the percent of correct target articulation outside of the therapy setting for each of their subjects.

**Treatment Procedures.** Speech-language specialists assigned to the four elementary schools with students participating in the study were provided a research booklet for each subject. The booklet provided space for all subject data as well as detailed instructions for each step of the study.

Prior to initiation of the self-monitoring treatment, each subject was scheduled for two, 20-minute therapy sessions per week. In
interview with the investigator, the specialists reported that these therapy sessions might include the following monitoring or practice:

1. activities in the clinic setting such as story-telling, role playing, reading, interviewing, conversation, and creating narratives;
2. activities at school outside the therapy setting such as conversation with the specialist or other students in the library, classroom, or playground, and classroom presentations;
3. charting of correct articulation by parents during conversation at home, by teachers during conversation at school, or by a person receiving a message delivered by the student.

Therapy sessions the week preceding treatment initiation were utilized to teach self-monitoring. The instructional steps for teaching the subject to self-monitor and criteria for moving to the ensuing step are included in Table 3. Subjects were required to pass each step utilizing lists of words and sentences provided in the specialists' data booklet. Any student unable to meet criterion on the first attempt was given further practice using stimuli other than those included in the booklet. When the specialist felt sufficient practice was accomplished, the student was administered the words or sentences from the booklet again.

Subjects failing to meet the 80% criterion for step 4 of Table 3 during two regularly scheduled therapy sessions were allowed two additional sessions for practice. Subjects were not restricted from entering the self-monitoring treatment as scheduled if the 80% criterion was not met.
TABLE 3
STEPS FOR SELF-MONITORING INSTRUCTION

<table>
<thead>
<tr>
<th>Step</th>
<th>Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The subject is required to signal each time the speech-language specialist misarticulates the target sound while reading a list of words with the target in various positions.</td>
<td>Correctly signal the occurrence of 10/12 or more misarticulations.</td>
</tr>
<tr>
<td>2. Repeat single words modeled by the speech-language specialist, counting each occurrence of the target sound using a wristcounter.</td>
<td>Correctly count 10/12 or more target occurrences.</td>
</tr>
<tr>
<td>3. Repeat sentences modeled by speech-language specialist counting each occurrence of target sound using the wristcounter.</td>
<td>Correctly count 16/20 or more target occurrences.</td>
</tr>
<tr>
<td>4. Monitor own speech in 5 minute conversation with the speech-language specialist, counting the number of correctly produced target sounds.</td>
<td>Correctly count and evaluate 80% or more of at least 30 target occurrences.</td>
</tr>
</tbody>
</table>

When self-monitoring began, therapy sessions were reduced from two to one, 20-minute session per week. This time was used to assess the accuracy of the subject's self-monitoring in the clinic and to exchange self-monitoring data sheets for rewards.

The specialist and subject selected three times per day, typically two during school and one at home, for self-monitoring. During each designated time, the child was required to self-monitor his or her speech during conversation, counting the number of correct target productions until 30 had been achieved. The subject was instructed to continue self-monitoring during weekends and school holidays.
Each subject entered into a written contract with the speech-language specialist, agreeing to wear a wristcounter at all times (except at night), to self-monitor articulation three times per day, to record completion of self-monitoring on data sheets, and to bring the data sheets to weekly therapy sessions (see Appendix F). In exchange for completed data sheets and teacher verification that the wristcounter was worn (see Appendix G), the speech-language specialist agreed to provide rewards such as stickers, small toys, and candy. Subjects were required to record self-monitoring data for 90% of the scheduled self-monitoring periods (18/20 sessions) to receive rewards, and no rewards were given if data sheets were misplaced or incomplete.

All subjects continued to self-monitor until the 78th day of the study. At that time the wristcounters were returned to the speech-language specialists.
RESULTS

Research Question #1

Does a therapy program incorporating articulatory self-monitoring result in rapid generalization of correct articulation outside the therapy setting?

Exceptions To Planned Treatment and Design. As previously described, subjects were assigned staggered treatment start dates. Subject 1 began treatment one week earlier than assigned when his speech-language specialist learned he would be absent the following week. As a result, the second 30-item measure, which should have been conducted prior to treatment initiation, took place four days after self-monitoring began.

Ten-item measures were scheduled for collection on a weekly basis. Absence of the student, the observer, or the classroom teacher caused some of the measures to be missed. Subject seven's teacher declined permission for an observer in the classroom, therefore no weekly 10-item measures were conducted.

After guardian consent and subject assent were received for subject 8, he decided not to participate in the self-monitoring portion of the study. Rather than discontinuing, we gathered information on his articulation carry-over in the same manner as other subjects. He was carried on a "monitor status" by the speech-language specialist, receiving therapy one time per week for 20 minutes. Therapy activities during that time were consistent with those described earlier in the methods section.

Following the last 30-item interview, observers asked each subject whether (a) they knew the purpose of the interviews; (b) they
were aware that their articulation was being evaluated during the interviews; and (c) they were aware that the new class "aide" was evaluating their articulation. With one exception, all subjects answered part (a) by reiterating the prepared statement explaining that observers wanted to know the likes and dislikes of elementary school children, and stated that they were unaware of the articulation evaluation. Subject 5 told observers that her mother had revealed the purpose of the interviews that week. No subject realized that the 10-item measures were taking place. These findings were confirmed by the speech-language specialists and observers themselves.

**Study 1.** The results of 10- and 30-item carry-over measures for subjects in study 1 are reported in Figure 2 and Table 4, and for subjects in study 2 in Figure 3 and Table 4. Comparison of 30-item scores shows small gains in the percentage of targets correctly articulated for subjects 1, 3, and 4 (range 4%-14.5%). Subject 2 showed decreased accuracy. Disregarding her last 30-item score for validity reasons, subject 5's articulation evidenced little change.

Results of 10-item measures demonstrate no substantial increase in carry-over during treatment. With the exception of subject 5, whose scores decreased over three 10-item measures, subjects scored within 20% of their initial 10-item measures throughout the study. Overall, no subject in study 1 evidenced increased generalization of the target phoneme outside the therapy setting during the course of treatment.

**Study 2.** Subjects 6 and 7 increased their percent of correct articulation during the study as measured by 30-item interviews. Subject 6 gained more percentage points than any subject in either
Figure 2. The percentage of correct phoneme production evidenced by each subject in study 1 during 10-item and 30-item carry-over measures. Also plotted are accuracy of self-monitoring measures conducted within the clinic. * Subject reported knowledge of articulation evaluation by interviewers.
study. The increase in percentages from the first to second 30-item measure may, however, demonstrate an unstable or rising baseline. His improving articulation may not have been associated with the treatment. Subject 8 completed one pre- and one post-treatment 30-item measure only, because of his decision to forego self-monitoring. His scores revealed little change in articulatory performance.
The performance pattern on 10-item measures for subjects in study 2 was similar to study 1. All subjects scored within 20% of their initial 10-item measure. Subject 6 scored 100% correct on all 10-item measures, another indication that his articulation carry-over may have increased prior to treatment initiation.

TABLE 4
% CORRECT ARTICULATION FOR ALL 30- and 10-ITEM MEASURES

<table>
<thead>
<tr>
<th>Subject</th>
<th>% Correct articulation</th>
<th>% Correct articulation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30-item measures</td>
<td>10-item measures</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>38</td>
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<td>3</td>
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</tr>
<tr>
<td>4</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>5</td>
<td>18</td>
<td>20</td>
</tr>
</tbody>
</table>

Study 2

<table>
<thead>
<tr>
<th></th>
<th>% Correct articulation</th>
<th>% Correct articulation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30-item measures</td>
<td>10-item measures</td>
</tr>
<tr>
<td>6</td>
<td>56</td>
<td>83</td>
</tr>
<tr>
<td>7</td>
<td>70</td>
<td>81</td>
</tr>
<tr>
<td>8</td>
<td>80</td>
<td>-</td>
</tr>
</tbody>
</table>

Note. * Subject reported awareness that articulation was being evaluated, therefore validity of score is questionable.
- Measure not administered.

Discrepancy In Results Between 30- and 10-Item Measures.

Mean calculations are typically not reported in single subject designs because individual data points are lost. In the present studies however, the discrepancy between scores on 30- and 10-item measures warranted further examination. To facilitate comparison, Table 5 reports individual subject means for pre- and post-30 item measures and individual means for 10-item measures. Including only the first 30-item post-test score for subject 5, subjects in study 1
scored an average of 36.68 percentage points higher on the 10-item measures than the 30-item measures (range: 13.8-54.5).

In study 2, subject 6 scored an average 18.5 percentage points higher on 10-item than 30-item measures. No 10-item measures were conducted for subject 7 because his teacher declined permission for an observer to enter the classroom. Subject 8, who received no self-monitoring treatment, demonstrated this discrepancy to a lesser extent, scoring an average of 4.5 percentage points higher on 10-item than 30-item measures.

### TABLE 5
COMPARISON OF INDIVIDUAL SUBJECT MEANS FOR PRE- AND POST- 30-ITEM MEASURES AND 10-ITEM MEASURES

<table>
<thead>
<tr>
<th>Subject</th>
<th>Mean Percent Correct Articulation</th>
<th>Study 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30-Item Pre-tx</td>
<td>10-Item</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>40</td>
</tr>
<tr>
<td>2</td>
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<td>60</td>
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<tr>
<td>3</td>
<td>3.5</td>
<td>65</td>
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<tr>
<td>4</td>
<td>15</td>
<td>43.3</td>
</tr>
<tr>
<td>5</td>
<td>19</td>
<td>46.6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Study 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>8^</td>
</tr>
</tbody>
</table>

**Note.** ^ Subject was not receiving treatment.

* Entry represents a single score rather than the mean of two scores.

- Measures not administered.
Research Question #2

Does the accuracy of self-monitoring within the clinic during conversation with the speech-language specialist relate to articulatory generalization outside the therapy setting?

Study 1. Table 6 presents information regarding the within clinic accuracy of self-monitoring for subjects in study 1 and 2. With the exception of Subject 2, who was the youngest study participant, subjects in study 1 required two teaching sessions to perform self-monitoring at an 80% or better accuracy level. Subject 2 required 3 teaching sessions to reach 73% correct, and never achieved 80% accuracy. The ability to self-monitor within the clinic does not appear to be positively related to carry-over performance as measured in this study. Subject 1 performed self-monitoring very accurately within the clinic, but had the poorest carry-over of any participant in either study.

Study 2. Although subjects in study two evidenced carry-over at higher levels than subjects in study 1, they did not self-monitor with any greater degree of accuracy. In fact, Subject 6 had more difficulty learning to self-monitor than any subject in either study. Four teaching sessions were required to reach 73% accuracy, and the scores on subsequent self-monitoring measures varied greatly. Conversely, subject 6 scored higher than any subject in either study on both 10- and 30-item articulation carry-over measures.
TABLE 6
WITHIN CLINIC ACCURACY OF SELF-MONITORING

<table>
<thead>
<tr>
<th>Subject</th>
<th>Measure #1</th>
<th>Percent Correctly Self-Monitored</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Measure #2</td>
</tr>
<tr>
<td>Study 1</td>
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<td></td>
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<tr>
<td>1</td>
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<td>7</td>
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<td>95</td>
</tr>
<tr>
<td>8*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. *Subject did not self-monitor, therefore self-monitoring measures were not conducted. - No measure conducted.

Research Question #3

Do reports from parents, teachers, and speech-language specialists indicate change in the subjects' speech over the course of the study?

Parent/Guardian Questionnaires. Copies of parent/guardian and teacher questionnaires may be found in Appendices C and D. Recall that prior to and following treatment, the parents and teachers of each subject were requested to complete identical questionnaires concerning subjects' articulation. On a scale of 1 to 5, with a value of 1 representing never and a value of 5 representing always, respondees answered questions regarding the subject's articulation of the target sound in three contexts: (1) in conversation with family members (or other students for the teacher questionnaire); (2) when reading; and
(3) when talking with the respondee. A fourth question (4) asked whether, compared with two months ago, the subject articulated his or her target sound less often (a scale value of 1), more often (a value of 5), or somewhere between (scale values of 2, 3, or 4). Parent and teacher ratings are reported in Table 7. Pre-treatment and post-treatment ratings are paired for ease of comparison.

Agreement Between Parents and Teachers. Parents and teachers did not exhibit good agreement in rating the same student. Fourteen of 49 (28.6%) parent and teacher ratings matched. These were proportionately divided among subjects in studies 1 and 2. Thirteen of 49 ratings (26.5%) were within one scale value.

Most of the 46 responses completed on both pre- and post-treatment questionnaires were within one scale value, and none reflect a change of more than 3 scale values. Ten (21.7%) indicated decreased articulatory performance and 12 (26%) indicated improved performance. Eight of the poorer performance ratings were given by the teachers of subjects 1 and 3, who rated performance in all contexts lower at study end. The parents of these two students rated performance in all contexts as improved. With one exception, all improved performance ratings were given by parents.

Parent and Teacher Agreement With Study Results. With rare exception, parents rated post-treatment articulation in all contexts a "4". Parental ratings for subject 6 were lower; however, study findings suggest this subject evidenced better carry-over than any subject in either study. Subjects in study 2 received the best overall ratings from teachers.
Subject 2's teacher did not complete the pre-treatment questionnaire, but commented that she couldn't "discriminate" any articulation problem. This is in contrast to both 10- and 30-item scores for this subject.

### TABLE 7
RESPECT TO PARENT AND TEACHER QUESTIONNAIRES AS RECORDED ON A 5-POINT EQUAL APPEARING INTERVAL SCALE

QUESTIONS 1-3: 1 = NEVER 5 = ALWAYS

QUESTION 4: 1 = LESS OFTEN 5 = MORE OFTEN

<table>
<thead>
<tr>
<th>Question #</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
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</thead>
<tbody>
<tr>
<td>Subject Number</td>
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<td>Conv Self</td>
<td>2 Mo Comp</td>
<td>Conv Others</td>
<td>Reading</td>
<td>Conv Self</td>
<td>2 Mo Comp</td>
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<td>Study 1</td>
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<td>•</td>
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</tr>
<tr>
<td>4 Pre</td>
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<td>3</td>
<td>2</td>
<td>4</td>
<td>4</td>
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<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5 Pre</td>
<td>3</td>
<td>-</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>4</td>
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<tr>
<td>Post</td>
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<td>4</td>
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<td>4</td>
<td>4</td>
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<tr>
<td>Study 2</td>
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<td>6 Pre</td>
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<td>3</td>
<td>3</td>
<td>5</td>
<td>5</td>
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<tr>
<td>Post</td>
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<td>5</td>
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</tr>
<tr>
<td>7 Pre</td>
<td>3</td>
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<td>4</td>
<td>5</td>
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</tr>
<tr>
<td>Post</td>
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<td>8 Pre</td>
<td>-</td>
<td>4</td>
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<td>5</td>
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<td>4</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

**Note.** Pre = Pre-treatment questionnaire. Post = Post-treatment questionnaire. Conv Others = Conversation with others. Conv Self = Conversation with respondee. 2 Mo Comp = Comparison with 2 months ago. • Questionnaire not completed. - Question left unanswered. ^ Teacher stated that she couldn't discriminate and noticed "no problems".
Both parents and teachers tended to rate articulation as improved compared with two months earlier; however, they did so on both pre- and post-treatment questionnaires. With the exception of subject 6, all parents felt their child's articulatory performance was better than two months ago, based on response to question 4. With the exception of subjects 1 and 3, all teachers rated articulation as improved.

Speech-Language Specialist Questionnaires. Following study completion, the four participating speech-language specialists were requested to complete a questionnaire assessing subjects' level of correct articulation following treatment as compared with before treatment. One question concerned performance in the therapy setting, the other performance outside the therapy setting. In addition, for each subject, specialists were asked to predict the percent of correct articulation outside the therapy setting following treatment. Table 8 summarizes the information from the speech-language specialist surveys. One specialist did not return the survey for either of her subjects. No subject received ratings reflecting decreased performance. At the same time, any increase in correct articulation was rated as minimal.

For subjects in study 1, specialists' predictions of the percentage of correct articulation outside the clinic were higher than levels resulting from either 10- or 30-item carry-over measures, but more closely matched findings of the 10-item measures. Predictions for subjects in study two were quite accurate based on both 10- and 30-item measures.
TABLE 8
RESPONSES TO SPEECH-LANGUAGE SPECIALIST SURVEY
AS RECORDED ON A 5-POINT EQUAL APPEARING INTERVAL SCALE
1 = MARKEDLY DECREASED  5 = MARKEDLY INCREASED

<table>
<thead>
<tr>
<th>Subject Number</th>
<th>Within Clinic Articulation</th>
<th>Outside Clinic Articulation</th>
<th>Predicted % Correct Artic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>3</td>
<td>75</td>
</tr>
<tr>
<td>4</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>4</td>
<td>75</td>
</tr>
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<td>Study 2</td>
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<tr>
<td>6</td>
<td>4</td>
<td>4</td>
<td>85</td>
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</tr>
<tr>
<td>8</td>
<td>3</td>
<td>3</td>
<td>80</td>
</tr>
</tbody>
</table>

Note. * Specialist did not complete the survey.
DISCUSSION

The present investigation was motivated by clinical questions concerning articulation generalization. These studies sought to identify a population of school-aged children who demonstrated accurate articulation in the therapy setting, but failed to carry-over correct articulation to the school environment. Past research investigating articulation carry-over was evaluated to determine what treatment methods showed promise of encouraging carry-over in these children, and whether they could be administered in the public school setting. The method of Koegel, Koegel, and Ingham (1986) was selected for field testing because of the powerful results achieved in two recent studies incorporating self-monitoring (Koegel, Koegel, & Ingham, 1986; Koegel, Koegel, Van Voy, & Ingham, 1988). The following discussion considers the need for treatment and research specifically addressing articulation carry-over, the results of the current studies, and interpretations of the current findings in comparison with the Koegel, et. al. studies (1986 & 1988).

Current Findings In Comparison With Koegel, et. al. Results.

Because the previous two studies which utilized self-monitoring treatment were so successful (Koegel, Koegel, & Ingham, 1986; Koegel, Koegel, Van Voy, & Ingham, 1988), the results of the current studies are somewhat surprising. No subject in study 1 or 2 clearly demonstrated a positive treatment effect. Discussion will focus on the differences in variables among the studies and their possible effect on treatment efficacy.
Subjects. Table 9 contains information summarizing the subject characteristics for the current studies, Koegel, Koegel, and Ingham (1986), and Koegel, Koegel, VanVoy, and Ingham (1988). The subject selection process in the current studies was designed to (a) identify students who apparently had the ability to articulate accurately in conversation, but remained in therapy because of carry-over failure; and (b) invite their participation in this study to determine if the experimental treatment would be effective with this student sample. As a result of this selection process, subjects in the current studies were significantly older, more advanced in school, and had received more articulation therapy than subjects in the Koegel et. al. studies.

<table>
<thead>
<tr>
<th>Study Authors</th>
<th>Number of Ss</th>
<th>Mean Age</th>
<th>Mean Grade</th>
<th>Target Error Sounds</th>
<th>M:F Ratio</th>
<th>Mean Mos Previous Tx^</th>
</tr>
</thead>
<tbody>
<tr>
<td>Koegel, Koegel, &amp; Ingham</td>
<td>13</td>
<td>7:11</td>
<td>2.23</td>
<td>/s, z, r/</td>
<td>6:7</td>
<td>3.15</td>
</tr>
<tr>
<td>Range:</td>
<td>(6:6-10:9)</td>
<td>(2-4)</td>
<td></td>
<td></td>
<td></td>
<td>(0-16)</td>
</tr>
<tr>
<td>Koegel, Koegel</td>
<td>7</td>
<td>*</td>
<td>*</td>
<td>/s, z/</td>
<td>5:2</td>
<td>0</td>
</tr>
<tr>
<td>Van Voy, &amp; Ingham</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Range:</td>
<td>*</td>
<td>(2-4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gray</td>
<td>5</td>
<td>10.4</td>
<td>4</td>
<td>/s, r/</td>
<td>3:2</td>
<td>15</td>
</tr>
<tr>
<td>Study 1</td>
<td></td>
<td>(9:9-10:10)</td>
<td>(4-5)</td>
<td></td>
<td></td>
<td>(4-28)</td>
</tr>
<tr>
<td>Range:</td>
<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>9.2</td>
<td>3.5</td>
<td>/r/</td>
<td>2:0</td>
<td>21</td>
</tr>
<tr>
<td>Study 2</td>
<td></td>
<td>(7:7-10:9)</td>
<td>(2-5)</td>
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<td></td>
<td>(11-31)</td>
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<tr>
<td>Range:</td>
<td></td>
<td></td>
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</tbody>
</table>

Note. * Information not available from published study.
^Tx = treatment.
In all probability, this group of students represents a faction of children who do not "outgrow" their articulation errors by age 9 (Bernthal & Bankson, 1981). They are not among the 60% of students dismissed from articulation therapy prior to fourth grade (Eger, 1986). They may represent the most persistent cases of developmental articulation disorder. It is interesting to note that, of the subjects receiving articulation treatment for the first time, the subject with the poorest maintenance in the 1986 Koegel, et. al. study was also the oldest, the only fourth grader. Subject characteristics are not reported in a manner allowing similar comparison for the 1988 Koegel, et. al. study.

It is also interesting that no subject in either Koegel et. al. study had difficulty acquiring correct articulation of the target sound in sentences in less than seven, 15-20 minute therapy sessions. A survey discussed by Engel, Erickson, and Groth (1971) of school clinicians found that approximately 9 hours of therapy time were required to teach a child correct articulation of misarticulated sound in "running speech." It is not known exactly how much therapy was required for subjects in the current studies to reach the same level, but review of Individual Education Plan progress notes indicates the process was longer than that required by the Koegel et. al. subjects (1986 & 1988). These differences in subject characteristics are plausible explanations for differing treatment outcomes.

The subjects in both Koegel, et. al. studies received carry-over treatment under two novel conditions; (1) the self-monitoring treatment was either different from the type of treatment previously received, or it was the initial articulation therapy administered to a
child; and (2) self-monitoring treatment was delivered by a different (presumably unknown) clinician for children who had received articulation therapy in the past, or the clinician was new to the child because he or she had never received speech therapy before. By contrast, subjects in the current studies received carry-over treatment under one novel condition - the self-monitoring treatment was different from previous carry-over therapy. Perhaps the expectation of treatment outcome is different when a subject enters an entirely new treatment condition, which in turn effects that outcome. In addition, subjects in the current studies had "practiced not generalizing" in the settings and under the conditions which the new self-monitoring treatment was administered, whereas subjects in the Koegel studies had not practiced "not generalizing" under the treatment conditions.

**Treatment.** Although 4 of the 20 subjects in the Koegel et. al. studies had received articulation therapy prior to their inclusion in the self-monitoring study, all subjects completed the same acquisition therapy steps prior to self-monitoring treatment. In the 1986 study, subjects began self-monitoring at different points following this acquisition stage, completing various articulation practice activities during the intervening therapy time. In the 1988 study, all subjects began self-monitoring within the clinic immediately following the acquisition phase. All subjects received treatment from the same speech-language pathologist, or one advanced graduate student under her supervision. By contrast, subjects in the current studies were treated by four different speech-language pathologists and had presumably accomplished target acquisition as a result of varied
treatment steps. It is possible that the acquisition steps, the clinician's personal presentation of those steps, or both, represents an important component of the successful self-monitoring treatment.

The self-monitoring treatment as taught, administered, and consequated in the Koegel et. al. studies was replicated as closely as possible, with three exceptions: (1) following treatment initiation, Koegel et. al's subjects attended therapy two times per week, whereas subjects in the current studies attended once per week; (2) subjects in the current studies were instructed to self-monitor articulation 3 times per day, whereas continuous self-monitoring was required in the Koegel, et. al. studies; and (3) subjects in the current studies were required to wear a wristcounter the entire day, regardless of whether it was being utilized for self-monitoring, whereas subjects in the previous studies either recorded self-monitoring data on paper, or were allowed to keep the wristcounter in their pocket, even during self-monitoring activity. The first procedural departure was made on the theoretical assumption that consequation of correct articulation was tied to the self-monitoring activity, not to clinic performance. Therefore, one less session per week was not expected to effect carry-over and reduction in the number of therapy sessions per week would provide more efficient use of therapy time. In terms of the study outcome, however, it appears that additional therapy time might have focused attention on the self-monitoring activity and it's importance, and would have yielded additional self-monitoring activity within the clinic each week.

The second departure was an attempt to quantify, more closely than the previous studies, how much self-monitoring was required to
effect positive change. The decision to require subjects to wear the wristcounters continuously (the third departure), as opposed to the practice in previous studies where subjects recorded self-monitoring on paper or were allowed to keep the counter in their pocket, was made in conjunction with departure 2. It was hypothesized in the Koegel, et. al. studies that the data sheets or wristcounter may serve as a discriminative stimulus to produce the target sound correctly. We reasoned that, even if subjects were not required to self-monitor continuously, the presence of a "discriminative stimulus" would remind them to correctly articulate the target sound.

Amount of Self-Monitoring. We cannot say with any certainty how many target productions were self-monitored by subjects in either the Koegel et. al. studies or the current studies. Both Koegel, et. al. studies relied on verbal reports by parents, teachers, or both, to confirm that subjects were self-monitoring. The results of these reports seemed to indicate that, with only one exception, children consistently performed the self-monitoring tasks. The subjects' reports of the number of sounds self-monitored decreased as time went on, however, and there was tremendous variability (range: 398/6 weeks - 5,316/3 weeks) in the number of self-monitored sounds reported. This suggests that some of the subjects may have gone days without self-monitoring and questions the reliability of parent and teacher reports.

Compliance With Self-Monitoring. Subjects in the current studies who completed 100% of the self-monitoring sessions would have had the opportunity to self-monitor between 2,610 to 3,240 target sounds in a period of 29 to 36 days respectively. Table 10
provides information regarding subject compliance with self-monitoring treatment. As previously described in the methods section, the teachers of each subject were provided with data sheets to record compliance of wearing the wrist counter each school day (see Appendix G). It appears that, in most cases, the students rather than the teachers actually completed these data sheets, perhaps with their teachers' permission. Unlike the previous studies, where all subjects reportedly complied with treatment, three subjects (2, 3, & 8) in the current studies never wore the wristcounters. Subject 8 refused to do so prior to treatment initiation. Subject 1 was the only student who complied with all self-monitoring requirements. His speech-language specialist reported that he loved to wear the wrist-counter, was highly motivated by "edible rewards", and completed self-monitoring "religiously." Subject 1 also had the lowest percentage of correct articulation at study initiation and study completion. Subjects 2 and 3 continually had some reason for not wearing their wrist counter. The knobs were broken off (we provided two replacements), or they were misplaced or forgotten. Both subjects did complete data sheets, at times, providing evidence of self-monitoring by tallying correct articulation on paper. Subject 4 complied similarly to subjects 2 and 3, but wore the wristcounter more than half the time. With rare exception, subjects 5, 6, and 7 reported self-monitoring only on days they wore the wristcounters. Subjects in partial compliance with wearing wristcounters invariably "forgot" to wear them on weekends but honestly reported that they had not done so. The number of targets self-monitored may be higher than estimated in Table 10. Frequently subjects self-monitored more than
TABLE 10
SUBJECT COMPLIANCE WITH SELF-MONITORING AND WEARING WRISTCOUNTER

<table>
<thead>
<tr>
<th>Subject Number</th>
<th>Possible # of Compliance Days</th>
<th>Days Wristcounter Worn Number</th>
<th>Days Wristcounter Worn Percentage</th>
<th>Days Self Monitored Number</th>
<th>Days Self Monitored Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>36</td>
<td>36</td>
<td>100</td>
<td>36</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>34</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>35</td>
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<tr>
<td>3</td>
<td>28</td>
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<tr>
<td>4</td>
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<tr>
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<td>29</td>
<td>22</td>
<td>76</td>
<td>22</td>
<td>76</td>
</tr>
<tr>
<td>Study 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>29</td>
<td>19</td>
<td>65</td>
<td>21</td>
<td>72</td>
</tr>
<tr>
<td>7</td>
<td>32</td>
<td>21</td>
<td>66</td>
<td>22</td>
<td>69</td>
</tr>
<tr>
<td>Mean</td>
<td>32</td>
<td>17</td>
<td>52</td>
<td>24</td>
<td>76</td>
</tr>
</tbody>
</table>

Despite the apparent lack of compliance with treatment as scheduled, it appears that subjects in the current studies self-monitored as many targets as several of the subjects in the previous studies who markedly improved their articulation carry-over.

**Study Duration.** The length of time subjects were enrolled in the current studies was less than in either Koegel et. al. study, because the acquisition portion of therapy was not included in treatment of the subjects. The time available for self-monitoring treatment in the current studies ranged from 28 to 36 days. During that time, no subject completed less than two 10-item and one 30-item carry-over measure, allowing adequate opportunity for any improvement in articulation carry-over to be noted. In the 1986 Koegel, et. al. study, "by the time the first monthly measurement was made, most of the
children had already reached a high level of proficiency outside of the treatment setting. ...these changes appeared to occur gradually during the month, rather than suddenly." And in the 1988 Koegel study, "By the second generalization probe [four weeks following treatment initiation outside the clinic] 6 out of 7 subjects had exceeded generalization levels from the previous condition." While it is possible that additional time in the self-monitoring condition might prove beneficial, it also seems likely that some consistent improvement in carryover should have been noted in the time allotted, if the treatment was effecting positive change.

**Experimental Design.** The present studies do not meet stringent criteria for sampling baseline behavior, in that "stable" baseline behavior was not established utilizing the same measures (Silverman, 1985; McReynolds & Thompson, 1986). Three data points encompassed by two 30-item and one 10-item measure were scheduled for collection prior to treatment initiation. Because of student, teacher, or observer absences, this schedule was not always met. Had subjects' evidenced improved levels of carry-over, it would have been difficult to conclude that the treatment alone was responsible for the change, due to the lack of a stable baseline. We have enough data points to indicate, however, that no strong systematic change occurred. Eight of thirteen subjects in the 1986 Koegel et. al. studies also had less than three baseline data points.

The multiple-baseline across subjects experimental design appears well suited to this clinical research question, but given the unexpected outcome of these studies, additional designs should be considered for further research. Connell and Thompson (1986)
discussed the benefits of "a priori" and "ad hoc" flexibility in single subject designs when the treatment effect is weak or "when the researcher is unable to predice accurately the manner in which the behavior under study will react." A priori planning would allow additional control of environmental variables (e.g. same specialist delivering all treatment) which seem to have played an important role in these studies. Had time allowed, ad hoc flexibility (e.g. return to baseline and modify a treatment component) could have been utilized to search for ways of increasing the treatment effectiveness. Such a search might have isolated factors leading to the ineffectiveness of the treatment. The single subject "interaction design." (Kearns, 1986) which conforms to an ABA format but allows individual components of a multicomponent treatment (e.g. acquisition steps, self-monitoring treatment) to be compared for effectiveness, may be another design which would help determine essential elements of the self-monitoring treatment package.

Self-Monitoring Accuracy. Findings of the Koegel et. al. 1988 study and the present studies, suggest that subjects' ability to accurately self-monitor was not directly related to carry-over performance. It is important to note that subjects in both studies were old enough to have acquired the metalinguistic skills necessary to identify a "sound". If younger children were included in this type of treatment, metalinguistic development might have an important impact on the ability to identify and self-monitor target phonemes.

Carry-over Measures. Both Koegel et. al. studies utilized the same procedure for assessing carry-over to the school environment. Observers were trained to engage subjects in conversation, and count
the first occurrence of the target phoneme in each response as correct or incorrect, until 10 targets had occurred. Observers held their concealed fingers in a straight or bent manner in order to distinguish between counts of correct and incorrect on a trial-by-trial basis. This allowed for calculation of reliability when two observers were utilized. The present studies utilized the same technique for 10-item measures, with one exception. Observers counted correct or incorrect targets beginning with the "pinkie" fingers of opposite hands. Because no reliability was calculated for these measures, only the right/wrong count was necessary. Unlike either Koegel, et. al. study, one subject could not be assessed for carry-over utilizing the 10-item measure because a teacher declined permission for the observer to enter her class.

In addition to these 10-item probes, we attempted to gain more information about each subject's articulation carry-over by sampling conversation in an interview which allowed more target occurrences to be analyzed. The interviews were conducted in an environment more conducive to listening. The higher percentages of correct articulation achieved on the 10-item compared with the 30-item measures might be explained in several ways. The discrepancy might have been resolved if both types of measures were audiotaped, but doing so would have compromised the "blind" aspect of measurement, where subjects were unaware that articulation was being evaluated.

Perhaps no real difference in performance on the two measures actually existed. Rather the difference could reflect error on the part of observers or different response criteria in either or both types of measures. Given the acceptable reliability calculated on 30-item
measures, 10-item measures are more suspect. Each subject had his or her own 10-item observer, who might have been more "lenient" than 30-item observers, regardless of acceptable performance during training. On the other hand, 4 observers conducted both types of measures, and the same higher performance on 10-item measures was noted for all subjects. This consistency suggests that observer error alone cannot account for the difference. The environment in which the measures were conducted may have played an important role. Thirty-item observers had the opportunity to converse with subjects on a one-to-two basis in a quiet environment with no distractions. This allowed observers to concentrate auditorially and visually on each subject's articulation and, in effect, be more "critical listeners", an opportunity not as readily available in the classroom setting. In this is true, 30-item measures might more accurately reflect articulatory performance.

It is possible that subjects performed differently during the two measurement tasks. Perhaps the 30-item task was more difficult; therefore, fewer targets were correctly articulated than on the 10-item tasks. The interview situation required the student to formulate answers and maintain appropriate pragmatic interaction with the observers for approximately 15 minutes. This communicative pressure might make attention to correct articulation less likely or more difficult. At the same time, the types of questions asked to elicit conversation in both measures were similar; therefore, content alone probably does not explain the difference. The discrepancy in performance might be explained by the different communication environments. The "natural reinforcers" (Stokes & Baer, 1977;
Nelson & Hayes, 1981; Kohler & Greenwood, 1986) present in the classroom environment (i.e. teacher and peers) may serve to reinforce correct articulation of the target, whereas two unknown observers with only a passing interest in the child, sitting where no other people could observe, offer no reinforcement for correct articulation. One of the posited effects of self-monitoring is that it solicits reinforcement from the natural environment (Koegel, Koegel, & Ingham, 1986; Koegel, Koegel, Van Voy, & Ingham, 1988; Nelson & Hayes, 1981). One would guess that, if environmental reinforcement was already acting on a child to encourage correct articulation in a specific environment (the classroom), the addition of self-monitoring would serve to enhance those effects.

**Parent, Teacher, and Speech-Language Specialist Observations.**

Overall, parents, teachers, and speech-language specialists agreed on one study finding, subjects' correct articulation of the target sound changed very little throughout the study. Beyond that, parents and teachers did not agree on the degree to which subjects correctly articulated their target sound. This lack of agreement may reflect a difference in (1) judgement standards; (2) investment in how well their subject articulates; (3) the accuracy of subjects' articulation in different environments; or (4) how closely the evaluator attends to articulatory performance. In other words, the misarticulation may be "in the ear of the beholder". On her pre-treatment questionnaire, one teacher noted that she couldn't discriminate any misarticulation on the part of the subject. It would be interesting to survey the subjects' peers to determine if they detected a difference in their classmate's
speech. In retrospect, subjects should have been asked to quantify the amount of correct articulation they felt they produced.

Both Koegel et. al. studies surveyed parents and teachers regarding subjects' articulatory accuracy. In the 1986 study, parents and teachers were contacted once per month and asked, "In order to assess the effects of your (or the) child's treatment, I would like to know how (child's name) sounds at home (or in your class)". Responses were coded into one of three categories: (1) no improvement; (2) partial improvement; or (3) complete improvement. The authors reported that, with two exceptions, parents' and teachers' judgements corresponded very closely with study data. Two teachers disagreed with parental assessment, reporting that articulation had not improved significantly whereas parents felt it had improved. Recall that in the current studies, the only negative assessment was also made by teachers in disagreement with parents. Following subjects' completion of treatment in the 1988 study, parent and teachers were asked if they perceived their child’s (or student's) speech as: (1) showing marked improvement; (2) showing improvement, but with some remaining errors; or (3) showing no improvement. The authors reported that, "...teachers and/or parents" perceived improvement or marked improvement for 6 of 7 subjects. Information was not reported for the 7th subject. Because of the "and/or" wording utilized in their report, it cannot be determined if agreement between teachers and parents always occurred. The lack of data for the 7th subject might reflect disagreement on subject performance.
Despite the acknowledged lack of change in their students, speech-language specialists' comments regarding the self-monitoring treatment were generally positive. Specialists were asked to comment on the self-monitoring treatment, citing advantages, disadvantages, and suggestions for improvement. Among the advantages listed were: "time-freeing" effects of the monitor [1 session per week] status; shift in responsibility for speech production to the child; likely application to other disorders (voice); and the provision of alternative treatment for students who have "reached their potential" in the clinic setting. The disadvantages noted were reduced attention to speech production ("the student sort of forgot about speech") on the part of subjects, and apparent peer pressure exerted on subjects not to wear the wrist counter. All of the specialists plan to utilize self-monitoring treatment in the future. Their suggestions for improvement of the self-monitoring treatment included: modification for children who do not honestly report self-monitoring activity; continuation of treatment for longer time periods; increased number of self-monitoring periods required each day; selection of students who appear motivated to change; and enlistment of better teacher cooperation.

The Need for Carry-Over Treatment. Carry-over has been cited as a major concern of speech-language pathologists (Chapman, Herbert, Avery, & Selmar, 1961; Sommers, 1969; Mowrer, 1971; Wing & Heimgartner, 1973), yet we do not know whether a significant number of speech-language pathologists attend to this phase of therapy. In a recent survey conducted in a large Pennsylvania public school district, 48 speech and language clinicians were asked to respond to questions concerning factors influencing their decision to
terminate children from articulation therapy (Eger, 1986). The children were not enrolled in any special education program, and demonstrated normal hearing acuity and intelligence. In the vast majority of cases (90.2%), the decision to dismiss was based on the child's demonstrated level of sound mastery within the clinic. Other factors less frequently mentioned were parent's attitude and homework (.7%), length of time in therapy (.7%), graduation (.2%), awareness of sound (1.3%), parent request for dismissal (.4%), stimulability - ease of production (.4%), and "other" (.9%), which included maturation, dentition, peer influence, and reinforcement from classroom teacher. The child's level of sound mastery within the clinic may be one of the least important factors in predicting carry-over to out-of-clinic environments. The factors included under "other" in the above-named survey may have more influence on carry-over than others listed. If the "treatment outcome" aspect of generalization is the product by which successful therapy is to be measured, speech-language pathologists must attend to it.

We do not have a clear idea of how many children require treatment specifically designed to promote carry-over. Information from the present studies suggests that a significant number of children in this school district require carry-over therapy. Figure 4 depicts the percentage of children enrolled in speech-language therapy in the Amphitheater school district by communication disorder. Language cases comprise the largest percentage of the caseload, followed by children who receive only articulation therapy. Based on the somewhat stringent (80% correct articulation in conversation in the therapy setting; no special education received)
entrance criteria for this study, approximately 9% of the children on the articulation-only caseload remained in therapy because of their failure to carry-over correct articulation to out-of-clinic environments. Undoubtedly, more children who receive additional speech or language therapy, or who are enrolled in special education of some type, are in need of carry-over treatment. It is apparent that a number of children in this district, and undoubtedly in most school districts, need treatment which encourages carry-over. Speech-language
pathologist must attend to development of treatments which will accomplish this end.

**Programming For Subjects' Future Articulation Therapy.** The students who served as subjects in the current studies are now on vacation from school. They will return to their speech-language specialists' caseloads following a three month hiatus from articulation treatment. Articulatory performance in the school environment should be measured when they return to determine whether maintenance of before-vacation accuracy levels has occurred.

Given current study findings, what articulation treatment is warranted? Subjects in study 2 demonstrated stable articulation carry-over with performance in the 80%-100% range on both 10- and 30-item carry-over measures. Teachers and speech-language specialists confirmed these findings, although parents were not as enthusiastic about performance. If parents believe that further therapy is warranted, these students (and perhaps their parents) might benefit from a self-monitoring program designed to encourage accurate articulation in the home environment. If the student, his Individual Education Plan team, or both, feel articulation is no longer a problem, he should be dismissed from therapy. Covertly obtained periodic probes of the student's articulation would reveal any deterioration in performance.

Subjects in study 1 have room for improvement, although study findings suggest that people in the student's communication environment do not agree on "how much room." Perhaps the year should begin with assessment on the part of teachers, parents, and students regarding the necessity of further treatment. Agreement
should be reached on exactly what behavior will be demonstrated and how it will be measured, prior to dismissal from therapy. Student motivation should be carefully considered. Treatment success depends on student cooperation and desire to improve articulation. Additional self-monitoring might prove beneficial to these students. Modification of the treatment application should be considered.

Possible Treatment Modifications for Subjects in Study 1. In behavioral terms, self-monitoring is believed to increase the occurrence of the desired behavior because it is "reactive." That is, the act of self-monitoring is thought to trigger self-evaluation followed by self-reinforcement (if the desired response occurs) or self-punishment (if the undesired response occurs). Self-monitoring is also thought to cue external consequences related to the self-monitoring behavior which ultimately control response frequency (i.e. instructions from the clinician, training in self-monitoring, the self-monitoring device itself, comments from others about the device) (Nelson & Hayes, 1981). Modification of the self-monitoring treatment should be made with the goal of increasing the amount of "external cueing" referred to above. Parents and teachers should be encouraged to comment on the self-monitoring activity (i.e. wristcounter, data sheets, data completion, improved articulation). In addition, self-consequation of correct or incorrect articulation may be encouraged if the student is highly motivated to achieve the rewards offered for correct articulation. Students should be allowed to pick the method utilized to record self-monitoring and help choose the rewards which will be most reinforcing to them. Perhaps another discriminative stimulus for correct articulation (bracelet or friendship band) that
evoked no negative peer comment would be worn more frequently than the wrist counters in the current studies. The amount of self-monitoring required on a daily basis, and the frequency of reporting that activity, might be increased, especially in the early stages of treatment. A method of data collection which assures covert sampling of speech should be utilized to evaluate treatment effectiveness.
CONCLUSION

Self-monitoring treatment has been shown to be an effective treatment for encouraging articulation carry-over in school-age children (Koegel, Koegel, & Ingham, 1986; Koegel, Koegel, Van Voy, & Ingham, 1988). More recently, self-monitoring has been shown to improve articulation during the acquisition stage of therapy (Ingham & Parks, 1989). The accuracy of self-monitoring has not been shown to be an important variable contributing to treatment efficacy (Ingham & Parks, 1989; Koegel, Koegel, & Ingham, 1986; Koegel, Koegel, Van Voy, & Ingham, 1988).

The current studies cannot confirm that self-monitoring accuracy has no effect on treatment efficacy; however, they demonstrated that the ability to accurately self-monitor within the clinic was not related to carry-over performance in the school environment. The current studies failed to replicate the successful treatment effect of the Koegel et. al. (1986 & 1988) studies. Subjects demonstrated the ability to articulate their target sound correctly in conversational speech within the clinic but failed to increase correct articulation in the school environment. Differences among subject, treatment, and environmental variables may account for the lack of success. Research which systematically manipulates these variables is needed to determine which subject groups are most likely to benefit from self-monitoring treatment. Components of the self-monitoring package require further study to determine which aspects effect change.

The assessment of articulation carry-over also requires attention. Different measures may yield different results. People in the student's
natural communication environment, parents, teachers, speech-language specialists, and the students themselves, need to agree on a satisfactory performance level, how achievement of that level will be quantified, and then actively participate in treatment to achieve that goal.
### Appendix A

#### 30-Item Pre-Treatment Questionnaire

<table>
<thead>
<tr>
<th>SUBJECT CODE</th>
<th>DATE</th>
<th>EXAMINER #1</th>
<th>% CORRECT ARTIC</th>
<th>EXAMINER #2</th>
<th>% CORRECT ARTIC</th>
</tr>
</thead>
</table>

**INSTRUCTIONS:** As one interviewer asks each question, both interviewers write the first word in each new utterance containing the target sound. *If the target is misarticulated, circle the target sound.*

(Examiner says: We are conducting a survey of elementary school children to find out their likes and dislikes and to see if they change over time. We will ask you questions today and again in several weeks to see if your opinions change. Please answer as honestly as you can.)

1. Please tell me your full name.
2. What grade are you in and what is your teacher's name?
3. How long have you attended this school and what other schools have you ever attended?
4. Tell me about your family. Your brothers', sisters', parents', and pets' names.
5. How old are your brothers and sisters and pets?
6. Where do you live, a house, an apartment, etc.?
7. How do you get to school?
8. Tell me about your after school activities.
9. Tell me about any other organizations you belong to like scouts or sports leagues.
10. What is your favorite subject in school and why is it your favorite?
11. Please describe your classroom to me. What's on the walls and that kind of thing?
12. Do you bring your lunch or purchase it in the cafeteria?
13. What is your favorite lunch?
14. How often do you get to eat it?  

15. What lunch do you dislike most?  

16. Tell me about your allowance.  

17. What do you like to spend money on?  

18. What was the last thing you bought with your own money?  

19. How much did it cost?  

20. How do you spend your spare time?  

21. What chores are your responsibility at home?  

22. Tell me about your favorite television program.  

23. When does it come on?  

24. What was the last movie you saw?  

25. What was it about?  

26. What grown-up do you admire or respect the most?  

27. Why?  

28. If you could be anyone in the world, who would you be?  

29. Why?  

30. If you could take a trip anywhere, where would you go?  

31. What make you really angry?  

32. What make you very happy?
Appendix A (Continued)

33. Tell me your three favorite colors.

34. What is one of your favorite outfits and why do you like it so much?

35. Who cuts your hair and who decides how you will wear it?

36. Who are two of your friends at school?

37. What would you change about your school if you had the chance?

38. What do you like best about your school?

39. If we could take you for your favorite treat, where would we go and what would you get?

40. Is there anything important we haven't asked you about?

(Examiner says: Thank you very much for participating in our survey. We'll see you again in a few weeks.)
Appendix B
30-Item Post-treatment Questionnaire

EXAMINER #1 ____________________________  % CORRECT ARTIC _____
EXAMINER #2 ____________________________  % CORRECT ARTIC _____

INSTRUCTIONS: As one interviewer asks each question, both interviewers write the first word in each new utterance containing the target sound. If the target is misarticulated, circle the target sound.

1. Please tell me your full name.
   ____________________________ / ____________________________

2. What grade are you in and what is your teacher's name?
   ____________________________ / ____________________________

3. What family pets did you tell us about in the last interview?
   ____________________________ / ____________________________

4. Tell me the names of your family members.
   ____________________________ / ____________________________

5. Who has had a birthday in your family this school year?
   ____________________________ / ____________________________

6. How old are you now?
   ____________________________ / ____________________________

7. Where will you attend school next year?
   ____________________________ / ____________________________

8. What summer activities do you have planned?
   ____________________________ / ____________________________

9. Where will your family go on vacation?
   ____________________________ / ____________________________

10. What's the best part about summer vacation?
    ____________________________ / ____________________________

11. What do you miss most about school being out?
    ____________________________ / ____________________________

12. What were your best subjects in school this year?
    ____________________________ / ____________________________

13. What were your worst subjects?
    ____________________________ / ____________________________

14. Do you remember what you said your favorite lunch was? What was it?
    ____________________________ / ____________________________

15. Tell me about your allowance. Has it changed during the school year?
    ____________________________ / ____________________________
Appendix B (Continued)

16. What do you have to do to get a raise in your allowance?  
17. What do you do to earn extra money in the summer?  
18. What was the last thing you spent your own money on?  
19. How much did it cost?  
20. What was the last thing your parents bought for you?  
21. How much did it cost?  
22. What did you tell us was your favorite television program?  
23. What is your favorite program now?  
24. What was the last movie you saw?  
25. Who saw the movie with you?  
26. What was it about?  
27. What grown-up do you respect the most?  
28. Why?  
29. Who in the world would you like to be for a day?  
30. Why?  
31. Where did you say you would take a trip if you could go anywhere?  
32. Where would you go now?  
33. What was the last thing you felt very happy about?
Appendix B (Continued)

34. What was the last thing you felt very sad about?
   ____________________________  /  ____________________________

35. What is one of your favorite outfits and why?
   ____________________________  /  ____________________________

36. Tell me your three favorite colors.
   ____________________________  /  ____________________________

37. What is your favorite sport?
   ____________________________  /  ____________________________

38. What is the name of a star in that sport?
   ____________________________  /  ____________________________

39. Who are two of your friends?
   ____________________________  /  ____________________________

40. Are these friends you made just this year?
   ____________________________  /  ____________________________

41. If we could take you for your favorite treat, where would we go?
   ____________________________  /  ____________________________

42. What would you order?
   ____________________________  /  ____________________________
Appendix C
Parent/Guardian Questionnaire

THE EFFECT OF SELF-MONITORING ON ARTICULATION CARRY-OVER IN SCHOOLAGE CHILDREN

Dear Parent or Guardian,

You recently consented to your child's participation in the above named project. This questionnaire will give us additional information about how your child articulates sounds which have been the target of speech therapy. If your child receives therapy for more than one sound, please complete one of these questionnaires for each sound. When completing this form, please consider your child's talking when he or she is at home with family members.

Thank you for your cooperation. Please return this form to _________________, your child's speech-language specialist, as promptly as possible. If you have any questions, please call Shelley Gray, the Principal Investigator of this project, at __________. evenings.

--------------------------------------------------------------------------------

---------------------------------------------  -----------------------------------
child's name                                school

---------------------------------------------  -----------------------------------
completed by                                relationship to child     date

In conversation with other family members, my child says ___ correctly (circle one)

1  never       2  3  4  5  always

When reading, my child says ___ correctly (circle one)

1  never       2  3  4  5  always

When talking to me, my child says ___ correctly (circle one)

1  never       2  3  4  5  always

Overall, when compared with two months ago, my child uses ___ correctly (circle one)

1  less often  2  the same  4  5  more often
Appendix D

Teacher Questionnaire

THE EFFECT OF SELF-MONITORING ON ARTICULATION CARRY-OVER IN SCHOOLAGE CHILDREN

Dear Teacher,

Your student, ____________________________, is enrolled in a research project designed to assess two methods of encouraging articulation carry-over to the school and home environments. Your completion of this questionnaire will give us additional information about how the child articulates sounds which have been the target of speech therapy. If the child is receiving therapy for more than one sound, please complete one questionnaire for each sound. Please consider the child’s talking during tasks in the classroom and while at play, recess, etc.

Thank you for your cooperation. Please return this form to ______________________________, as promptly as possible. If you have any questions, please call Shelley Gray, the Principal Investigator of this project, at _________, evenings.

--------------------------------------------------------------------------------------------------

_________________________________________  ___________________________________________
child’s name  school

_________________________________________  ___________________________________________
completed by  relationship to child  date

In conversation with other students, the child says ___ correctly (circle one)

1  never  2  3  4  5 always

When reading, the student says ___ correctly (circle one)

1  never  2  3  4  5 always

When talking to me, the student says ___ correctly (circle one)

1  never  2  3  4  5 always

Overall, when compared with two months ago, the student uses ___ correctly (circle one)

1  less often  2  the same  4  5 more often
Appendix E
Speech-Language Specialist Survey

Speech-Language Specialist Report
Self-Monitoring Study

Name: ____________________________ School ____________

Subject: ________________

In my opinion, this student's correct articulation of his/her target sound in the therapy setting since the initiation of the study:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>has decreased</td>
<td>has decreased</td>
<td>is the same</td>
<td>has increased</td>
<td>has increased</td>
</tr>
<tr>
<td></td>
<td>markedly</td>
<td>somewhat</td>
<td></td>
<td>somewhat</td>
<td>markedly</td>
</tr>
</tbody>
</table>

My opinion is based on these observations:

---

In my opinion, this student's correct articulation of his/her target sound outside of the therapy setting since the initiation of the study:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>has decreased</td>
<td>has decreased</td>
<td>is the same</td>
<td>has increased</td>
<td>has increased</td>
</tr>
<tr>
<td></td>
<td>markedly</td>
<td>somewhat</td>
<td></td>
<td>somewhat</td>
<td>markedly</td>
</tr>
</tbody>
</table>

My opinion is based on these observations:

---

I believe correct articulation outside of therapy is currently at ____%. 

---
Appendix F
Subject Contract

CONTRACT

I WILL WORK HARD TO SAY MY TARGET SOUND CORRECTLY ALL OF THE TIME, AT HOME AND AT SCHOOL.

I WILL SELF-MONITOR THREE TIMES EACH DAY.

I WILL WEAR MY WRISTCOUNTER EVERY DAY.

I WILL FILL OUT MY REPORT SHEET EVERY DAY AND BRING IT TO THERAPY EACH WEEK.

SIGNED: ____________________________  DATE: ________

I WILL PROVIDE REWARDS FOR FOLLOWING THE CONTRACT.

SIGNED: ____________________________  DATE: ________
Appendix G
Teacher Verification Form

Name__________________________________________
For the week of__________________________________

Monday  Tuesday  Wednesday  Thursday  Friday

_____________________________________________
LIST OF REFERENCES


Engel, D. C., Erickson, K. M., & Groth, L. R. (1971, November). Two approaches to articulation carryover therapy which can be done in the school setting. Paper presented at the annual convention of the American Speech and Hearing Association, Chicago.


