

THE EFFECT OF EXAMINER SOCIAL BEHAVIOR ON CHILDREN'S ARTICULATION TEST PERFORMANCE

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Forty-eight first- and second-grade children with /r/ or /s/ errors met with an articulation examiner once a week for three consecutive weeks. During each session, the investigator role-played social behaviors of a supportive examiner (S) or a non-supportive examiner (N) (Relationship Segment) and then administered a Vocal Imitation Task and an imitative Articulation Task (Testing Segment). Subjects were divided into four groups balanced by sex, error sound, grade, and therapy experience. The sequence of experimental conditions for each group was Group 1 (SSS); Group 2 (NNN); Group 3 (SNS); and Group 4 (NSN). Two questions were posed: Do supportive versus non-supportive examiner social behaviors affect articulation performance? Do differences in examiner social behaviors affect children's test-retest reliability? No main or interaction effects for the type of examiner behaviors were obtained on either dependent variable. Comparison of the Pearson correlation coefficients for each group indicated that Group 1 obtained the highest temporal reliability, 0.92, while Groups 2, 3, and 4 obtained average coefficients of 0.67, 0.76, and 0.62, respectively. Clinical and theoretical implications of these data point to the value of using intensive designs for further study of interpersonal variables in the clinical process.

Relationships between "functional" articulatory errors and differing interpersonal constructs have been of recurrent interest in the speech disorders literature. Three general levels of inquiry may be discerned. Theoretical views of articulatory development have invoked constructs such as identification (Mowrer, 1958), imitation (Wyatt, 1969) and various psychoanalytic terms (Rousey, 1965) to capture the earliest parent-child processes mediating phonological development. A second literature, reviewed by Spriestersbach (1956), Goodstein, 1958a, b) and Winitz (1969) has sought correlations between personality and emotional adjustment characteristics and articulatory development. Methodological problems in acquisition-related studies and a general lack of theoretical direction in correlation studies have limited the substantive findings generated in both of these areas.

A third type of relationship between articulatory errors and interpersonal issues is the effect of situational variables on articulation performance. The necessity for developing rapport with a child has been recommended as of paramount importance in virtually every standard discussion of clinical process (e.g., Johnson, Darley, and Spriestersbach, 1963; Van Riper, 1963; Van Riper

and Irwin, 1958). As a representative example, Millisen (1954, p. 12), discussing the effect of an audience on the adequacy of articulation, has cautioned:

This effect is so powerful that it ranges from facilitation to complete disruption. A friendly audience usually facilitates a child's performance. . . . An unfriendly audience may present such a threat that the child regresses catastrophically to a faulty but more automatic speech pattern.

Similar statements have popularized the notion that articulation behavior is in part determined by dispositional variables related to current motivational incentives as well as prior learning and sensory-motor integrity. Accordingly, a traditional emphasis in clinical training has been to attempt to develop a student's interpersonal skills with the tacit understanding that the attainment of rapport is necessary for optimum and reliable client performance. Recent functional analyses of the relation between contingent social reinforcers and articulation performance (e.g., Draper, 1970) are theoretically related to the influence of motivational states; however, operant conditioning paradigms must bypass interpersonal causal explanations. The general purpose in behavior-modification studies has been to find what works with children without recourse to covert, hypothetical constructs.

In the last decade, social reinforcement studies have provided considerable evidence that an adult's noncontingent social behaviors can influence a child's performance on simple motor and learning tasks (Bandura, 1969). These studies would appear to offer models for experimental study of the articulation examiner (the clinician) as an independent variable. The purpose of the present study was to investigate whether an adult's social behaviors would influence children's articulation performance. An articulation-testing paradigm was modeled on an imitative situation, so that both applied and theoretical views of the data might be considered. The two questions posed were (1) Do supportive versus nonsupportive examiner social behaviors affect the mean articulation test performance of a group of articulatory deviant children? and (2) Do differences in examiner social behavior affect children's test-retest reliability?

METHOD

Examiner Roles

The roles of a supportive (S) versus a nonsupportive (N) examiner were developed in a series of pilot studies. The verbal, vocal, and facial-gestural behaviors that operationally define these roles are presented in Table 1. In keeping with the clinical research objectives, the attempt was to role-play behaviors within the range of practicing clinicians. This consideration was of particular influence in characterizing the nonsupportive role as consisting of nonsupportive rather than overtly punishing behaviors. The reactions of several viewers to live and videotaped pilot sessions lent initial face validity to the

TABLE 1. Role-playing behaviors in supportive versus nonsupportive conditions.

Mode	Examiner Behaviors	
	Supportive	Nonsupportive
Verbal	complex sentences references to self colloquialisms many "very good," "that's fine," etc. calls child by familiar name, e.g., "Bob"	short, concise sentences no personal references no colloquialisms no "very good," "that's fine," etc. calls child by formal name, e.g., "Robert"
Vocal	varied pitch expanded inflection patterns	lowered pitch reduced inflection patterns
Facial and Gestural	eye contact many head nods many smiles many hand gestures	limited eye contact no head nods no smiles limited hand gestures

role-playing attempts; these viewers agreed that the impression of a supportive versus a nonsupportive clinician could be markedly conveyed by role-playing these behaviors. A reliability check on the verbal and vocal behaviors is reported for the main study.

Subjects and Experimental Design

Subjects were drawn from eight public schools in Johnson County, Kansas, an area with a middle to high socioeconomic level. Two female speech clinicians administered one of four randomized lists of a 30-item Sound Production Task (Elbert, Shelton, and Arndt, 1967; Shelton, Wright, and Arndt, 1967) for the /r/ or /s/ phone-type to children in the first and second grades during a fall screening program. Children who were considered for the study met the following criteria: articulation scores between 5 and 25 correct on a 30-item task; a pass on the hearing screening; normal intelligence (no lower than 80 on any of the several group tests administered by the school); and no previous speech therapy experience. Forty-eight children were included in the final sample which was composed of 24 boys, 24 girls; 37 children with /r/ errors, 11 with /s/ errors; 36 first graders, 12 second graders. It should be noted that the subjects were unselected in terms of personality or behavioral adjustment.

The 48 subjects were divided into four groups of 12, carefully balanced by sex, error sound (type and severity), grade, and school attended. In order to balance the groups it was necessary to include two children in each group who had received previous speech therapy. A table of random numbers was used to assign the four groups to four experimental conditions. The children in Group 1 were to experience a supportive examiner for one session each week for three consecutive weeks (SSS); those in Group 2 would experience a nonsupportive examiner for each of three sessions (NNN); Group 3 would experience a supportive examiner, then a nonsupportive examiner, and finally a supportive examiner (SNS); and Group 4 would experience nonsupportive-supportive-

nonsupportive conditions (NSN). During each session the investigator, in the role of either a (S) or (N) examiner, was to interact with a child for the first part of a session (Relationship Segment) and then administer the two dependent variables (Testing Segment).

Scheduling and Instrumentation

In each of the eight schools the childrens' teachers (32) were informed that the study was concerned with articulation testing, and schedules for seeing each child at the same time, once per week, were arranged. The teachers were asked to tell each child only that "Mr. Shriberg would like to see you today" when the investigator appeared at the door to the classroom.

In each school, a quiet room was arranged so that the investigator was directly facing each subject. An Electro-Voice 664 microphone was positioned on a table four to ten inches from a child's lips. The microphone was connected to an Ampex 601 monaural audio tape recorder which was positioned on a table behind the subject. Scotch-brand 1.0 mil polyester tape was used to record an entire session at 7 ips. A Norelco model NR131701 audio tape recorder, positioned three feet behind and slightly above a subject's head, was used to present the Vocal Imitation Task to be described.

Components of Each Experimental Session

Relationship Segment. Spontaneous talk: Each session lasted from 8½ to 12 minutes. Immediately upon meeting the child at the door to his classroom the investigator assumed the role specified by the child's group assignment for the session. For supportive sessions, the examiner would greet the child cheerily and chat with him as they walked to the experimental room. For a nonsupportive session, the examiner would merely nod to a child and walk wordlessly to the experimental room, which in some schools took as much as a minute and one-half. For the first two to three minutes the investigator would converse about the child's school activities, friends, favorite television programs, etc. For the (S) role, the examiner would let the child direct the flow of conversation, attempt to convey genuine interest, nod in agreement frequently, praise the subject's professed skills, etc. In the (N) role, the examiner avoided eye contact with the child, listened with ostensible disinterest, and asked brief questions in the flat business-like role prescribed in Table 1.

Telling stories to pictures: In the second two-to three-minute segment of each session a child was asked to tell a story about each of six pictures which were presented in a photograph album. The pictures contained children and adults engaged in various social activities. The (S) examiner would praise a child's story or description of each picture, filling in details of each picture as the child construed it. The (N) examiner would either say "Is that all?" or "What else?" in a factual tone or say nothing at all after each story.

Testing Segment. The Vocal Imitation Task: The rationale for the use of the Vocal Imitation Task as a dependent variable warrants consideration. As will be described next, the Articulation Task used as the dependent variable is administered by imitation in keeping with the imitation paradigm of the study. Hence, two questions are involved: (1) Will the examiner's social behavior affect a child's disposition to imitate? and (2) Is articulation a class of verbal behaviors which is sensitive to these changes in dispositional states? In order to answer the first question, some independent behavioral measure is needed which would be sensitive to the occurrence of the desired mediating states, i.e., the perception of the examiner as supportive versus nonsupportive. For this purpose, an imitation task was developed which would yield score values capable of parametric analysis.

The Vocal Imitation Task requires a child to repeat 20 four-word sentences which are presented via an audio tape. The 20 sentences were prerecorded by the investigator in a neutral tone of voice. Within each four-word monosyllable word sentence, four distinct peaks in intensity were realized, as monitored by Graphic Level Recorder tracings (General Radio Graphic Level Recorder Model GR 1900A). The configurations of the four peaks were different for each item. The directions for the task are: "I have recorded *my* voice saying some words on the tape recorder behind you. Say the words that I say." Whereas a subject is required to repeat only the words that he hears, it is the faithfulness with which he copies the intensity contours for each item which is scored as reflecting his current disposition to imitate the examiner (that is, the examiner's voice). Since both the prerecorded stimuli and the child's responses were recorded by the Ampex 601 during each administration, his imitation of each item was scored by comparing the intensity contours of each stimulus to the contours of his response on the Graphic Level Recorder tracing. A simple scoring system, in which each similar directional change receives one point, yielded a total score for each administration.

At the conclusion of the Relationship Segment, the examiner gave the directions for the Vocal Imitation Task and, standing behind the child's line of vision, presented the tape-recorded task at an overall intensity of 58 dB hearing level. At no time during the administration of the task did the examiner comment on the child's performance; the task took exactly two minutes to administer.

The Articulation Task: Three randomized arrangements of the Shelton 30-Item Sound Production Tasks were employed; one of the lists was given at each session. These tasks present /r/ or /s/ phone-types in differing phonetic contexts including isolation, syllables, words, and sentences.

Following the Vocal Imitation Task the examiner said to a child, "Now I am going to say some words and sentences; say them after me." The examiner then read the articulation stimuli to the child, using the vocal characteristics appropriate to (S) or (N) conditions, but giving no reinforcement or feedback of any sort throughout the testing. The pacing of the items was kept constant so that a complete test took two and one-half minutes in both examiner conditions.

At the conclusion of each session, the child was told that the session was over for the day, and the child returned to his room by himself. At the conclusion of the third and last testing session, extra time was spent with each subject praising his overall participation, particularly for NNN and NSN subjects.

Scoring and Reliability

Consistency of Examiner Roles. Twenty-five 30-second segments from the 144 experimental sessions were randomly selected for a reliability check on the consistency with which the examiner role-played (S) versus (N). Ten judges, including doctoral and master's level speech pathologists and clinic secretaries, were given copies of Table 1 to familiarize themselves with the role behaviors. They were then asked to indicate which of the roles the investigator was attempting to play for each of the 25 segments presented on a specially dubbed audio tape. The mean percentage of consistency, defined as agreement between the examiners intended role and the listener's judgment, was 97.6%.

Vocal Imitation Task. One judge scored all the Vocal Imitation Tasks. Intra-judge item-by-item percentage of agreement was obtained by having this judge rescore 20 randomly selected tasks (14% of the sample). The resulting mean percentage of agreement was 99 (percentage of agreement equals number of agreements divided by total items). Interjudge item-by-item percentage of agreement was assessed by comparing the investigator's scores for 20 randomly selected tasks with the judge's scores. The mean percentage of agreement was 98.

Articulation Task. A judge who had conducted and participated in several investigations requiring extensive articulation judgments scored the articulation responses of all subjects as correct or incorrect. The clinical standard used was "Score correct unless heard as incorrect." Specially dubbed tapes with the examiner's voice dubbed out and subjects randomized were presented to this Criterion Judge on a sound system consisting of a Sony Model TC104A tape recorder and an Electro-Voice 10-inch Sonocaster speaker. Several weeks after scoring was completed, intrajudge reliability was obtained by having this judge rescore the responses of 12 randomly selected subjects, three of whom had /s/ errors. The mean item-by-item percentage of agreement was 89.

Three judges holding the Certificate of Clinical Competence in Speech Pathology scored the responses of 12 randomly selected subjects to provide an interjudge reliability estimate. The mean interjudge item-by-item percentage of agreement was 76. In consideration of the particular sounds tested and the inconsistency with which the subjects produced the sounds, that is, judgments were maximally independent, the task presented to these judges was considered an extremely difficult test of reliability. No differences in interjudge reliability for /r/ versus /s/ were observed.

RESULTS

Effects of Examiner Behaviors on Mean Articulation Task and Vocal Imitation Task Scores

Separate analyses of variance were computed to assess the effects of experimental group, session, and sex, and their interactions on the Vocal Imitation Task and the Articulation Task scores. Because there were only 11 /s/ subjects distributed into the four groups the analyses did not differentiate between error sounds. None of the main or interaction effects were statistically significant, indicating that the role-playing behaviors were not associated with mean group effects on either task. Among the alternative explanations for this negative finding, the possibility that the conditions may have influenced the children's performances but in different directions was suggested. Although the planned test-retest analyses would explore this possibility, it seemed useful to compare the intrasubject variability estimates on each dependent variable.

First, a simple percentage of agreement was calculated to assess whether the direction of performance on each task covaried from session to session. Each session in which the scores on both tests varied in the same direction from the scores in the previous session was scored as an agreement. The resulting percentage of agreement of 41 indicated that the direction of performance on each of these tasks did not covary.

Next, for each task, eight sub-analyses of variance were calculated to yield separate variance estimates for boys and girls in each experimental condition. These variances were compared by means of Cochran Tests of Homogeneity of Variance (Winer, 1962) to determine whether any of the variances were significantly different from the variances of the other three groups. On both the Vocal Imitation Task and the Articulation Task, the Group 4 (NSN) boys were more variable across the three sessions than boys in the other conditions. This effect was significant at the 0.01 level of confidence for the Vocal Imitation Task and just short of reaching significance at the 0.05 level for Articulation Task scores. Figure 1 presents a comparison of the mean intrasubject variability for each task. Although previous analysis indicated the two tests were not correlated in a directional sense, the sequence of nonsupportive-supportive-nonsupportive behaviors did appear to cause the greatest intrasubject variability for boys on both measures. In general, boys were more variable than girls, although in the SNS condition girls are associated with more variability than boys on both tasks.

Effects of Examiner Behaviors on Test-Retest Reliability

Table 2 presents the Pearson correlation coefficients which describe the test-retest stability for each experimental group. For both session comparisons, that is Session 1 with Session 2, and Session 2 with Session 3, the SSS group was higher than the other three groups. Subsequent chi-square tests of Fisher Z

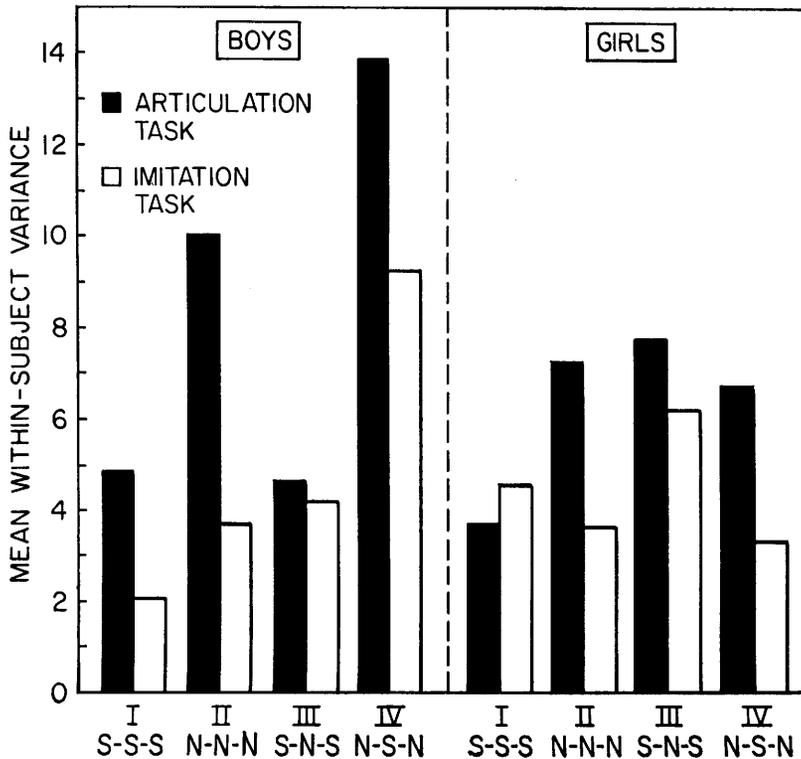


FIGURE 1. Comparison of the mean within-subject variances on the Articulation Task and the Vocal Imitation Task for boys and girls in the four experimental groups.

transformations of these scores¹ indicated that one of the two contrasts of Group 1 scores with the average of the scores of the other three groups was

TABLE 2. Pearson *r* correlation coefficients for the Articulation Task scores of the four experimental groups.

Group	Conditions	Session 1 with Session 2	Session 2 with Session 3
1	SSS	0.88*	0.96**
2	NNN	0.65	0.69
3	SNS	0.66	0.85
4	NSN	0.65	0.58

*Chi-square test of significant difference between Group 1 and the average of Groups 2, 3, and 4 (Fisher Z scores) = $p < 0.0537$.

**Chi-square test of significant difference between Group 1 and average of Groups 2, 3, and 4 (Fisher Z scores) = $p < 0.0037$.

$$^1 X^2 df = 3 = \sum \frac{(z - \bar{z})^2}{n - 3}$$

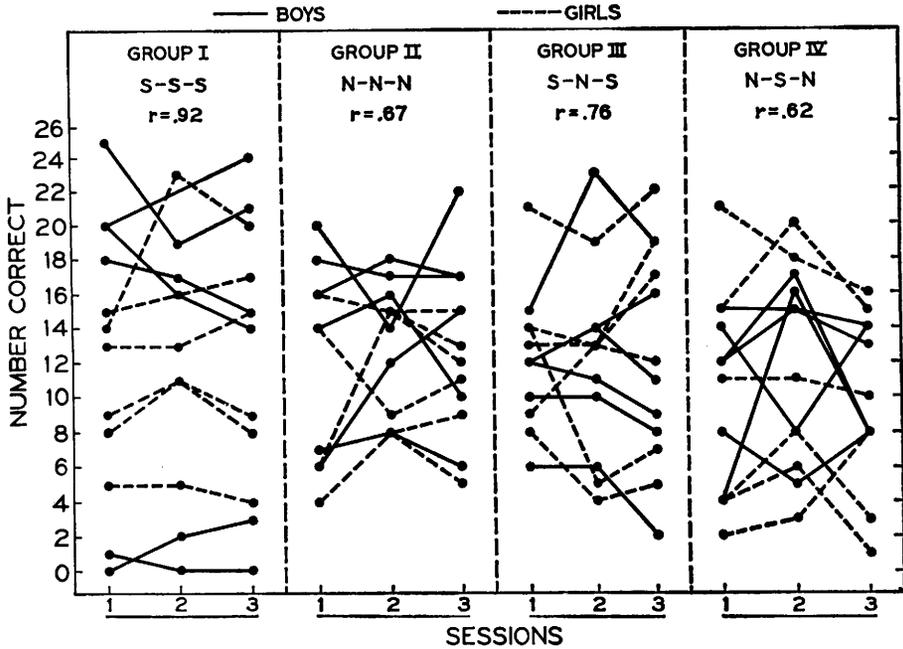


FIGURE 2. Articulation Task scores of all subjects in each of the three experimental sessions.

statistically significant ($p < 0.0037$) while the other contrast was close to significance at the 0.05 level of confidence ($p < 0.0537$).

A descriptive picture of these data is presented in Figure 2, which plots the Articulation Task scores of all subjects across the three sessions. For this purpose, the two correlation coefficients are averaged for each group. Note the relatively flat configurations of the raw scores across the three sessions for Group 1 in contrast with the variability for the other three groups, most notably, for Group 4. The most variable child in the study was a Group 4 boy who scored 4 in the initial nonsupportive condition, 16 in the supportive condition, and returned to 8 in the final nonsupportive session.

DISCUSSION

Of the two related questions posed in the study, both the positive finding (temporal reliability) and the negative finding (no mean effects) warrant consideration.

Test-retest correlations averaging in the low to middle 0.90s have been reported by Siegel (1962), Stancyk (1968), Templin (1953), and Winitz (1963) using a variety of subject populations and articulation tests and scoring procedures. In comparison, I found average test-retest coefficients of 0.67, 0.76, and 0.62 for Groups 2 through 4 respectively. The data would appear to implicate examiner behavior as a source of variance in serial testing, since Group 1 was the only group which did not experience at least one session with a non-

supportive examiner. Moreover, the reduced test-retest reliability of the NNN group (0.67) suggests that the type of examiner behavior is more important than whether an examiner is consistent in his behaviors. To the extent that the NNN group experienced adult behaviors which resemble the behaviors of a deliberately businesslike experimenter, this finding may have implications for the conduct of articulation research. Possibly, a "research" (nonsupportive) role adopted for control by an investigator interested in other variables may, of itself, invoke variability in single subject, repeated measures data.

The trend for boys to be more variable than girls, particularly in relation to nonsupportive examiner conditions, is of clinical interest. Intuitively, it might be expected that young boys would become most engaged in a one-to-one relation with an adult male, a situation quite uncommon both in speech clinics and in the elementary school. Anecdotal data on the behaviors of the boys during both the Relationship and Testing segments support this expectation. Their facial and bodily gestures and overall sense of participation seemed, on the whole, to suggest a more intense personal involvement in the process than observed in the girls. Social reinforcement studies have found few dependable sex or cross-sex effects (Flanders, 1968). However, Siegel (1962) has reported both lower mean scores and higher standard deviations for the one male examiner among his four examiners who each individually tested the articulation of a group of mentally retarded boys. Siegel suggested that this examiner may have actually elicited poorer performance from the boys.

The failure to obtain main effects for examiner behaviors is provoking. The concept of rapport, in any theoretical view, is operationally tied to the immediate history of the participants, which in this study constituted the independent variable. The behaviors of the examiner in the Relationship period were designed to create a valence (McArthur and Zigler, 1969) or alternately, to give him generalized reinforcer properties (Skinner, 1953) which would be reflected in the direction of children's imitation performance on the two independent variables. The simplest theoretical as well as clinical prediction would be that supportive behavior should have been associated with optimum imitation performance. However, the children in the SSS conditions did not have higher performance than NNN children. Moreover, inspection of single subject data (Figure 2) suggests that some children from the SNS and NSN groups may have actually scored higher in the nonsupportive conditions. Since three data points do not yield sufficient information to support a functional relation and particularly since session-to-session differences of similar magnitude may also be observed in some children in the SSS and NNN groups, the data provide only limited internal support for the previous notion. However, such a possibility would not be inconsistent with the findings of social reinforcement studies which have employed a variety of dependent variables to assess imitation. Studies which have found better imitation performance in children who have been mildly socially deprived (cf. Maccoby and Masters, 1970), and a number of other concepts such as demand characteristics (Orne, 1969) and perceived task orientation of the examiner (Leventhal and Fisher, 1970), could suggest

explanatory variables mediating better performance with a nonsupportive examiner. Additionally, the concept of satiation (McArthur and Zigler, 1969) could account for the failure of the history of supportive interaction to promote optimum performance. Observations wherein an ostensibly nonsupportive student clinician appears to elicit excellent performance from one or several clients would suggest a clinical homologue.

A closer theoretical analysis requires discussion of articulation as a response class in relation to differing concepts of imitation. Mowrer et al. (1968), McClean (1970), and others have employed reinforcement theory principles such as shaping, chaining, and establishing discriminative and contingent stimulus control (Brookshire, 1967; McReynolds, 1970) for articulatory retraining. These studies have reinforced a subject for matching the articulatory behaviors of a clinician, shaping increasingly better imitations of the target phonemes where needed. Draper (1970) has discussed limitations in the power of matched-dependent designs employing only differential reinforcement, that is, without shaping or instructional antecedent events, to effect response acquisition. A request for a correct imitative response, even when the phoneme is modeled over many trials and correct responses are reinforced,² seems to be an insufficient antecedent event to modify certain types of articulatory errors. In contrast, social learning concepts of imitation and generalized imitation (Gewirtz, 1969; Kanfer and Phillips, 1970) have been invoked as explanatory processes in studies which have manipulated a variety of model and subject variables in observational learning paradigms. Social learning theory studies have attempted to demonstrate that behavioral patterns can be acquired without ever having been reinforced. Since both the questions posed and the methodology employed in the present study are more closely allied to the social learning literature, two procedural issues in relation to the failure to obtain main effects for examiner conditions should be noted.

First, to be consistent with social learning experimental paradigms, the supportive examiner should have been rewarding imitation of examiner-modeled stimuli during the relationship phase, rather than praising a child's spontaneous verbalizations. The study did not set up conditions wherein imitation of the examiner might acquire reward value so that imitation as a response class would be sustained on the Vocal Imitation Task and Articulation Task. Therefore, since the disposition to imitate the articulation examiner was never properly tested, the dependent variables should be viewed only as performance measures. It seems plausible that a non-imitative articulation task, i.e., spontaneous testing, might have disclosed the temporal reliability effects without ever invoking the central imitation feature of ". . . similarity of behavior between subject and model" (Peterson, 1968, p. 61).

A second issue confronts the very heart of the experimental question. The attainment of significant increases in the number of correctly imitated items

²Barbara Roth (personal communication, 1970), in a training program with a five-year-old female, modeled the /s/ phoneme for 3,600 trials. Total percentage of accuracy at the end of this period was only 60.

on the articulation tasks may have called for adjustments of the articulators which were beyond a child's immediate sensory-motor ability. Bandura (1969, p. 224), discussing dependent variables used in social reinforcement studies, notes:

Accurate behavioral enactment of modeling cues is also difficult to achieve under conditions where the model's performance is governed by subtle adjustments of internal responses that are unobservable and not easily communicable. The problem of behavioral reproduction is further complicated in the case of highly coordinated motor performances . . . in which a person cannot observe many of the responses he is making and must therefore primarily rely upon proprioceptive feedback cues.

In the one trial allowed for each of the 30 /r/ or /s/ items, both the perception of the model's stimulus and the proprioceptive cues for a matching production may have required too much of the organism even under optimum motivational disposition (recalling similar problems when motivation is tied to extrinsic rewards in operant conditioning models). Flanders (1968) points out that to test a modeling hypothesis, one must chose a dependent variable of which the child is physically capable, a criterion which the constraints inherent in the differing phonetic contexts of the 30-item deep test may have been only partially met. Thus, a performance-based assessment of the effects of examiner behavior should have included only those items known to be in a child's repertoire, i.e., those he has been heard to articulate correctly. Due to the several methodological limitations which affected both dependent variables, it is not known whether the experimental conditions in the present study failed to create the intended mediating states, i.e., dispositions toward the examiner, or whether these states occurred but were not reflected in the imitation task performances. It will remain for future investigation to determine whether such molecular behavior as that which is involved in phonological features may be usefully explored within social learning theory models of the determinants of acquisition and performance.

For differing reasons, Locke (1968), Prins (1962), Sommers (1967), and Winitz (1969) have stressed that treatment of articulation-defective children as a homogeneous group is an untenable research strategy. Future experimental investigations of the effects of a clinician's social stimuli on articulation performance may be most productive by initial differentiation of subjects on articulatory, demographic, or personality dimensions not accounted for in the present study. Additionally, the social characteristics of clinicians, as assessed by a number of rating scales or behavioral measures (e.g., Weiss, 1967) may interact with subject characteristics to yield optimum client-clinician dyads. Current models of the clinical process (Girardeau and Spradlin, 1970; Irwin, 1970) attempt to integrate the growing empirical evidence that topographical changes in articulation performance can be managed using procedures which minimize interpersonal skills. Single-subject studies are now under way which will attempt empirical evaluation of historical assumptions relating interpersonal processes to articulatory behavior.

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