# Establishing a Generalized Autoclitic Repertoire in Preschool Children

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Skinner's (1957) analysis of language presents the notion of secondary verbal behavior, some of which is termed ''autoclitic.'' These kinds of verbal responses are dependent upon primary verbal behavior and are controlled by some feature of the primary verbal relationship (e.g., mand, tact, etc.). In this study preschool children were trained to make autoclitic responses evoked by the weakness of the relation controlling a primary tact response. A method for training tacting of private events known as ''public accompaniment'' was utilized. Theoretical issues related to the nature of autoclitic behavior as well as practical concerns for training are discussed.

Skinner's treatment of language as presented in Verbal Behavior (1957) has been recognized by some as one of his most important contributions to the study of human behavior. However, this analysis is probably the one that is least understood and least appreciated by behaviorists and nonbehaviorists alike. The reasons for this may be twofold: (1) it is a complex treatment of a complicated subject matter, and (2) unlike many of his earlier works, Verbal Behavior is largely a theoretical account, rather than a description of functional relations obtained under laboratory conditions. Nevertheless, it is a thoroughgoing description of how a radical behaviorist would talk about language and analyzes such intricacies as "Freudian slips," humor, and even what makes literature interesting. But the majority of it is devoted to an analysis of what Skinner terms primary and secondary verbal behavior.

Primary verbal behavior consists of those verbal relations known more specifically as mands, tacts, intraverbals, echoics, textual responses, taking dictation, and copying a text. Each is a distinct unit, defined by its own controlling variables. Skinner points out the independence of each of these relations by emphasizing that identical response forms do not equal identical behavior. For example, saying "water" after one has ingested something salty and because water would now function as reinforcement is not the same response as saying "water" under the control of rain dripping through the ceiling. The difference, of course, lies in the controlling variable for each response. The first example would be classified as a mand because it is controlled by an establishing operation (Michael, 1982) and the latter as a tact because the response is evoked by a nonverbal stimulus. (The reader who is interested in learning more about these elementary verbal relationships is encouraged to read Peterson, 1978, before *Verbal Behavior*.)

After introducing the various forms of primary or elementary verbal behavior, Skinner presents the notion of secondary verbal behavior. That is, verbal responses that were never emitted in isolation but always accompanied by some primary verbal response. He termed some of these types of responses "autoclitics." Skinner (1957) describes autoclitics as secondary verbal behavior which are based upon, or dependent upon, other verbal behavior. As Peterson (1978) has stated, autoclitics are "verbal behavior about other verbal behavior'' (p. 164). The controlling variable for the autoclitic is some aspect of the controlling relation for the primary response (e.g., mand, tact, etc.) which, itself, can serve as a stimulus. The reinforcement for emitting autoclitics, in general, is that they sharpen the effect of the primary verbal response upon the listener's behavior. As Skinner (1986) has suggested, when the effect of the primary verbal response is made more precise the listener can "behave in

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ways that are more likely to have reinforcing consequences, and hence more likely to promote reciprocally reinforcing consequences for the speaker'' (p. 120).

For example, if someone makes the statement, "I see it is raining" because he or she can see rain, *raining* would be considered the primary verbal response—a tact—which is under the control of the nonverbal stimulus rain. The autoclitic would be *I see*. Its controlling variable is, by definition, some aspect of the controlling relation for the response *raining*. In this case, the speaker is tacting the fact that he or she is emitting the primary response under the control of visual, rather than auditory, stimulation.

Skinner elaborated upon the autoclitic by describing five major categories: (1) descriptive autoclitics, (2) qualifying autoclitics, (3) quantifying autoclitics, (4) manipulative autoclitics, and (5) relational autoclitics. Examples were provided for all five types but the defining features must be inferred for some. While this material covers several chapters in the book, major points are summarized below.

According to Skinner (1957), the critical feature which defines descriptive autoclitics is that they are controlled by some aspect "of the circumstances in which a (primary) response is emitted or something of the condition of the speaker, including the strength of his verbal behavior" (p. 322). The example I see in "I see it is about to rain" as is an example of the descriptive autoclitic. Other descriptive autoclitics indicate that the primary verbal response is being emitted as an intraverbal but that it was originally acquired as a tact or textual response as in "I remember" or "I recall." Yet other descriptive autoclitics are controlled by the emotional condition of the speaker as in "I am happy to say....'

Qualifying autoclitics ''qualify the tact in such a way that the intensity or direction of the listener's behavior is modified'' (Skinner, 1957, p. 322). In Skinner's view it is this characteristic which distinguishes them from descriptive autoclitics, as descriptive autoclitics do not alter the nature of the listener's reaction. Subtypes include: (1) negation as in the response *not* in ''This is not red,'' when there is some stimulus strengthening the tendency to say *red* (e.g., the presence of an orange-red stimulus); (2) assertion as in the response, *IS* in "It IS raining," perhaps after someone else has just said that it isn't; (3) and type of tact extension as in the response *like* in "It is like a chair" which tacts the relationship between the response *chair* and the nonverbal stimulus (perhaps an unusual looking sculpture found in a modern museum of art) as somewhat weak.

A third type of autoclitic is the quantifying autoclitic. While Skinner did not clearly define the critical features of this type of autoclitic, he offers a number of examples including *all*, *the*, and *a*. The general function of autoclitics with respect to sharpening the effect of the speaker's primary verbal response upon the listener is evident when the responses "May I have a book?" and "May I have the book?" are considered.

Manipulative autoclitics enjoin the listener to carry out some behavior with respect to the primary verbal response. For example, in the response "John loves Mary and vice versa," the primary response "John loves Mary'' (which might be an intraverbal) is followed by the autoclitic vice versa which mands that the listener react to the unemitted "Mary loves John" in the same way as he or she responds to the emitted "John loves Mary." Additional examples would include "Take it from me," or when a speaker makes the responses quote and unquote to indicate that some part of the speaker's primary verbal response is someone else's verbal behavior. The critical feature is the presence of an establishing operation which makes it reinforcing to the speaker if the listener were to react to the primary verbal stimulus in a particular fashion.

Skinner also identified "relational autoclitics" which help the listener to react to the relationship between or among primary verbal responses. Relational autoclitics might include the s as in "The boy runs" indicating the agreement of "boy" and "run" and therefore their relationship to one another; more specifically, that it is the boy which possesses the property of running. A similar relational function is served by the s in "the boy's gun." Relational autoclitic processes can also operate along the quite different dimension of word order (syntax). For example, the order of "Bob sees Tom" is reversed when the relationship of these nonverbal stimuli is reversed (i.e., Tom is looking at Bob).

As in other sections of Verbal Behavior, Skinner carefully warns the reader that classification based upon response topography alone will result in a flawed analysis. While the following is not Skinner's example, it illustrates his general point. The response "like a mad dog'' is probably emitted as a unit under the stimulus conditions typically reinforced by the verbal community rather than as a complex response composed of tacts and autoclitics. In the latter case the autoclitic *like* would be controlled by the rather weak stimulus control evoking the tact mad dog. While the response "like a mad dog" is almost certainly emitted now simply as a tact, it must have originated as part of a tact/autoclitic relationship. Nevertheless, Skinner's own classification system for autoclitics seems to have certain topographical features; the resulting confusion has probably caused some readers to study this material less than thoroughly. For example, he offers I think as in the response "I think it is about to rain" as an example of the descriptive autoclitic because it is controlled by the (relatively weak) stimulus conditions evoking the speaker's primary verbal response of rain. However, this example does not seem functionally different from the response "It seems like it is about to rain," where seems like would be classified as an example of a qualifying autoclitic controlled by these same weak stimulus conditions. And his failure to define the essential features of quantifying autoclitics may have been due, in part, to the difficulty in distinguishing them from those of manipulative autoclitics.

In an attempt to deal with these problems, Peterson (1978) has proposed collapsing descriptive, qualifying, quantifying, and manipulative autoclitics into two categories: autoclitic tacts and autoclitic mands. The critical feature of Peterson's autoclitic tacts is that they are controlled by some nonverbal aspect of the relationship controlling the primary verbal response. Roughly speaking, Skinner's descriptive autoclitics and qualifying autoclitics are subsumed under the broader category "autoclitic tacts," whereas manipulative and quantifying autoclitics are labeled "autoclitic mands." The defining feature of Peterson's autoclitic mands is that they are controlled by establishing operations which make it reinforcing (for the speaker) if the listener were to alter his or her reaction to the primary verbal response. This analysis does seem more functionally-based and reduces

some of the ambiguity in Skinner's original scheme. However, further study must be done to see if anything of value is lost if this newer classification system is adopted.

While Skinner's book generated some debate and discussion (e.g., Chomsky, 1959) and continues to do so (e.g., Place, 1981) behavior analysts did not make much use of it until the 1970's. Around that time a series of studies began to address the validity and possible applications of Skinner's analysis. Much of the credit for these germinal studies must be given to Dr. Jack Michael who has for many years taught courses in verbal behavior at Western Michigan University. These initial investigations were conducted by his students, and focused, appropriately enough, on the elementary verbal relations. While Skinner never mentioned sign language in Verbal Behavior, these researchers recognized its potential both as an experimental vehicle and as an effective system with nonvocal populations. As a result, many of the original studies utilized sign language as a means to study Skinner's analysis while simultaneously enhancing the verbal repertoires of developmentally disabled and deaf children (e.g., Sundberg, Michael, & Peterson, 1977; Sundberg, Milani, & Partington, 1977).

Subsequent research carried out by Hall and Sundberg (1987) with developmentally disabled adults, Lamarre and Holland (1985) with nursery school children, and Lee and Pegler (1982) with elementary school children have validated Skinner's original notion about the independence of these various repertoires. Other lines of research have articulated procedures for generating these verbal relations (e.g., Halle, Marshall, & Spradlin, 1979; Halle, Baer, & Spradlin, 1981; Braam & Poling, 1983; Charlop, Schreibman, & Thibodeau, 1985; Carroll & Hesse, 1987; Sundberg, 1987), or examining characteristic differences among them (e.g., Sundberg, Milani, & Partington, 1977; Stafford, Sundberg, & Braam, 1988). Skinner's verbal operants have also been used to develop some basic verbal relations with pigeons (Michael, Whitley, & Hesse, 1983; Sundberg, 1985).

However, little experimental attention has been given to Skinner's treatment of autoclitics. Discussion of the autoclitic has been almost entirely at the theoretical level (e.g., Vargas, 1982; Skinner, 1986). However, Catania (1980) proposed a pigeon analogue experiment in an article which described the nature of some autoclitic processes.

The purpose of the present study was to conduct an experimental investigation of Skinner's ''qualifying autoclitic'' behavior and Peterson's (1978) "autoclitic tacts." More specifically, the type of autoclitic responses studied were those evoked by the weak stimulus control of a primary tact. The goals of the study were to: (a) determine whether or not these types of autoclitic responses, whose topographies were determined by the experimenters, could be trained in structured settings, (b) determine if such procedures would lead to generalized autoclitic responding, (c) identify the components of a program necessary to generate such behavior, and (d) attempt to clarify the nature of the autoclitic's controlling variables.

#### METHOD

#### Subjects and Setting

The subjects were four preschool children (two boys, two girls) aged four and five years old. All attended the Child Development Center at California State University, Stanislaus, three to five days each week. The subjects were identified for the experimenters by the Director of the Child Development Center on the basis of their generally cooperative behavior and average language skills. Parents were informed as to the nature of the study and parental permission was obtained. Sessions were conducted individually at the Center in a small room (2.5 m x 3 m x 2.5 m) which contained a table and two chairs.

#### Materials

The experimenters created two types of stimulus cards (all  $8 1/2'' \times 11''$ ) for nine concepts: (1) red, (2) square, (3) the letter ''L,'' (4) yellow, (5) circle, (6) the letter ''H,'' (7) blue, (8) triangle, and (9) the letter ''M.''

One type of stimulus card was utilized for tact training and was composed of unambiguous or generic examples of the particular concept. There were three different cards (each a slight variation) for each of the nine concepts. For example, there were three cards all colored various shades of red, but still all clearly red. Similarly there were three stimulus cards for the letter "L." Although all the "L"s were of the same general topography, the size of the "L" printed on the card varied from small, to medium, to large.

The second type of stimulus card was utilized during autoclitic probes and autoclitic training. These cards were distorted examples of the nine concepts. Three cards of this type were also prepared for each concept, each showing a slightly different distortion. For example the distorted concept cards for the color red were: (1) reddishpurple, (2) reddish-pink, and (3) reddishorange. Similar cards for the concept of "L" consisted of a card where the vertical line was rotated to a 45 degree angle and one where the vertical line was rotated to 135 degrees. The third distorted example for this concept consisted of a drawing of a 3-dimensional "L."

In addition to these nine concepts, stimulus cards were also developed for two nonsense concepts ''eek'' and ''shhh.'' Both of these concepts consisted of two-dimensional line drawings. Both ''eek'' and ''shhh'' concepts were presented on the same size cards as the preceding nine concepts and each was presented on three different cards with some slight variation. Similarly there were three cards which presented unusual or distorted examples of each nonsense concept.

#### Design

The design was a multiple-baseline across tasks with two main conditions: tact and autoclitic training. The nine concepts were grouped into three sets. Each set contained a color, a geometric shape, and a letter. Subjects were first trained to tact examples of concepts contained within a single set. They were then trained to make autoclitic responses to distorted examples of these same concepts. Training began by first training the color concept to criterion, then the geometric shape, and finally the letter. Because of time constraints only subject 1 was exposed to all three sets of stimulus cards, subjects 3 and 4 received training with two sets, and subject 2 received training with only 1 set of concepts. Sessions were conducted with individual subjects, rather than in a group, and held twice weekly. See Table 1 for the specific concepts and order of exposure for each subject.

 Table 1.

 Specific concepts and order of training for all subjects.

	SET 1	SET 2	SET 3
S1	Yellow Circle H	Red Square L	Blue Triangle M
S2	Yellow Circle H	Not Available For Training	Not Available For Training
S3	Red Square L	Yellow Circle H	Not Available For Training
<b>S</b> 4	Red Square L	Yellow Circle H	Not Available For Training

#### Observation and Reliability

The dependent measure was the subject's verbal response to the unambiguous and distorted example stimulus cards during training and probe trials. During tact training a correct response consisted of appropriately tacting the stimulus (e.g., "red" when a red stimulus card was shown) within 10 seconds of the start of the trial. Responses were scored as incorrect when there was either no response within 10 seconds or an inappropriate response form (e.g., "blue" in the presence of a red stimulus). A response during autoclitic training was considered correct only if it was of the standard topography modeled by the trainer (e.g., "like H'') during correction trials. However, some variations in response forms during the probe trials were scored as generalized autoclitics.

For example, if the autoclitic was of a different topography but appeared to be evoked primarily by weak stimulus control (e.g., "not a very good \_\_\_\_\_\_"), this response was scored as a generalized autoclitic providing that the tact response also was appropriate. In addition, responses partly composed of variant tacts were scored as generalized autoclitics if an autoclitic was also emitted and if the tact seemed appropriate. For example, one of the distorted stimulus cards for the concept "square" was a trapezoid with the pair of parallel lines at the top and bottom, with the shorter line on top, thus resembling a pyramid or triangle. Responses such as ''like a pyramid'' or ''like a triangle'' were scored as generalized autoclitics. However, if the tact did not seem appropriate (i.e., not controlled by the characteristics of the nonverbal stimulus) as in ''like L'' when presented with a distorted stimulus card for the concept ''red'' it was not scored as a generalized autoclitic.

All sessions were tape recorded. Audio tapes were randomly selected at a later date for review by an independent observer. The independent observer recorded each response verbatim on a data sheet that indicated the order of presentation for the stimulus cards. An agreement was defined as an exact match between the response recorded by the trainer and the independent observer. Scorings by the trainer (one of the experimenters) and the independent observer were compared by calculating the number of agreements divided by the number of agreements plus disagreements.

#### Procedure

Tact training. A session began with the trainer presenting one of the stimulus cards for that concept and then asking, "What is this?" If the subject emitted the appropriate tact (e.g., "red") within 10 seconds the trainer provided verbal praise and generalized conditioned reinforcement in the form of a "happy face" stamp. A few seconds later a new trial began with the presentation of one of the two remaining stimulus cards for that concept. If no response was given within 10 seconds, or an incorrect response was made, the experimenter modeled the correct response (e.g., "red") and withdrew the stimulus card. The stimulus card was re-presented a few seconds later and the trial repeated. All three cards for a particular concept were presented randomly in this fashion.

"Happy faces" were placed in a box on a sheet of  $8 \frac{1}{2}$ " x 11" paper with 120 boxes. Each time 10 boxes were filled, the subject could choose to draw a picture, complete a dot-to-dot picture, paste paper dolls, or sing for a few minutes. Criterion for a particular task was considered met when the subject's responses to these stimulus cards was 90% or greater for two consecutive sessions. However, if a session had to be terminated early because the subject needed to participate in some activity at the Center, the session was not counted towards criterion. When criterion was reached, tact training began for the second concept in a set with the stimulus cards from the previously mastered discrimination from that set randomly presented along with those for the new discrimination. This same training procedure and criterion were utilized for the third remaining concept in each set.

Each third tact training trial resulted in the trainer randomly presenting one of the three distorted examples for each of the three concepts in that set. Each of these stimulus cards was presented once during a session and in the same way as during a training trial (i.e., the trainer asked, "What is this?") However, responses were simply recorded and not consequated in any particular way.

Autoclitic training. After subjects had met criterion for tact training for all three concepts within a set, autoclitic training began. As with tact training, autoclitic training began with a single concept and training continued with examples of this concept until criterion was reached. Subjects were first trained to make autoclitic responses to distorted examples of the first concept (i.e., a color) that they had been trained to tact during tact training.

All autoclitic training sessions began with a tact review of the concepts contained in that particular set. The trainer presented stimulus cards which the subject had previously been trained to tact. Correct responses were followed by verbal praise, a "happy face," and eventually the activity reinforcement. Incorrect responses were followed by a modeled "correct" response and the trial was repeated a few seconds later. When the subjects's accuracy reached 80% correct, autoclitic training began with the presentation of one of the three distorted examples of the particular concept being trained. The trainer then asked, "What is this?" If the subject made an acceptable autoclitic response, reinforcement identical to that provided during tact training followed and a new trial began. If subjects did not respond within 10 seconds or gave an unacceptable response, the experimenter modeled the correct response (e.g., "like red") and withdrew the stimulus card. This same card was presented again a few seconds later when a

new trial began. All three distorted examples of the autoclitic concept being trained were presented randomly until criterion was met. Criterion for a particular task was 90% correct responses to all stimulus cards for two consecutive sessions. Autoclitic training began on the second concept after criterion was reached on the first concept of that set. Stimulus cards from the previous autoclitic training task were presented randomly along with those for the new discrimination. When criterion was reached on the second concept, autoclitic training began with the third concept using this same procedure.

Autoclitic probes during this phase were identical to those conducted during tact training with the following exception: only stimulus cards that portrayed examples of concepts (within that set) to which the subject had not yet been trained to make autoclitic responses were presented. If a subject was currently being trained to make autoclitic responses to all three concepts within a set then no probes were conducted.

When autoclitic training had been conducted for all three concepts within a set, the same general procedure (tact training followed by autoclitic training) began with the next set of concepts.

Tact and autoclitic training sessions lasted for approximately 20 minutes and ended when a subject was presented with 36 training trials and 9 autoclitic probes. However, when no probe trials were conducted (phases when autoclitic training was in effect for all 3 concepts within a set) a session terminated after 45 training trials.

Random order control test. Several days after a subject finished tact and autoclitic training for one, two, or three sets (Subjects 2, 3 and 4, and 1, respectively) a review of all trained discriminations (both generic and distorted concept examples) was conducted. Each stimulus card was presented once in a random order. The subjects were simply shown the card and asked, "What is this?" Correct responses were reinforced in the manner previously described during tact and autoclitic training; incorrect responses were not consequated or prompted.

Nonsense concept series. Following the random order control test, subjects were exposed to two nonsense concepts. Subjects

were shown one of the stimulus cards for one of the nonsense concepts as the trainer modeled the correct tact (e.g., "This is shhh''). After the first example, the remaining two stimulus cards for that concept were simply presented to the subjects and they were asked, "What is this?" with no further prompting or correction. Following the presentation of these three stimulus cards, the three distorted examples of the concept were immediately presented and the subjects were again asked, "What is this?" Correct responses (whether to generic or distorted examples) were reinforced with verbal praise and "happy face" stamps but incorrect responses were not consequated (i.e., the trial simply ended). This identical procedure was utilized with the second nonsense concept.

#### RESULTS

#### Reliability

Measures of reliability were obtained during 55 sessions (43% of the total number of sessions for all subjects). Twenty-five of the reliability checks were during tact training and 30 occurred during autoclitic training. The average reliability for all sessions was 98% with a range from 86% to 100%.

#### Percentage of Correct Responses and Generalized Autoclitic Responses

Figures 1 and 2 show the percentage of correct responses made on training trials as well as the cumulative number of generalized autoclitics emitted during probe trials for all subjects.

S1 was the only subject available to complete training on all three sets of concepts. Correct responses averaged 97% during training although accuracy was somewhat higher during tact training than during autoclitic training (99% and 95% respectively). S1 made a total of 47 generalized autoclitic responses during probe trials with the first generalized autoclitic emitted during the second session of autoclitic training with the first concept. However, many of the responses during probe trials continued to consist simply of tacts previously reinforced during tact training (e.g., "L") or responses whose control was unknown (e.g., brown). The number of generalized autoclitics did



Fig. 1. Percentage of correct responses during training and cumulative number of generalized autoclitics during probes for S1 and S2.

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not increase substantially until autoclitic training with the second set of concepts was almost completed. Thirty-nine of the total number of autoclitics made were emitted after this subject had received autoclitic training on four concepts and was undergoing training with the fifth. (See Figure 1.)

S2, who was available only for training with one set of concepts, averaged 96% correct responses during training with the percentage of correct responses somewhat lower during tact (94%) than autoclitic training (97%). The lower percentage during tact training seemed primarily due to the fact that responses during the initial training sessions were controlled by other nonverbal stimuli. For example, the subject repeatedly made the response "paper" rather than "yellow" when presented with the stimulus cards for the concept yellow. This subject made no generalized autoclitic responses until autoclitic training began with the second concept (session 11). Once this training began, this subject made generalized autoclitic responses on all probe trials, for a total of 18 generalized autoclitics (see Figure 1).

Figure 2 shows the data obtained for S3. This subject's overall percentage of correct responses averaged 89% with responses during autoclitic training less accurate (86%) than during tact training (93%). Thirteen sessions were required before criterion was reached when autoclitic responses to all three concepts from set 1 were required. Errors consisted primarily of emitting reinforcible topographies (e.g., "like red") but in the presence of inappropriate stimuli (e.g., distorted example of concept "square"). Like the previous two subjects, S3 did not make any autoclitic responses until after autoclitic training had begun. The rate at which autoclitic responses were emitted was fairly low until autoclitic training began with the second set of concepts. Seven of the 20 autoclitics emitted by this subject were made during these four sessions and suggest that the subject was beginning to acquire generalized autoclitic behavior. However, this subject was not available for training with the third set of concepts.

S4 averaged 94% on all training trials with responses during tact training slightly more accurate (96%) than responses during autoclitic training (92%). (See Figure 2.) Unlike the other subjects, S4 made 4 autoclitic responses prior to receiving autoclitic training. However, no additional autoclitics were emitted during autoclitic training with the first concept (red). But once autoclitic training began with the second concept, the rate of generalized autoclitics increased. The rate of responses further increased when autoclitic training began on the second, and for this subject, final set of concepts. The total number of generalized autoclitics emitted by S4 was 53.

While all subjects emitted generalized autoclitics of the form modeled during correction procedures and reinforced during autoclitic training (i.e., "like"), two of the subjects (S1 and S4) occasionally responded with different topographies (e.g., "not a very good \_\_\_\_\_," "seems like part of a \_\_\_\_\_"). These variant response forms, however, occurred only on 26 trials. Variations also occurred in the primary tact response with all subjects but S2. This type of response variation (e.g., *like a tepee* when shown a distorted example for the concept "triangle") occurred on 46 probe trials.

Responses during probe trials which were not scored as generalized autoclitics tended to fall into one of six categories: (1) an appropriate and previously reinforced tact response without an accompanying autoclitic (e.g., red when a reddish-orange stimulus was shown), (2) an appropriate tact response without an accompanying autoclitic; however, the response topography was not one reinforced during training (e.g., pyramid or cloud when shown distorted examples of square and circle), (3) a tact response without an accompanying autoclitic; however, the response topography, though one that had been reinforced during training, was inappropriate (e.g., red when a distorted stimulus card for the concept "square" was shown), (4) an autoclitic response accompanied by an inappropriate tact response (e.g., like red when a distorted example of "L" was shown), (5) a response whose control was unknown (e.g., brown or hot pink when shown distorted stimulus cards for the concepts "blue" and "square"), (6) a response indicative of no strong stimulus control (e.g., "I don't know").

The exact proportion of responses from these six categories which were not scored as generalized autoclitics varied for each sub-



Fig. 2. Percentage of correct responses during training and cumulative number of generalized autoclitics during probes for S3 and S4.

ject. However, more than 60% tended to be of the first two types for all subjects.

Random order control test. Table 2 shows the percentage of accuracy for all subjects during the random order control test. All subjects demonstrated retention of the trained discriminations. S1 performed with 96% accuracy with both the generic and distorted stimulus cards. Both S2 and S4 demonstrated 100% accuracy with both types of stimulus cards. S3 responses were 100% accurate with respect to the distorted examples, and 83% with the generic stimulus cards.

Nonsense concept series. With the exception of S3, all subjects made correct tact responses to both nonsense concepts when the generic stimulus cards were presented. S3 made correct responses only on 50% of the trials. However, the percentage of correct autoclitic responses made to distorted stimulus examples varied for each subject. S1 and S4 made appropriate autoclitic responses on 66% of the trials, and S2 was correct for 50%

#### Table 2.

Percentage of correct responses during random order control test.

	GENERIC EXAMPLES	DISTORTED EXAMPLES
S1	96%	96%
S2	100%	100%
<b>S</b> 3	83%	100%
<b>S</b> 4	100%	100%

Table 3. Percentage of correct responses during nonsense concept series.

	GENERIC EXAMPLES	DISTORTED EXAMPLES
S1	100%	66%
<b>S</b> 2	100%	50%
<b>S</b> 3	53%	0%
<b>S</b> 4	100%	66%

of the trials. None of the responses emitted by S3 to distorted example trials were correct (see Table 3). Thus, despite earlier demonstrations of generalized autoclitic responding, subjects did not demonstrate similar behavior with the less familiar nonsense concepts.

#### DISCUSSION

The results of this study show that autoclitic behavior evoked by weak stimulus control of a primary tact can be trained in a structured setting. All subjects acquired generalized autoclitic behavior as demonstrated by the number of scorable responses emitted during probe trials. In addition, three of the four subjects also showed generalization along the dimension of response topography. Subjects either emitted: (1) autoclitics of weakness whose response forms had never been reinforced during autoclitic training, and/or (2) tacts that, while appropriate, had never been reinforced during tact training.

However, it is important to note that (1) the emission of these variant autoclitics of weakness, as well as (2) the rapidity with which three of the subjects acquired generalized autoclitic responding suggest that the experimenters were able to take advantage of some prior training. It seems likely that at least some of the subjects had previously engaged in "passive learning" with stimuli similar to those used in the present study. For example, the children may have been told to hand someone an object with which they were not familiar by being asked "Please give me that thing that is like a ball," or "Hand me that thing that is kind of a ball." Such experiences, in and of themselves, were not sufficient to generate autoclitic behavior as evidenced by performance during early probe trials. However, once training was provided, the subjects were able to respond, not just as listeners, but also as speakers.

Having trained generalized autoclitic behavior, it is now possible to begin considering some of the variables relevant to that training. Two issues seem to emerge. First, the data from all subjects indicate that the ability to tact some stimulus in and of itself is not sufficient to evoke autoclitic behavior when similar but distorted examples are presented. Only S4 emitted autoclitics having received only tact training, and these were few in number. Second, autoclitic training needs to be conducted with more than one concept before generalization is likely to occur. Only after having received autoclitic training with at least two concepts (and for S3 several more) did any of the subjects begin to demonstrate any substantial increase in correct response forms during probe trials. Therefore, it seems likely that many of the responses emitted during autoclitic training trials were, at least initially, just primary tacts with more complicated response forms. However, once training began with additional concepts, subjects began making a secondary discrimination (weakness of the primary verbal response). For two of the subjects (S2 and S4) this apparently occurred after receiving autoclitic training with the second concept. For S1 this discrimination was apparently further sharpened after receiving autoclitic training with two more concepts. S1, S2, and S4 acquired these discriminations fairly readily as demonstrated by the fact that it usually required only two sessions to meet criterion for a particular concept. The data from S3, however, show a different pattern of acquisition.

This subject emitted three scorable responses during probe trials while undergoing autoclitic training with the first concept (red). Four more were emitted while undergoing autoclitic training with "red" and "square." These responses were emitted during the four sessions required before meeting criterion. This was one session more than was required for S4 and two more than required for either S1 or S2. S3 then proceeded to require 13 sessions before meeting criterion when autoclitic training was conducted with all three concepts in the first set. This is in contrast to S1 and S2 who required only two sessions, and S4 who required three.

Subject 3's difficulty in this phase of training may be partially explained by emphasizing the behavior required during autoclitic training trials and probes. Each trial required the subjects to make a response under multiple stimulus control. First, subjects had to respond to the characteristics of the nonverbal stimulus which controlled the primary tact response; second, subjects had to be affected by the weakness of this control. S3 had difficulty doing this on a consistent basis. When responses were incorrect, it appeared they were controlled by one stimulus feature but not both. Seventy percent of the incorrect responses made during these 13 sessions consisted of making the (appropriate) tact response only. The remaining 30% consisted of the appropriate autoclitic (i.e., like) accompanied by an inappropriate tact. However, mastery of these tasks, which were associated with the first set of concepts, did not result in much additional autoclitic behavior during probes while tact training was conducted with the second set of concepts.

There are at least two possible explanations for this phenomenon: (1) the relatively high rate of errors made during autoclitic training for the first set of concepts impeded the emission of autoclitic responses to distorted examples in the second set. That is, the difficulty this subject had in making the multiple discriminations required during autoclitic training with the first set of concepts resulted in similar difficulties when presented with similar discriminations during probe trials with the second set of concepts. This would be consistent with the findings of other researchers who have observed problems in the acquisition of related discriminations following an errorful history (e.g., Sidman & Stoddard, 1967; Touchette, 1971; Reese, Howard, & Rosenberger, 1977). Reasons for the difficulty of these discriminations probably extend beyond the fact that multiple discriminations were required and are discussed later. (2) Membership within a particular set of concepts (i.e., the first set) was treated as a relevant, rather than an irrelevant, feature for discriminating weakness of control. Thus, when the subject began receiving training with the first concept in the second set, the subject would learn that such membership was not critical to the discrimination. In fact, this subject did begin to make scorable autoclitic/tact tesponses during the probe trials at an increased rate while autoclitic training for the first concept in the second set was being conducted. However, since the rate at which autoclitics were emitted during probe trials during this phase was lower than those of the other subjects, it is possible that both of these explanations are applicable. The latter explanation may also be relevant to the increased rate of autoclitics by S2 and S4 when autoclitic training began with the second concept in the first set. However, with these subjects, control by the weakness feature was apparently restricted to a few concepts rather than a set of concepts. S1's performance was more similar to that of S3; the most substantial increase in generalized autoclitics occurred in the middle of autoclitic training with the second set of concepts.

An interesting complexity occurs when an attempt is made to analyze the exact nature of the stimulus that evokes autoclitics of weakness. The nonverbal stimuli which evoke many tacts typically lie outside the skin of the speaker. For example, the tact *red* is usually controlled by the wave length of some stimulus which stimulates the receptors of other individuals besides the speaker. The public nature of these stimuli facilitates tact acquisition by allowing a trainer to consequate the learner's responses depending upon the presence or absence of some nonverbal stimulus. However, the stimuli which evoke autoclitics of weakness are, as Skinner (1957) has suggested, probably private. Consider the response like red which is part autoclitic and part tact. The stimulus which controls the response *red* is easy to identify, the stimulus which controls the response *like*, however, is more difficult. There is no particular characteristic of the nonverbal stimulus that one can point to and say, "It is this dimension which is controlling the autoclitic like." A strictly methodological approach might involve an operational definition that describes a certain deviation from a standard nonverbal stimulus but that account seems incomplete.

Given that it is difficult to identify a public stimulus which evokes autoclitics of weakness, it seems reasonable to assume that the speaker is reacting to some private stimulation related to the reduced tendency to make the primary tact response. The very fact that this stimulus is private suggests that training is going to be more difficult. And this task may be even more difficult than some others which involve training the speaker to tact private events.

Skinner (1957) has identified four methods by which individuals can be trained to talk about private events. The one he termed "public accompaniment" was used in the present study. This methodology requires that some public stimulus be reliably correlated with some private stimulation. For example, if a trainer observes a learner being hit by a ball (the public stimulus) the probability is high that the learner is also experiencing some private painful stimulation. The trainer can then teach the learner to tact that stimulation as *pain* even though the trainer does not have access to the private stimulation.

In this study the public stimulus was the distorted example and the private stimulation was related to some aspect of the weak controlling relation. Two of the variables that may determine the effectiveness of public accompaniment are: (1) the magnitude of the private stimulation, and (2) the reliability of the correlation between the public stimulus and the private stimulus.

It may well be that the magnitude of private stimulation related to the weakness of the primary tact is relatively small in comparison to other private events such as pain. Even more potentially problematic is the fact that the strength of the correlation between the public and private stimuli is probably largely dependent upon the learning history of each individual with respect to the primary tact.

Therefore, there are at least two situations where a low rate of autoclitics of weakness would be anticipated due to the absence of a strong correlation between public and private stimuli. One is when the defining features of a concept are not well-established (lack of agreement in the verbal community as to the criterion for classifying some stimulus as an example or non-example of a concept). However, the absence of autoclitics in these situations probably poses no special difficulty or the verbal community would have arranged contingencies to generate them. But the second, and more critical, case is when an individual has not learned to tact some nonverbal stimulus accurately yet the verbal community differentially reinforces autoclitics controlled by the strength of the primary tact. The ability to be differentially affected by weakness of control requires that the individual experience strong control by other similar (unambiguous) nonverbal stimuli and tact it as such. Without this kind of history there would be little chance of the individual differentially responding to private stimulation related to weak stimulus control.

This would also suggest that whether or not an individual emits autoclitic responses with respect to some stimulus is dependent upon that individual's learning history with respect to highly similar stimuli. For example, an individual might emit generalized autoclitics of weakness to a variety of nonverbal stimuli (e.g., heat, blue, etc.) but fail to emit this same behavior when presented with unusual examples of other concepts (e.g., donkey, smooth, etc.). The probability of doing so would be directly related to the individual's tacting history with respect to those concepts. In this study, three of the subjects were able to accurately tact the two nonsense concepts during the test trials. However, none of the subjects reliably emitted appropriate autoclitic responses when presented with distorted examples of these same concepts. Failure to do so, despite previous evidence of generalized autoclitic responding, probably resulted from an inadequate history with respect to these particular concepts.

These issues are likely to have some bearing upon training. First, it seems reasonable to suggest that autoclitic training be conducted only with those stimuli whose classification is agreed upon by the verbal community. Second, autoclitic training should be preceded by a demonstration that the primary response is under strong control by the nonverbal stimulus. The subjects in this experiment had already acquired a strong tacting repertoire in general and probably with respect to the specific nonverbal stimuli utilized in this study. The fact that these tacting repertoires were already established probably facilitated the acquisition of related autoclitics.

Related to this issue is the notion that tact training should encompass the range of stimuli routinely classified as exemplars of a particular concept. But additional research is needed to assess these recommendations along with investigations about other details of training. For example, it may well be that combining the training of autoclitics of strength (assertion) such as very with the training of autoclitics of weakness is a more efficacious method for training both types. Or that interspersing the stimulus cards utilized during tact training with those presented during autoclitic training would help learners more easily come under the control of variations in the strength of control. A further refinement might involve training subjects to react appropriately to the "null case" as well. That is, subjects would be presented not just with stimuli likely to exert either strong or weak control over tacting behavior but also stimuli which strengthen no particular response at all. During these trials subjects might be trained to react to the absence of stimulus control by saying, "I don't know." In the present study, subjects were reinforced for making either a tact response or a tact accompanied by an autoclitic. Such an arrangement might have inadvertently reinforced some random responses. However, including the "null case" might not only reduce guessing but also render the subjects more easily affected by variations in the strength of control by the nonverbal stimulus. Finally, the usefulness of procedures which promote stimulus equivalence (e.g., Sidman, Cresson, & Willson-Morris, 1974) should also be investigated as a means for rapid acquisition of autoclitics which vary in topography but share the same controlling variables.

It is clear that most children acquire autoclitics of weakness without participating in special training programs. However, the verbal repertoires of many developmentally delayed individuals are impoverished by the absence of such secondary verbal behavior. There are language training programs available which teach relational autoclitic processes fairly well (e.g., DISTAR Language), but further investigation is needed before procedures which efficaciously teach all forms of autoclitic behavior can be identified. In addition, the experimental analysis of autoclitic behavior may prove to be a useful vehicle for studying part of "the world within the skin'' at the basic research level.

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