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GENERALIZATION OF SAY-DO CORRESPONDENCE

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Say-do correspondence training establishes a relation between what a person says and then does, or does and then reports. The conditions that establish the generalized form of this behavior-behavior relation have not been thoroughly investigated. The current study analyzes two conditions, or types of histories, giving rise to the generalization of say-do correspondence. Eleven preschool children, ages 3 years, 10 months to 5 years, participated. Two baseline phases showed the lack of say-do correspondence in four behaviors, two similar and two dissimilar, with the second baseline involving social consequences contingent upon saying what to do. Next, differential consequences were applied to the say-do correspondence relation in Behavior 1. Subsequently, say-do correspondence was maintained under two conditions with 6 and 5 children participating, respectively. In both conditions consequences were equally thinned but in Condition 1, saying was kept in a vocal modality (as during training) and, in Condition 2, saying was changed from a vocal to a symbolic modality. Generalized say-do correspondence of untrained behaviors was then tested. Considering the first trial for each behavior, greater generalization was observed in the symbolic condition. Observation of the children's behavior in this condition indicated that the type of symbolic saying response used in the current study permitted the transfer of the stimulus properties of saying from the saying to the doing context.

Say-do correspondence training establishes an arbitrary relation between what a person says and does, or does and then reports (Baer, Detrich, & Wenginger, 1988; Israel & O'Leary, 1973). To explain these

This research was conducted in the kindergarten Fábula, Granada. We thank the teachers, Jose Fernández Echeverría and Nuria García Pallás, for their help and to all the students who participated for their careful observations. This research was conducted when the first two authors were affiliated with the University of Granada, and it was presented at the Easter Conference (London, April, 1991). We thank Professor Charles A. Catania for his comments on a first view of these data and Professor Lyle Grant and Claire Hamilton for their comments and help with the English language on one of the drafts of this manuscript. Correspondence concerning this article should be addressed to M. Carmen Luciano, Departamento de Personalidad, Evaluación y Tratamiento Psicológicos Facultad de Humanidades, Universidad de Almería, 04120 Almería, Spain. (E-mail: mluciano@ual.es).

arbitrary relations is to identify the conditions under which the say-do relationship is learned and generalized. Experiments on say-do-report correspondence have normally been conducted with children who are prompted to promise what to do. For example, the experimenter might ask the child, "During play time, what are you going to play with, the doll or the ball?" When the child replies, the experimenter may then repeat back what the child said (i.e., "You said that . . ."). When play time is over, the experimenter may then say to the child, "You said that you would play with the ball and you did, so here is a token because you did what you said." Alternatively, the experimenter may say to the child "You said that you would play with the ball and you did not, so I can not give you a token because you did not do what you said." Say-do procedures have not only differed in the way the subject says what he or she would do, but in the way or moment that reinforcement is provided for the say-do-report correspondence. However, it is generally accepted that the say-do arbitrary relation is established through differential consequences for correspondence and noncorrespondence (see reviews in Dymond & Barnes, 1997; Herruzo & Luciano, 1994; Luciano, 1993; Paniagua & Black, 1990; Ward & Stare, 1990).

The nature of the say-do-report relationship has been examined by a number of researchers. For example, Matthews, Shimoff, and Catania (1987) used a contingency space analysis to define say-do correspondence "as a class only on the basis of observing a population of opportunities for say/do sequences in which the subject sometimes does not say" (p. 70), whereas Stokes, Osnes, and Guevremont (1987) pointed to the role of the verbalization. Other investigators (Baer et al., 1988; Rogers-Warren & Baer, 1976) have emphasized the role of the experimenter's prompt or subsequent reinforcement, and they have examined the possibility that "the child's verbalization actually exerts no functional control and when it does, it may not matter whether the child or the experimenter emits the verbalization" (Baer et al., 1988, pp. 353-354).

Perhaps one of the more important issues that has arisen from research in this area is the distinction between maintenance and generalization of the say-do-report relationship. Studies focused on maintenance indicate that it is possible to maintain correspondence by simply reinforcing the verbalization (Baer, Blount, Detrich, & Stokes, 1987; Baer, Williams, Osnes, & Stokes, 1984; Guevremont, Osnes, & Stokes, 1986b; Osnes, Guevremont, & Stokes, 1986; Paniagua & Black, 1990; Ward & Stare, 1990; Whitman, Scibak, Butler, Richter, & Johnson, 1982) or through intermittent reinforcement of the correspondence (Baer et al., 1987) and indiscriminable or almost random contingencies (Guevremont et al., 1986b). Research into the generalization of say-do correspondence has suggested that a number of variables may be involved in promoting successful generalization (Guevremont et al., 1986a; Rogers-Warren & Baer, 1976; Whitman et al., 1982). For example, some common element seems important from the training context to the new context, such as the presence of observers or the experimenter's

prompt (Baer et al., 1988; Paniagua & Baer, 1982), or the specific reinforcement of the verbalization (Ward & Stare, 1990). Furthermore, some evidence suggests that generalization of say-do-report correspondence may be a function of stimulus generalization (Williams & Stokes, 1982).

Hence, one of the most relevant areas—generalization of say-do to novel behavior—requires further research, that is, the analysis of conditions under which is produced say-do generalization to behaviors that are similar and dissimilar to those used during the explicit training of say-do correspondence, that is, the formation of say-do as a generalized operant class (Barnes-Holmes & Barnes-Holmes, 2000; Luciano, 1996). Research into this type of generalization has produced inconsistent results, but when generalization does occur, investigators have pointed to common elements between the trained behavior and the new behaviors, or to having trained different exemplars with indiscriminable contingencies, as the basis for generalization (Guevremont et al., 1986a; Risley & Hart, 1968; Williams & Stokes, 1982). The formation of a rule has been also indicated (Deacon & Konarski, 1987; Paniagua & Black, 1990; Stokes et al., 1987; Ward & Stare, 1990) based on the fact that in most of the studies the experimenter says something like “because you said and you did, then . . .” or “because you said that and you did not . . .” while implementing differential consequences for say-do correspondence (Deacon & Konarski, 1987). Moreover, this type of generalization might also be conceptualized in the same way as generalized imitative responding (Baer, Peterson, & Sherman, 1967) or as any other abstracted relational response class (Barnes-Holmes & Barnes-Holmes, 2000; Hayes, Gifford, & Wilson, 1996; Luciano, 1996, in press). In this case, the context of saying would be discriminative-like for doing, irrespective of the content of the verbalization. In other words, saying “I will do X” for the first time (Andronis, 1991; Luciano, 1993, in press) may have discriminative-like properties or derived functions “for doing X” even though X has nothing formally or physically in common with previously directly trained say-do relations (see Dymond & Barnes, 1994, 1995, 1996). Insofar as this interpretation is correct, when a description about doing X shows derived discriminative-like properties *for the first time*, both the description and the doing may be defined as verbal events (Hayes & Hayes, 1989; see also Dymond & Barnes, 1994, 1995, 1996). In any case, generalized say-do correspondence is one of the most important outcomes from an applied perspective (Baer et al., 1988), and additional experimental evidence is clearly needed to elucidate the variables involved in this form of correspondence.

The present study focuses on analyzing the conditions giving rise to the generalization of say-do-report correspondence from a directly trained behavior to both similar and dissimilar behaviors. Say-do correspondence was first generated in children using three types of responses with the same automatic and similar social consequences. Say-do correspondence was then maintained under two conditions that

differed in the modality employed by the subject to describe what she or he would do (in one case, the modality was spoken, and in the other it was symbolic on a piece of paper) and in the physical context where saying was produced. Finally, tests were conducted to determine whether generalization of say-do correspondence would occur from the trained behavior to three other behaviors that were topographically similar and dissimilar to the one trained.

Method

Participants

Eleven children, ranging in age from 3 years, 10 months to 5 years, 1 month participated. They were enrolled in two preschool classes and showed normal verbal and motor development as measured by the Portage Guide (Bluma, Shearer, Frohman, & Hilliard, 1978). In addition, they showed comprehension of the relationship between what was said and what was done, but did not show any say-do correspondence relationships (see Procedures below).

Setting and Materials

Sessions were conducted in the school 5 days a week. Several rooms were used at different times and for different behaviors. One room (2 x 2 m), the say-setting, was used for the verbal interactions between the child and the experimenter, and another four rooms were used as settings for doing or performing the different behaviors. The characteristics of each room and specific materials in each of them is described in the following section. Additionally, toys, surprise envelopes, tokens, and other tangible stimuli were used.

Definition and Measures of the Say-Do Relations

Behavior 1 (B1) occurred in a room (4 x 7 m) with a large table (1.5 x 1 m) with toys placed on top (plastic cars and trucks, small dolls, stuffed animals, puzzles). A white cardboard panel (30 cm x 20 cm) was also placed on the table. Two observers sat apart from each other (neither could see the other's data sheet). The panel had three identical figures placed in three spatial positions on the vertical (top, middle, and bottom) and four figures placed around the identical figures (see Figure 1). The three identical figures served as relevant stimuli for Target Behavior 1, while the other stimuli on the panel, and the toys on the table, served as other possible stimuli for responding. The procedure for observing a say-do relation involved asking the child in the say-setting about the figure that he or she would touch (the actual dialogue is indicated in the Procedure section), and then bringing the child into the do-setting room. Say-do correspondence was recorded on each trial. That is, the experimenter recorded (a) the content of what the subject said that she or he would do, and two observers recorded (b) what the subject actually did in the do-setting, (c) the response to the say-do relationship when asked by the experimenter, and (d) the type of consequences given by the experimenter.

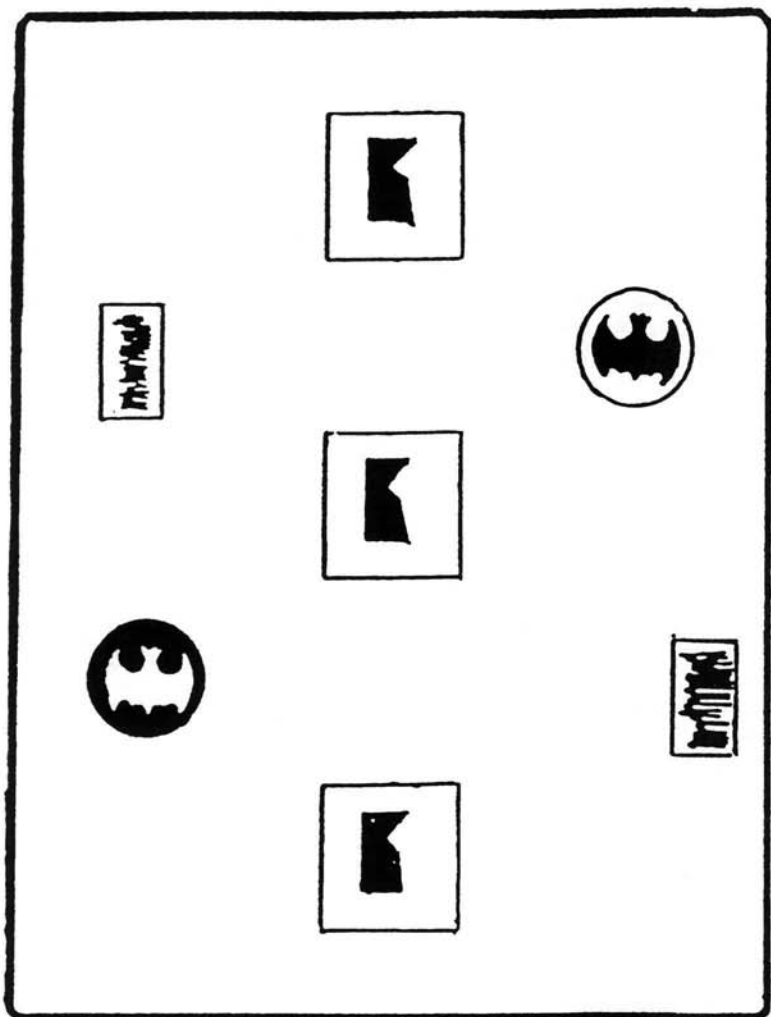


Figure 1. Panel used with Behavior 1. The three equal response locations appeared in the center column of the paper (at the top, middle, and bottom). Other stimuli appeared on both sides.

Behavior 2 (B2) occurred in a different room (3 x 4 m) with other toys on a different table and different observers from those employed with B1. There was a pencil on the table and a bookcase with three shelves by the table. The procedure for observing a say-do relation involved asking the child, in the say-setting, about the shelf onto which the child would put the pencil (the actual dialogue is presented in the Procedure section), and then bringing the child into the room (the do-setting) for B2. The trial continued as specified for B1.

Behavior 3 (B3) occurred in a different room (4 x 4 m), with a table containing toys different from the ones used with B1 and B2. Two different observers (from B1 and B2) sat separately in the room. An apple, a small chair, and a book were on the floor. Observing a say-do relation involved asking the child in the say-setting about the object that he or she would pick up and put on the table (the actual dialogue is presented in the Procedure section), and then bringing the child into the room (the do-setting) for B3. The trial continued as specified for B1.

Behavior 4 (B4) occurred in the school corridor (1.5 x 7 m) with different observers from B1, B2, and B3, who sat at opposite sides of the corridor. A table was placed at the end of the corridor with toys other than the ones used with the other behaviors. There were two doors (one yellow and one green) on one side of the corridor. The procedure for observing a say-do relation involved asking the child in the say-setting about the door to which she or he would go (the actual dialogue is presented in the Procedure section), and then bringing the child into the corridor (the do-setting for B4). The trial continued as specified for B1.

There were common and uncommon properties among the four types of behaviors that were used to examine say-do relations. Behavior 1 involved touching one of the figures on the panel, whereas Behavior 2 involved the same vocal response with regard to spatial positions but differed in the setting and in the specific nonvocal topography (pointing to one of the shapes in the panel versus picking up a pencil and placing it on a shelf). Behavior 3 involved picking up an object and putting it on the table, and Behavior 4 involved going to one of two colored doors. These last two were conceptualized as not sharing common properties with each other, or with the other behaviors, either in the words used to name the objects or in the movements required to do them.

Design

Before the main part of the experiment commenced, 12 baseline trials were conducted for the four types of behaviors (each including different response forms) in a multiple baseline across behaviors. The two baseline conditions differed, in that in the second one saying what to do was specifically followed by social consequences for several trials for Behavior 1 and for one trial for the other behaviors, whereas in the first baseline, saying only was followed by inviting the subject to go to the do-setting. Children who showed say-do correspondence in either of these two baseline phases were excluded from the experiment at this point. Say-do correspondence training for B1 followed and after the training criteria was achieved, maintenance followed but in two conditions within subjects. That is, 5 subjects followed maintenance with the thinning of consequences and keeping saying as during correspondence training (Condition 1: vocal saying), and 6 subjects followed maintenance with the thinning of consequences and the change of the conditions under which saying was produced (Condition 2: symbolic saying). Finally, tests for say-do generalization to Behaviors 2, 3, and 4 were successively conducted.

Procedures

Pretesting for comprehension of say-do relations. All subjects were individually preexposed to five different say-do relations that consisted of an adult who said he or she was going to do something and immediately did either this or did something different. For example, the adult said "I am going to close my eyes" and then either closed his or her eyes (say-do correspondence) or touched his or her nose (say-do noncorrespondence). The child was then required to answer correctly, "yes" or "no," to the question, "Have I done what I said?" for the five trials. Of the 20 children who achieved the criterion, only 11 continued for experimental reasons, as indicated below.

First baseline (BL1). Each child was permitted to play in the setting of Behavior 1 for 2 minutes before beginning the first baseline trial. From this point on, experimental sessions took place daily, Monday through Friday, between 10 a.m. to 1 p.m. for all children. Twelve baseline trials per child were conducted in the same morning, in two separate blocks, each of six trials. Three trials for B1 were followed by three trials for B2. The child was then returned to the classroom and approximately 1 hour later, three baseline trials for B3, followed by three baseline trials for B4, were conducted in the same way as for B1 and B2. A trial began when the child was brought into the say- setting and was asked to sit on a chair opposite the experimenter. The dialogue for Behavior 1 was as follows:

Experimenter (Exp.): In the other room, there is a panel with three identical figures placed at the top, in the middle, and at the bottom, "What figure are you going to touch in the other room, the figure in the middle, at the top, or at the bottom?" (prompts were given if necessary until a correct sentence as below was produced).

Child: "I am going to touch the figure at/in . . ." (one of the three locations).

Exp.: "Well, let's go to the other room" (the experimenter accompanied the child to the room, told her to play for a minute, and left).

The do period ended when the child touched any of the figures or spent 1 min playing with some toy or was involved in any other activity. One of the observers then accompanied the child to the say-setting by saying "Let's go" in order to begin a new baseline trial. Those parts of the dialogues for the baseline trials with B2, B3, and B4, that differed from the dialogue for B1 are presented subsequently:

The dialogue for Behavior 2 was:

Exp.: "You just saw what Nuria (the staff member) showed you, that is, the shelf and a pencil on the table" (this sentence was only provided in the first trial). "When you come into that room, on what shelf (at the top, in the middle, or at the bottom) are you going to put the pencil?"

Child: "I am going to put the pencil on the shelf at/in . . ." (one of the three locations).

The dialogue for Behavior 3 was:

Exp.: The experimenter pointed to the do-setting (the room for this behavior) only in the first trial, and said "There is an apple, a chair and a book on the floor. Which of them are you going to pick up and put it on the table?"

Child: "I am going to pick up . . ." (one of the three objects).

The dialogue for Behavior 4 was:

Exp.: "As you know there is a yellow door and a green door in the corridor. When you go into the corridor, where will you go, to the yellow door or to the green door?"

Child: "I am going to go to the . . ." (one of the doors).

If a subject's verbal response had the same content for more than two consecutive trials, the child was prompted to change the response. For example, if the child said that she or he was going to touch the figure at the bottom for more than two trials, the child was told: "You said that before, say something else." If necessary, the initial question was repeated.

Second baseline (BL2): Reinforcement of saying what to do. Each child was shown that tokens (small red round plastic pieces) could be exchanged at the end of the morning for a "surprise envelope" containing small prizes and toys. The child was asked about the exchange until he or she responded correctly to: "What will you get if you have tokens?" and "When will you get tokens?" Baseline trials were then conducted as in Baseline 1, but the subject's saying response was followed by descriptive feedback ("Very well, you say that you are going to touch the figure at . . ."), social praise (smiling and/or physical contact), and the presentation of one token. When the do period was over, one of the observers accompanied the child to the say-setting to begin a new trial. Five consecutive trials of Behavior 1 were conducted, during which the frequency of tokens contingent on the subject's verbalizations were diminished (that is, the first, second, and fourth trials were followed by feedback, social praise, and a token; the third and fifth trials were followed only by feedback and social praise). Consequences were thinned at this point so that conditions were similar to the generalization probes at the end of the experiment. One trial was conducted for each of the other three behaviors (B2, B3, and B4), with descriptive feedback as consequences. The eight trials in this phase were conducted in a single morning. Children who showed say-do correspondence relations in any of the two baseline conditions did not continue in the experiment—11 children remained in the study on this basis.

Correspondence training: Reinforcement of the say-do correspondence relationship for Behavior 1. In this phase, each trial consisted of three parts. The first two parts were as in Baseline 2, that is, saying what to do and doing. Then, one observer accompanied the child back to the say-setting, where the experimenter checked the observer's recording of the child's response in the do-setting. The experimenter described what the child said she or he would do, what she or he did, and the relation between both responses (see dialogues below). The child was then asked about this description and differential consequences followed contingent upon whether or not the child's saying and doing corresponded. Two dialogues could occur during the third part of the trial, as described below.

If say-do correspondence occurred, the dialogue was as follows:

Exp.: "You said that you were going to touch the figure at the bottom and you touched the figure at the bottom. So, I can give a token because you did what you said. What figure did you say you were going to touch?"

Child: "The figure at the bottom" or "At the bottom."

Exp: "What figure did you touch?"

Child: "The figure at the bottom, or at the bottom."

Exp: "Did you do what you said you were going to do?"

Child: "Yes."

Exp: "Then you're a big boy or girl because you do what you say. Why are you a big child?"

Child: "Because I did what I said I would do," or "because I said bottom and I touched bottom."

Exp: The experimenter approved: "That's all right" or "Good," and provided one token.

If say-do correspondence did not occur, the dialogue was as follows:

Exp: "You said that you were going to touch the figure at the bottom and you touched the figure in the middle. So, I cannot give you a token. What figure did you say you were going to touch?"

Child: "The figure at the bottom" or "At the bottom."

Exp: "What figure did you touch?"

Child: "The figure in the middle."

Exp: "Did you do what you said you were going to do?"

Child: "No."

Exp: "Then you did not do what you say. Why can't I give you a token?"

Child: "Because I did not do what I said I would do" or "Because I said at the bottom and I touched in the middle."

Exp: "Let's try again next time."

When errors occurred, early in training, the dialogue was reinitiated until the correct response was obtained. In particular, most of the children did not respond completely to the last question (e.g., they responded by saying "because I did" or "because I touched bottom"). These responses were corrected until the subjects emitted either of the two correct sentences indicated in the dialogues. No errors occurred following the fifth training trial.

The mastery criterion was achieved when 11 consecutive say-do correspondence relations were recorded. However, if an error occurred after eight consecutively correct responses, new trials were added until a total of 11 correct trials were completed. A maximum of six consecutively correct trials per day were conducted during this phase.

Two subjects (S2 and S7) appeared to have considerable difficulty in achieving the mastery criterion. In an effort to remediate this difficulty, the toys on the table were removed, which proved to be ineffective. Next, a response cost procedure was introduced, subtracting first one token, and then two tokens, for incorrect responses (i.e., noncorrespondence between saying and doing). Again, this was not effective, apparently because the child always had at least one token to exchange by the end of the morning. A new response cost procedure was then implemented in which the child lost all earned tokens following a trial during which say-do correspondence did not occur. After this contingency was introduced, S2 and S7 quickly met the mastery criterion.

Conditions for maintaining say-do correspondence. Two conditions were then introduced for B1 that were designed as conditions to maintain

the say-do correspondence relation and then to evaluate if both or any of these conditions produce say-do generalization in exemplars without training. In each condition, 6 and 5 subjects participated. In both conditions, consequences were equally thinned, but saying was kept as during training (vocal saying in the say-setting) in Condition 1; and in Condition 2 saying was changed from vocal in the say-setting to symbolic using a piece of paper (this occurred adjacent to the do-setting). We, first, describe Condition 1, that is, the thinning of consequences and, second, we describe Condition 2 with the process through which saying was changed. As indicated, consequences were equally thinned in both conditions as is now described.

Condition 1. Vocal saying and thinning in consequences. The gradual thinning in consequences contingent on say-do correspondence was conducted by programming consequences with three combinations: (a) descriptive feedback, social praise plus a token, (b) descriptive feedback and social praise, and (c) no specific consequences, just going to a new trial. A block of 25 trials was completed in this condition until achievement of the criterion of four out of six consecutive correct trials without any comment. Table 1 shows this process along the block of 25 trials. A minimum of six trials were completed per day, except for the first session which involved seven trials. If a child failed to show say-do correspondence, one additional trial with the corresponding programmed thinning consequences for such a trial was immediately conducted until the child's responding was correct across six consecutive trials. There

Table 1

Conditions for Maintaining Say-Do Correspondence. Process for Thinning Consequences and Changing Saying from Vocal to Symbolic																									
Condition 1 (Subjects 1 to 5): Thinning consequences and vocal saying (25 trials)																									
Consequences	V	I	V	I	V	I	V	I	V	I	V														
Saying what to do	0	0	0	0	0	0	0	0	0	0	0														
Trials per day	7						6			6															
Condition 2 (Subjects 6 to 11): Thinning consequences and symbolic saying (25 trials)																									
Consequences	V	I	V	I	V	I	V	V	I	V	I	V													
Steps to change saying	a	a	a	b	b	b	b	b	b	c	c	c	c	d	d	d	d	e	e	e	e	e	e	e	e
Trials per day	7							6				6				6									

Note. V = descriptive feedback, social praise plus one token, I = descriptive feedback and social praise, (no mark) = neither social praise nor descriptive feedback, nor any token, just a new trial.

The steps to change the child's saying about what s/he would do were (see procedure section for specific details):

o = in the say-setting, the experimenter asks the child to tell him what s/he will do (as during correspondence training);

a = in the say-setting, the experimenter suggests the child to tell him what s/he will do";

b = in the say-setting, the experimenter just says to the child "tell me";

c = in the say-setting, the experimenter says "tell me very quietly";

d = in the say-setting, the child picks up one of the three stickers located on a piece of paper in the three different locations and put on a blank paper;

e = as in d, but the piece of paper is on a table close to the one used for the target behavior in the do-setting.

were two exceptions, however. Subjects 2 and 7 produced two errors at the beginning and at the end of this phase, respectively. In both cases, the session was terminated and reinitiated the next day.

Condition 2. Change to symbolic saying and thinning consequences. As indicated, 6 subjects participated in a process through which saying was changed in modality and context, and, at the same time, consequences were thinned as described below. Now, we describe the process of changing saying (see also Table 1).

The change of saying response was done from the subject's vocally responding to what to do when the adult asks about that in the say-setting (that is, the adult asks "What figure are you going to touch . . ." and the child's vocal response, "I am going to touch the figure at/in . . ."), to the subject's symbolic response "of what to do" on a piece of paper placed on a table close to the one designed for doing B1 (the symbolic response was to attach a sticker to a piece of paper that the child picked up from another piece of paper containing three stickers in the three locations—up, middle, and bottom). This process, summarized in Table 1, was conducted across five steps (a, b, c, d, and e; see Table 1) with 3, 6, 4, 4, and 8 trials respectively in a block of 25 trials. Following is the descriptions of these steps:

Step a. The experimenter said: "I am not going to ask you the same question as other days. I would like you to tell me what you will do in the other room." The child's response was followed by general social consequences (i.e., O.K). Then the experimenter accompanied the child to the do-setting as always.

Step b. The experimenter said to the child "Tell me." The child responded and the trial continued as always.

Step c. "Now, tell me very quietly." The child responded quietly and the trial continued as always.

Step d. In the first trial of this step, the experimenter showed the child a piece of paper with three stickers, placed in three positions (top, middle, and bottom), and a blank piece of paper. Then the experimenter said to the child: "Now, if you think to touch the figure at the top, take the sticker at the top and put it on the blank paper. But if you think to touch the figure at the bottom, put the sticker at the bottom of the piece of paper, and so on . . ." (The child was asked different questions to evaluate the understanding of these instructions, that is, the experimenter told the child: "If you think to touch the figure at the top, what sticker will you pick up and put on this other paper?." The same questions were done with the stickers in the other two locations). Then the experimenter put the pieces of paper in front of the child and told him or her not to say anything but select the sticker she or he wanted. Then the child was accompanied to the do-setting and the trial continued as always. In the next trials of this type, the experimenter only indicated to the child the table with the pieces of paper and told the child that she or he knew what to do.

Step e. The child was told (only in the first trial of this step) that the piece of paper with the stickers were not there but would be in the do-

setting on a table in front of the door (2 m away, opposite the table used to do the target behavior). The child was accompanied to the door of the do-setting and told: "There (pointing to the table with the three stickers and the blank piece of paper) you have the pieces of paper to do the same as other times. Go, you have a minute to play." The child picked up the sticker and put it on the blank paper, leaving it on the table. Then, the child went to the other table to do the target behavior. In subsequent trials of this type, the child was only accompanied to the door of the do-setting and told "You have a minute to play."

Incorrect saying was corrected by repeating the instruction or prompting the response. For example, in Step c, if a child responded loudly, he or she was again instructed to do it quietly; or in Step d, if a child responded vocally, he or she was again instructed not to say anything, and to pick the selected sticker and place it on the blank paper. By the last 8 trials (Step e) the child simply entered the do room, picked up one of the three stickers, and put it on a blank piece of paper. Then the child moved to the other table to do the target behavior.

Generalization probes. For the 5 subjects in Condition 1 (vocal saying), generalization trials were as in BL1. For the 6 subjects in Condition 2 (symbolic saying), the child's report for B2 about what she or he would do involved the same piece of paper as for B1, but for B3 three small cards, with a picture of an apple, book, or chair, were employed, and for B4, two small cards, one green and one yellow, were used. The verbal interaction for the first generalization trial, in subjects who followed the symbolic condition, is described below:

Behavior 2 (B2): The experimenter said, "Now, the game is going to change. You will have to think about the shelf on which you want to place the pencil that you will find on a table in that room (the experimenter pointed to the room). You will find a piece of paper on the table opposite to the shelf. If you plan to place the pencil at the bottom shelf, you pick up the sticker at the bottom and put it on the blank piece of paper, but if you plan to place the pencil in the middle, you pick up the sticker in the middle and put it on the blank piece of paper, and so on." Three questions were then asked of the child to ensure that she or he understood the instructions (e.g., "if you plan to put the pencil on the bottom shelf, what sticker will you pick up from the piece of paper?" followed by the child's response: "the bottom sticker"). The same dialogue was repeated for the middle and top shelves. Correct responding was required for each of the three shelves and if the child failed to respond correctly, the dialogues were repeated until correct responding emerged. The experimenter then brought the child to the setting for B2, pointed to the pieces of paper, and left the child alone.

Behavior 3 (B3): The experimenter said, "Now, on a chair at the entrance of that room (the experimenter pointed to the do-setting), you will find three cards with a picture of a chair, a book, or a pencil. When you arrive at that room, if you plan to pick up the book that is on the floor and put it on the table, just pick up the card with the book on it, but if you plan

to put the chair on the table, just pick up the card with the chair, and if you plan to put the pencil on the table, just get the card with the pencil." The child was then asked three questions to ensure that he or she understood the instructions (e.g., "if you plan to put the book on the table, what card will you pick up?") followed by the child's response: "to pick up the card with the book"). The same dialogue was repeated for the chair and the pencil. Correct responding was required for each of the three objects and if the child failed to respond correctly, the dialogues were repeated until correct responding emerged. The experimenter then brought the child to the setting for B3, pointed to the cards at the entrance and left.

Behavior 4 (B4): The experimenter said, "Now, you will find two cards on the table in the corridor, one with a yellow door drawn on it and the other with a green door. When you go to the corridor, if you plan to run to the yellow door, just pick up the card with the yellow door, but if you plan to run to the green door, just pick up the card with the green door." The child was then asked two questions to ensure that he or she understood the instructions (e.g., "if you plan to run to the green door, what card will you pick up?") followed by the subject's response, "pick up the card with the green door"). The same dialogue was repeated for the yellow door. Correct responding was required for both questions, and if the child failed to respond correctly, the dialogues were repeated until correct responding emerged. The experimenter then brought the child to the setting for B4, pointed to the cards on the table and left.

Generalization probes began with five trials with B2, then five trials with B3, and finally five trials with B4. A trial with B1 was inserted between trials of B2 and B3, and trials of B3 and B4. During probes, the first generalized response for each behavior was followed by consequences (descriptive feedback, social praise plus one token) in order to strengthen the new relation, while the others were followed by the initiation of a new trial. However, the critical measure, as indicated, for generalization was the first response to the generalization trial.

Interobserver agreement with regard to the response produced in the do-setting as well as for the presence or absence of say-do correspondence and the proper contingencies, respectively for correspondence or noncorrespondence, provided by the experimenter was 100% for all children, trials, and behaviors across all of the experimental phases.

Results

Figure 2 shows, as example, 4 subjects' performances, two respectively for each condition, across all phases and behaviors. Performances were similar for the remaining subjects except during generalization probes. As the interest of this paper was to examine generalization under two conditions, no statistical comparison between groups of subjects or maintenance conditions was done. Generalization data are provided in Table 2 with respect to each subject. We will, first, describe data from the training and maintenance process and, second, generalization data will be described.

Say-do correspondence appeared when differential consequences were made contingent on the presence and absence of correspondence. However, the number of trials needed to achieve the criterion varied, ranging from 14 for S6 and S11, to 51 for S7. As indicated earlier, response cost contingencies were introduced for 2 subjects (S2 and S7) before they

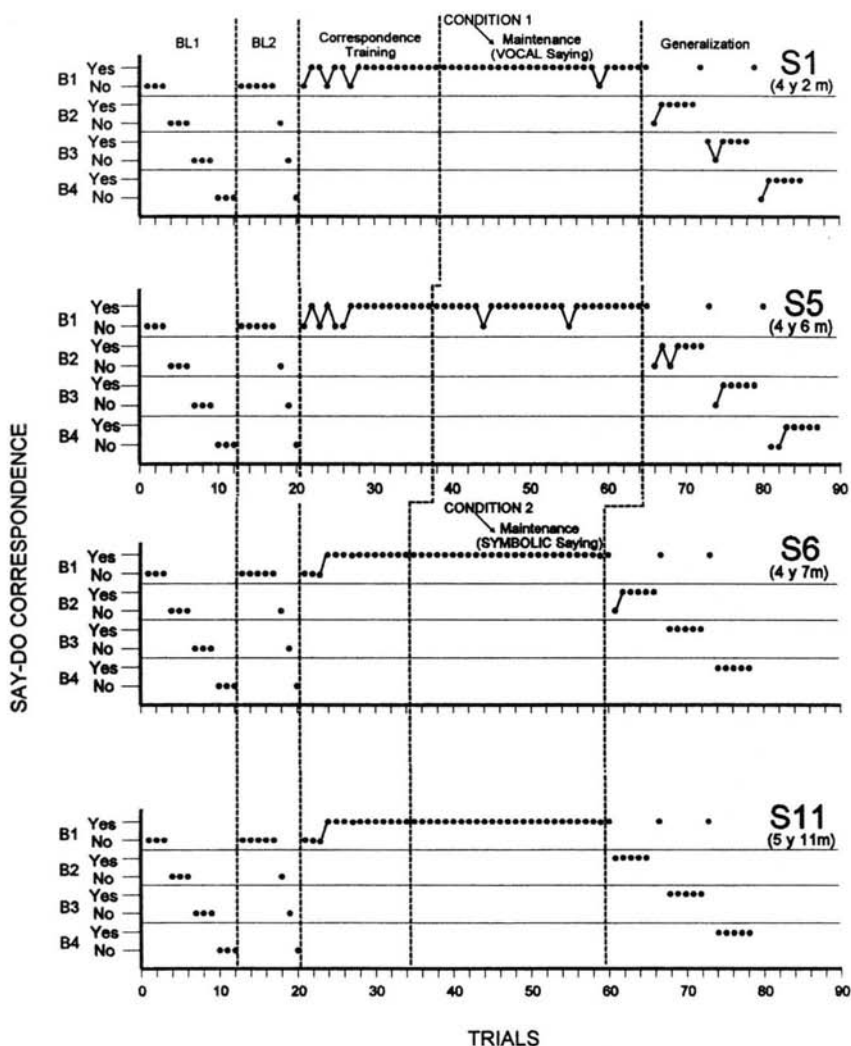


Figure 2. Occurrence (Yes) and nonoccurrence (No) of say-do correspondence for Subjects 1, 5, 6, and 11 for Behavior 1 (B1), B2 (similar to B1), and B3 and B4 (dissimilar to B1). Each graph includes data obtained in the first baseline (no explicit consequences for saying what to do), the second baseline (explicit consequences for saying what to do), during say-do correspondence training for B1, during maintenance in both Condition 1 (vocal saying) and Condition 2 (symbolic saying), and during the generalization probes for B2, B3, and B4.

achieved the mastery criterion for say-do correspondence. Say-do correspondence was maintained for all subjects when the programmed consequences were thinned, and under both saying conditions.

Generalization of say-do correspondence from the directly trained behavior (B1) to untrained similar and dissimilar behaviors was not achieved for all subjects and behaviors in the first trial (see Table 2). Based on the first trial, 5 out of the 6 subjects who provided symbolic saying showed say-do correspondence for Behavior 2 (83%), whereas only 1 out of the 5 subjects who provided vocal reports demonstrated say-do correspondence on the first generalization test trial (20%). Say-do correspondence for Behavior 3 occurred on the first trial for 5 of the 6 symbolic condition subjects (83%), and for 2 out of the 5 vocal condition subjects (40%). Finally, say-do correspondence for Behavior 4 was recorded on the first trial for 4 of the 6 symbolic condition subjects (66.3%), but for only 1 of the 5 vocal condition subjects (20%). The percentage of generalized correspondence across subjects for each of the three behaviors (considering only the first trial of the generalization test for each behavior) was greater for the symbolic condition subjects (66%, 100%, 100%, 33%, 66%, 100%, respectively for S6 to S11) than for the vocal condition subjects (33%, 66%, 0%, 33%, 0%, respectively for S1 to S5). It should also be noted, that no more than two errors occurred for any subject following the first generalization test trial across the three behaviors (i.e., there was rapid and almost errorless acquisition of the generalization test performances). Considering all generalization trials, subjects produced new relational responses, respectively for Condition 1, 83%, 88%, 83%, 79% and 75%, and for Condition 2, 94%, 100%, 90%, 83%, 94%, and 100%.

Table 2

Generalization in First Trial and All Generalization Trials,
Through Subjects, Maintenance Conditions, New Behaviors

	Subjects	B2 (Common properties to B1)	B3 (No physical elements in common to B1)	B4		% 1st trial (per subject)	% in all trials (minimum 5)
Vocal Saying (Condition 1)	S1	-	X	-	=	33%	83%
	S2	X	X	-	=	66%	88%
	S3	-	-	-	=	0%	83%
	S4	-	-	X	=	33%	79%
	S5	-	-	-	=	0%	75%
	% Ss	20%	40%	20%			
Symbolic Saying (Condition 2)	S6	-	X	X	=	66%	94%
	S7	X	X	X	=	100%	100%
	S8	X	X	X	=	100%	90%
	S9	X	-	-	=	33%	83%
	S10	X	X	-	=	66%	94%
	S11	X	X	X	=	100%	100%
	% Ss	83%	83%	66.3%			

Discussion

Subjects participating in this experiment did not demonstrate any correspondence between saying and doing until correspondence training was introduced. The number of trials needed to achieve the mastery criterion was similar for all subjects, except for S2 and S7 (the youngest participants) who required the implementation of a response cost procedure to eliminate the successive correct and incorrect responses on say-do correspondence.

Correspondence training, as used in this study (with a minimum of six trials per day), effectively developed say-do correspondence in a target behavior involving different response locations, with the same automatic consequence (touching) and equivalent social consequences provided contingently for the three response locations (top, middle, and bottom).

In contrast to the current study, previous researchers have typically trained say-do correspondence by using behaviors which, because of the child's history, might have different functions (playing with dolls or cars, for example) (see review in Herruzo & Luciano, 1994; Luciano, 1993). The present procedure is unique in controlling such variables for analyzing experimentally the formation of exemplars of say-do arbitrary relation and, consequently, its generalization, that is, the formation of a generalized operant class (see Barnes-Holmes & Barnes-Holmes, 2000; Luciano, 1996). Indeed the current procedures might be useful to analyze the say-do relation as a subcategory of rule-governed behavior, namely pliance (see Baum, 1995). The current procedures therefore reduce the probability that particular location-consequence compounds became discriminative for correct responding. In effect, the correspondence between saying and doing in the current study was more likely an example of a genuinely arbitrary relation not unlike that reported with adults (for example, Dymond & Barnes, 1994, 1995, 1996).

Say-do correspondence was maintained with minimum variability for all the children when consequences for correspondence became intermittent, regardless of the conditions under which saying was produced. The current data extend the research on thinning consequences reported by Baer et al. (1987). Moreover, the maintenance shown in the current study may have important implications in applied settings because it demonstrates the maintenance of say-do relation in conditions less dependent of the specific adult's questions about what the subjects would like to do. Generating this transfer of say-do correspondence from a context involving an adult's verbal prompt to a context without one is exactly the type of effect that clinicians would often seek to achieve in an applied setting.

Generalization to new say-do relations are discussed considering the first generalization trial as the critical measure. The relevance of the subject's performance on the first generalization test trial is based on our interest in isolating the abstracted function of saying (not depending on the content), thus providing evidence for the formation of a generalized

operant class. To isolate the first response from the subsequent responses is important because after the first response, consequences followed and thus subsequent say-do responses could be a function of that direct history of reinforcement. Nevertheless, the general measure per subject regarding all generalization trials will also be discussed. We will first focus on data from the first generalized trial.

Generalization probes for new relations showed that for 8 of the 11 children, say-do correspondence did not transfer on the first trial to all the three previously untrained behaviors (one similar and two dissimilar to the directly trained behavior) (see Table 2). The 3 children who did show generalization to all three untrained behaviors had previously participated in the maintenance condition that required a symbolic saying response in the absence of a question and produced close to the do-setting. How might we explain this difference between the two conditions? One explanation might be as follows. Subjects whose saying was only vocal might have had more difficulty in maintaining the controlling properties of the saying response until they entered the do-setting (for example, by engaging in self-echoic, such as "I will put it on the top shelf, I will put it on the top shelf. . ."). In contrast, the subjects whose saying response was changed to a symbolic response, may have had, during the generalization test, properties of stimulus control (in the do-setting) not available to the subjects in the vocal condition. Consider, for example, testing for B2 which involved the subject selecting one of three stickers (top, middle, and bottom) and putting it on a piece of blank paper in the do-setting (but on a separate table from the material for B2), and subsequently placing a pencil on a corresponding shelf (top, middle, or bottom). Because choosing stickers and pointing to objects based on their physical locations had been used previously for B1, many of the controlling properties of spatial location were present for B2 during the saying and doing. Vocally reporting what one intends to do, however, introduces arbitrary and perhaps less salient forms of stimulus control, and thus the availability of stimulus properties common to saying and doing is reduced. This suggestion is consistent with the fact that only one of the subjects in the vocal condition showed generalization from B1 to B2. Although these two behaviors involved similar statements (e.g., "touch the figure at the bottom" or "put the pencil at the bottom"), presumably the shared stimulus properties of these vocalizations (i.e., in this case, "on the bottom") are functionally weaker than physically contacting the same relative spatial locations during both saying and doing.

A related interpretation may be made for the generalization tests conducted with B3 and B4. For these behaviors, subjects selected one of several cards as symbolic response of saying. It was noted at this point in the experiment that most of the children (without experimental instructions) kept the card they had chosen on each trial and placed it into a pocket although they did not look at the card while in the act of doing. Because these cards had one printed color or one object, for B3 and B4 respectively, the subjects could literally carry the properties of the say

stimulus to the do-setting in a way that the vocal subjects could not (unless they engaged in self-echoics). However, there was no correlation between keeping the card and succeeding on the first attempt. Although we did not expect subjects to retain the cards, the emergence of what Lowenkron (1998) describes as self-duplic behavior and joint control highlights a possibly important controlling variable involved in the generalization of say-do correspondence. In any case, both conditions of maintenance were highly effective in producing new say-do relations in just one or two trials. Considering the five generalization trials, say-do relations were maintained after the first correct say-do correspondence was directly reinforced in both conditions (see Table 2).

Previous researchers have suggested and demonstrated that say-do correspondence generalizes to dissimilar behavior; (a) after training several exemplars using dissimilar behaviors, (b) when contingencies are difficult to discriminate, and (c) when the subjects' verbalizations are reinforced (Guevremont et al., 1986a; Williams & Stokes, 1982). In addition, getting subjects to verbalize the say-do relation itself (e.g., "I've done what I said I would do") has been thought to facilitate the generalization of say-do correspondence (Deacon & Konarski, 1987; Ward & Stare, 1990). The procedures used in the current study incorporated some of the foregoing features with a measure of generalization more restricted, the first trial, and two types of histories and conditions to probe generalization. Given that, generalization of say-do correspondence was observed, particularly when the saying response allowed the subject to carry a record of that response to the do-setting. These data point to the need for further research that investigates how to promote the abstracted value of saying with new content or for promoting, on the first trial, generalization of say-do relations to new behaviors, or generalized relational classes. In any case, the present research thereby provides some important clues as to the key variables involved in establishing and maintaining generalized say-do correspondence. In other words, the current study may shed light on the history that is required for the emergence of say-do generalized arbitrary relationships, particularly when saying "what to do" establishes derived or verbal properties of stimulus control for nonverbal stimuli (Hayes, Gifford, & Wilson, 1996).

References

- ANDRONIS, P. (1991). Rule-governance: Enough to make a term mean. In S. C. Hayes (Ed.), *Rule-governed behavior: Cognition, contingencies, and instructional control* (pp. 226-235). New York: Plenum.
- BAER, R. A., BLOUNT, R. L., DETRICH, R., & STOKES, T. F. (1987). Using intermittent reinforcement to program maintenance of verbal/nonverbal correspondence. *Journal of Applied Behavior Analysis*, 20, 179-184.

- BAER, R. A., DETRICH, R., & WENINGER, J. M. (1988). On the functional role of the verbalization in correspondence training procedures. *Journal of Applied Behavior Analysis*, 21, 345-356.
- BAER, D. M., PETERSON, R. F., & SHERMAN, J. A. (1967). The development of imitation by reinforcing behavioral similarity to a model. *Journal of the Experimental Analysis of Behavior*, 10, 405-416.
- BAER, R. A., WILLIAMS, J. A., OSNES, P. G., & STOKES, T. F. (1984). Delayed reinforcement and indiscriminable contingency in verbal/nonverbal correspondence training. *Journal of Applied Behavior Analysis*, 17, 429-440.
- BARNES-HOLMES, D., & BARNES-HOLMES, Y. (2000). Explaining complex behavior: Two perspectives on the concept of generalized operant classes. *The Psychological Record*, 50, 251-265.
- BAUM, W. M. (1995). Rules, culture and fitness. *The Behavior Analyst*, 18, 1-22.
- BLUMA, S., SHEARER, M., FROHMAN, A., & HILLIARD, J. (1978) *Gua Portage de Educaci n Preescolar* (Rev. ed. and Trans. by Cooperative Educational Service Agency 12). Madrid: TEA.
- DEACON, J. R., & KONARSKI, E. A. (1987). Correspondence training: An example of rule-governed behavior? *Journal of Applied Behavior Analysis*, 20, 391-400.
- DYMOND, S., & BARNES, D. (1994). A transfer of self-discrimination response functions through equivalence relations. *Journal of the Experimental Analysis of Behavior*, 62, 251-267.
- DYMOND, S., & BARNES, D. (1995). A transformation of self-discrimination response functions in accordance with the arbitrarily applicable relations of sameness, more-than, and less-than. *Journal of the Experimental Analysis of Behavior*, 64, 163-184.
- DYMOND, S., & BARNES, D. (1996). A transformation of self-discrimination response functions in accordance with the arbitrarily applicable relations of sameness and opposition. *The Psychological Record*, 46, 271-300.
- DYMOND, S., & BARNES, D. (1997). Behavior-analytic approaches to self-awareness. *The Psychological Record*, 47, 181-200.
- GUEVREMONT, D. C., OSNES, P. G., & STOKES, T. F. (1986a). Preparation for effective self-regulation: The development of generalized verbal control. *Journal of Applied Behavior Analysis*, 19, 99-104.
- GUEVREMONT, D. C., OSNES, P. G., & STOKES, T. F. (1986b). Programming maintenance after correspondence training interventions with children. *Journal of Applied Behavior Analysis*, 19, 215-219.
- HAYES, S. C., GIFFORD, E. V., & WILSON, K. G. (1996). Stimulus classes and stimulus relations: Arbitrarily applicable relational responding as an operant. In T. R. Zentall & P. M. Smeets (Eds.), *Stimulus class formation in humans and animals* (pp. 279-299). Amsterdam: Elsevier.
- HAYES, S. C., & HAYES, L. J. (1989). The verbal action of the listener as a basis for rule-governance. In S. C. Hayes (Ed.), *Rule-governed behavior: Cognition, contingencies, and instructional control* (pp. 153-190). New York: Plenum.
- HERRUZO, J., & LUCIANO, M. C. (1994). Procedimientos para establecer la correspondencia decir-hacer. Un análisis de elementos y problemas pendientes [Procedures to establish say-do correspondence: An analysis of elements and some problems]. *Acta Comportamental*, 2, 192-218.
- ISRAEL, A., & O'LEARY, K. (1973). Developing correspondence between children's words and deeds. *Child Development*, 44, 577-581.
- LOWENKRON, B. (1998). Some logical functions of joint control. *Journal of the Experimental Analysis of Behavior*, 69, 327-354.

- LUCIANO, M. C. (1993). La conducta verbal a la luz de recientes investigaciones. Su papel sobre otras conductas verbales y no verbales [Verbal behavior according to recent research: Its role on verbal and nonverbal behavior]. *Psicothema*, 5, 2, 351-374.
- LUCIANO, M. C. (1996). Intervención Psicológica en Retraso en el Desarrollo: Una perspectiva funcional [Psychological intervention in mental retardation: A functional perspective]. In M. C. Luciano (Ed.), *Manual de psicología clínica. Infancia y adolescencia* (pp. 465-523). Valencia: Promolibro.
- LUCIANO, M. C. (in press). Applications of research on rule-governed behavior. In J. C. Leslie & D. Blackman (Eds.), *Issues in experimental and applied analysis of human behavior*. Reno, NV: Context Press.
- MATTHEWS, B. A., SHIMOFF, E., & CATANIA, A. C. (1987). Saying and doing: A contingency-space analysis. *Journal of Applied Behavior Analysis*, 20, 69-74.
- OSNES, P. G., GUEVREMONT, D. C., & STOKES, T. F. (1986). If I say I'll talk more, then I will. *Behavior Modification*, 10, 287-299.
- PANIAGUA, F. A., & BAER, D. M. (1982). The analysis of correspondence training as a chain reinforceable at any point. *Child Development*, 53, 786-798.
- PANIAGUA, F. A., & BLACK, S. A. (1990). Management and prevention of hyperactivity and conduct disorders in 8-10 year old boys through correspondence training procedures. *Child & Family Behavior Therapy*, 12, 23-56.
- RISLEY, T. R., & HART, B. (1968). Developing correspondence between the nonverbal and verbal behavior of preschool children. *Journal of Applied Behavior Analysis*, 1, 267-281.
- ROGERS-WARREN, A., & BAER, D. M. (1976). Correspondence between saying and doing: Teaching children to share and praise. *Journal of Applied Behavior Analysis*, 9, 335-354.
- STOKES, T. F., OSNES, P. G., & GUEVREMONT, D. C. (1987). Saying and doing: A commentary on a contingency-space analysis. *Journal of Applied Behavior Analysis*, 20, 161-164.
- WARD, W. D., & STARE, S. (1990). The role of subject verbalization in generalized correspondence. *Journal of Applied Behavior Analysis*, 23, 129-136.
- WILLIAMS, J. A., & STOKES, T. F. (1982). Some parameters of correspondence training and generalized verbal control. *Child & Family Behavior Therapy*, 4, 11-30.
- WHITMAN, T. L., SCIBAK, J. W., BUTLER, K. M., RICHTER, R., & JOHNSON, M. R. (1982). Improving classroom behavior in mentally retarded children through correspondence training. *Journal of Applied Behavior Analysis*, 15, 545-564.