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THE SPEAKER AS LISTENER

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This study reports the results of an experiment with 4 female 5-year-old children, in which the verbal behavior of the children (talking to themselves) was studied under two conditions—an anthropomorphic toy condition and a nonanthropomorphic toy condition. The anthropomorphic condition consisted of three-dimensional toys such as dolls, stuffed animals, and figurines. The nonanthropomorphic toy condition consisted of two-dimensional materials such as puzzles, coloring books, and story books. The independent variables were the toy conditions. The dependent variables were verbal-behavior units; these included mands, tacts, intraverbals, autoclitics, and conversational units. The conditions were compared using a multiple schedule design. The results showed that more total units occurred in the anthropomorphic toy condition than in the nonanthropomorphic toy condition and that conversational units occurred in the anthropomorphic condition only. Consistent with Skinner's (1957) hypothesis, the children acted as both speaker and listener when emitting verbal behavior to themselves in the anthropomorphic condition.

Key words: verbal behavior, conversational units, mands, tacts, intraverbals, self-talk, speaker/listener control, children

Little is known about the phenomenon of talking to oneself. Skinner (1957) posited that in talking to oneself, one acts as both listener and speaker. If Skinner's interpretation is correct, a child speaking to herself will perform in the roles of both speaker and listener.

The basis for an analysis of talking to oneself has developed as a result of research on verbal behavior. The experimental analysis of verbal behavior has been conducted with several species including pigeons (Epstein, Lanza, & Skinner, 1980), chimpanzees (Savage-Rumbaugh, 1984), albino rats (Wenrich, 1964), and humans (Chase, Johnson, & Sulzer-Azaroff, 1985; Lamarre & Holland, 1985; Stafford, Sundberg, & Braam[1]). Mands and tacts (Skinner, 1957) have been shown to be functionally independent verbal repertoires (Lamarre & Holland, 1985; Savage-Rumbaugh, 1984) under the control of nonverbal stimuli (Wenrich, 1964). Mands have been shown to be under the control of specific reinforcers, whereas tacts have been shown to be under the control of generalized reinforcers.[1]

Epstein et al. (1980) demonstrated that pigeons could be taught verbal exchanges. Savage-Rumbaugh (1984) found that gestural responses taught to chimpanzees as mands could not be used as tacts without retraining. When these same sets of mands were taught initially as tacts, they were acquired more rapidly than when they were retrained from mands to tacts. Chase et al. (1985) demonstrated three functionally independent components of Skinner's (1957) intraverbal behavior with college students: (a) definition tasks, (b) example identification tasks, and (c) exemplification tasks.

Greenspoon (1962) demonstrated in a series of experiments with college students that verbal behavior was under the control of the verbal reinforcement of another speaker. Becker and Greer (1988) introduced the conversational unit as a measure of the reciprocity of verbal behavior between two individuals (normal and developmentally delayed adults). A unit of conversation consisted of each individual acting as both speaker and listener. The unit included verbal-behavior components already identified in the literature (mands, tacts, autoclitics, intraverbals). Conversational units were functionally related to audience control (speaker alone, speaker with experimenter, speaker with peers). The emission of conversational units was also a function initially of the type of verbal behavior (tact or mand) emitted by the experimenter. The unit and the procedure used for identifying speaker and listener roles provided a measure and a procedure

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[1] Stafford, M., Sundberg, M. L., & Braam, S. (1978). *An experimental analysis of mands and tacts.* Paper presented at the 4th annual convention of the Midwestern Association of Behavior Analysis, Chicago.

for testing whether or not children act as both speaker and listener when they play alone.

No studies have investigated Skinner's (1957, p. 440) claim that when one talks to oneself, one acts as both speaker and listener. One impediment to such research is that with adults such behavior is covert. However, children do talk to themselves in certain settings until punished for doing so (Skinner, 1957). The purpose of the following experiment was to test Skinner's claim that when talking to oneself one acts as both speaker and listener; we studied the verbal behavior of young children playing alone.

METHOD

Participants and Setting

The subjects of the experiment were 4 kindergartners (5 years old). They were selected on the basis of the parents' volunteering the children for the study. All 4 children were females from upper middle-class homes. Females were selected because it is believed that males engage in vocal sounds (explosions, engines, screams) more so than do females while playing alone.

Participant 1 was bilingual but used only English during the play sessions in the study. Her mother reported that the girl frequently talked aloud while playing. Participant 2 was the youngest subject (by a few months) and reportedly spoke aloud while playing alone. She, as was the case with the remaining children, spoke English only. According to her parents, Participant 3, unlike Participants 1, 2, and 4, did not talk to herself while playing alone. Participant 4, according to her mother, talked to herself infrequently while playing alone.

The children were videotaped playing alone during six to nine 10-min sessions with each of two types of toys. The two types of toys were the independent variables and were termed either anthropomorphic or nonanthropomorphic toys. Participants 1, 2, and 4 were videotaped while playing alone in their bedrooms or playrooms. Participant 2 was videotaped playing with toys at the kitchen table. She was placed in the kitchen because while in her bedroom she would alternate between the two types of toys. In the kitchen she played continuously without distraction with whichever set of toys she chose for the session.

The mothers of Participants 1, 2, and 3 set up the videocamera in the children's play area (bedroom, kitchen, sandbox, or family room), focused it on the child playing, turned on the video recorder and an audiotape recorder, and left the play area. The mother of Participant 4 remained in the child's room. The child interacted with the mother for a mean of two times each session. The mother made brief replies or ignored the child. These episodes were omitted from data collection.

Response Definitions and Data Collection

Response definitions. The response categories were conversational units and traditional verbal operants including mands, tacts, and autoclitics (Skinner, 1957). Responses were typically vocal, but occurrences of gestural verbal behavior were also included. Mands consisted of verbal behavior that specified its reinforcer under the control of nonverbal stimuli and deprivation, whereas tacts were verbal behavior under the control of nonverbal stimuli and generalized reinforcers. Tacts were either under the control of the immediate environment or a remote environment. They included generic, metaphorical, metonymical, or impure tacts that were accessible to the speaker. Intraverbals were verbal responses that lacked point-to-point correspondence with their antecedent verbal stimuli. Autoclitics consisted of operants that depended on other verbal behavior for their occurrence (Skinner, 1957).

Each occurrence of a verbal unit (mand, tact, intraverbal, autoclitic) constituted a count. These were also subcomponents of a count of conversational units. Examples of responses and counts were: "Do you want an animal?" (a mand) followed by "Yes" (a qualifying autoclitic), "I do" (a tact). "Your turn, want to play?" (two mands); "Got him, sir" (two tacts). If there was a pause greater than 3 s between emissions of verbal behavior (Becker & Greer, 1988), a change in reference, or a radical change in the pitch and tone of voice designating changes in roles of speaker and listener, a response was counted as a new operant. If the controlling stimulus was intraverbal and the behavior (vocal or physical) that followed did not specify any other function, it would be included in the same intraverbal count as consistent with the prior definitions. For example, "Baby, baby, baba baba black sheep, have you any wool" contained two operants. One operant was a tact ("Baby, baby"), because it had neither a 3-s pause nor did it change the

point of reference based on the setting with the previous operant. The second operant ("baba baba black sheep, have you any wool?") was an intraverbal, which was controlled by prior verbal stimuli and lacked point-to-point correspondence with prior verbal stimuli. Both quantifying and qualifying autoclitics were also tallied according to Skinner's (1957) definition.

A conversational unit consisted of verbal exchanges between speaker and listener in which each responded in the roles of both speaker and listener. An example of a single conversational unit by 1 participant was:

As speaker: "When are you going to be done looking in there?"

As listener/speaker: "I'm almost done, I am done, what's up?"

Original speaker as listener: "Oh, hey, how are you doing?"

This sequence completed a three-term contingency for both speaker and listener roles for the child. However, in this case, the speaker and listener were the same person. Speaker and listener roles were observed by viewing videotapes of the vocal and nonvocal behavior of young children to determine the function of the behavior. Additional examples are shown in the Appendix. However, the function could be determined only by observing the function of the behavior for the child.

Data Collection

Data were collected from the videotape recordings of the play sessions, supplemented by audiotape recordings and written transcripts. That is, when videotape recordings were difficult to hear, the audiotapes were played to assist the data collection or transcription. Initially, the vocal and gestural verbal behavior was transcribed from the tapes. The transcription and the videotapes and audiotapes were used jointly to determine the verbal-operant units. The transcription alone would not have been adequate because, in order to determine verbal-operant units, the antecedent and consequent events were often nonverbal. After initial data collection sessions, definitions of all of the verbal-operant units were written and used to train several observers. Each occurrence of mands, tacts, autoclitics, intraverbals, and conversational units was tallied. Each session consisted of 10 min in one of the two toy conditions. Interruptions were excluded as were periods in which the child inadvertently switched to playing with toys not part of the specific toy condition in effect.

Interobserver Agreement

Interobserver agreement was obtained for agreement on transcription of words from tapes and agreement on response-category tallies. Checks of interobserver agreement for transcription were made on the first 12 sessions of Participant 1, first 10 sessions of Participant 2, all sessions of Participant 3, and the first five sessions of Participant 4. Interobserver agreement was calculated by comparing transcription agreement word by word for the occurrence or nonoccurrence of words. The number of words agreed on was divided by agreed plus nonagreed words and multiplied by 100%. The mean and ranges for word agreement were, for Participant 1, 96% (85% to 100%); for Participant 2, 97% (82% to 100%); for Participant 3, 97% (87% to 100%); and for Participant 4, 94% (88% to 100%).

Interobserver agreement checks on response categories were made by a second independent observer for 25% of the sessions for each participant. The transcription, tapes, and definitions of responses were given to an independent observer who had passed written examinations on Skinner's *Verbal Behavior* (1957). This observer was also trained on sample tapes until she had achieved 100% agreement on a single session with the primary observer. The second observer subsequently and independently observed 25% of the sessions for each participant.

Interobserver agreement on verbal-behavior units was determined by comparing the second observer agreement on occurrences and nonoccurrences of each operant point by point with that of the primary observer. Interobserver agreement was calculated by dividing the number of agreements on operants by the number of agreements and disagreements multiplied by 100%. The mean and ranges of interobserver agreements were, for Participant 1, 95% (88% to 100%); for Participant 2, 90% (75% to 100%); for Participant 3, 94% (90% to 100%), and for Participant 4, 96% (91% to 100%).

Experimental Design

A multiple schedule design with replication across different participants was used to determine the effects of the two toy-play conditions (anthropomorphic and nonanthropo-

Table 1

Session mean percentages of verbal operants by categories and session mean number of verbal operants by categories.

	Tacts		Mands		Autoclitics		Intraverbals	
Subjects	Mean %	Mean no.	Mean %	Mean no.	Mean %	Mean no.	Mean %	Mean no.
Anthropomorphic condition								
1	28	38.75	28	39	39	54.38	4	5
2	36	48.38	26	34.5	30	40.63	8	10.75
3	29	23.2	23	18.8	31	25.2	16	13
4	30	44.8	25	37.5	35	53.3	9	13.5
Nonanthropomorphic condition								
1	48	8.5	11	1.9	19	3.38	22	3.87
2	43	4.8	14	1.56	19	2.22	23	2.89
3	61	3.58	7	0.43	14	0.83	22	2.28
4	51	11.2	10	2.2	18	3.8	21	4.6

morphic) on the emission of verbal-behavior units. The independent variables were the toy conditions. Both toy conditions were presented in an order partially determined by the participant. The order of the initial two toy conditions was alternated across participants. After the first two sessions, the child chose which of the two types of toys with which she wished to play. No condition was to be repeated more than five times consecutively. If this occurred, the tape in question was omitted from the data analysis. The dependent variable consisted of conversational units, mand units, tact units, intraverbal units, and autoclitics.

Anthropomorphic and Nonanthropomorphic Conditions

The anthropomorphic toy condition consisted of three-dimensional toys selected from the child's own collection that had human or animal form to which one would ascribe human characteristics (*Webster's New Collegiate Dictionary,* 1979). The nonanthropomorphic condition consisted of activities with two-dimensional materials that one would not normally treat as a puppet or to which one would ascribe human characteristics. For Participant 1, the anthropomorphic condition included dolls, a plastic pony, and stuffed animals, and the nonanthropomorphic materials were puzzles, coloring books, books, writing material, and fill-in-the-blank work sheets. For Participant 2, the anthropomorphic toys were stuffed animals, Fisher-Price® animal toys, and plastic and wooden animals. Her nonanthropomorphic toys and materials were puzzles, coloring books, match-to-sample pictures, books, and drawing materials. For Participant 3, the anthropomorphic conditions included dolls and Fisher-Price® animals, and the nonanthropomorphic materials were coloring books, cutting and gluing materials, and sand. For Participant 4, the anthropomorphic toys were dolls, stuffed animals, and wooden animals, and the nonanthropomorphic materials included puzzles, coloring books, and match-to-sample pictures. The anthropomorphic condition provided toys that could serve in speaker/listener roles, whereas the nonanthropomorphic condition provided play activities with objects that would not serve as speaker/listener but might be materials with which the child could direct nonverbal behavior with verbal behavior or provide a running commentary.

RESULTS

Data for mands, tacts, autoclitics, and intraverbals are presented in Table 1; data for conversational units are shown in Figure 1. Table 1 shows the mean numbers and percentages of verbal units, excluding conversational units, emitted by each participant by verbal-behavior categories and conditions. Session-mean percentages represent the number of units in each category for a given session divided by the total number of operants multiplied by 100%. All session percentages for a given participant were then totaled and divided by the number of sessions in the related condition. This yielded session-mean percentages for each participant. Session-mean number of operants by categories were obtained by determining the number of units in each category for each session, which were then summed and

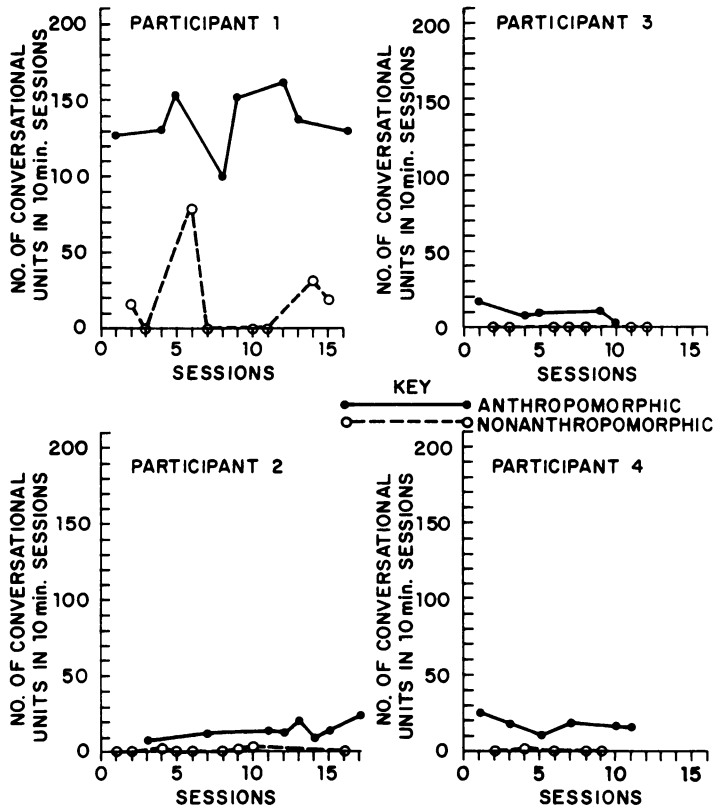

Fig. 1. Number of conversational units emitted during 10-min sessions in the anthropomorphic and nonanthropomorphic conditions.

divided by the number of sessions in the related condition for a given participant.

In the anthropomorphic condition, most of the verbal behavior was relatively equally distributed across mands, tacts, and autoclitics with fewer units in the intraverbal category. In the nonanthropomorphic condition, more units were emitted in the tact category than in other categories. However, relatively few units were emitted in this condition. Thus although tact percentages were high, the percentages were not comparable with the anthropomorphic condition because of the relatively infrequent number of units in the nonanthropomorphic condition. All participants emitted more verbal behavior in the anthropomorphic condition than in the nonanthropomorphic condition. There was no overlap between conditions for any of the 4 participants.

Figure 1 presents the number of conversational units in each of the two conditions for all 4 participants. Participant 1 emitted a mean of 5.63 conversational units per session in the anthropomorphic condition with a standard deviation of 3.89. Participants 2, 3, and 4, respectively, emitted the following means and standard deviations (in parentheses) of conversational units under the anthropomorphic condition: 7.25 (2.92), 4 (3.31), and 8.67 (2.42). No conversational units were emitted in the nonanthropomorphic condition by any of the subjects.

In summary, significantly more total units occurred in the anthropomorphic condition than in the nonanthropomorphic condition, with one overlap between conditions for Participant 3. That is, conversational units occurred for all participants in all anthropomorphic conditions except one, and no conversational units occurred in the nonanthropomorphic condition.

DISCUSSION

The 4 girls emitted conversational units in the anthropomorphic condition and did not do so in the nonanthropomorphic condition. The dolls, stuffed animals, and wooden toys were

treated frequently as speakers or as listeners. The children emitted verbal behavior to themselves in which they acted in the role of speaker and listener using the three-dimensional anthropomorphic objects for these purposes; no conversational units occurred in the nonanthropomorphic condition. In the anthropomorphic condition, conversations consisted of verbal exchanges between speaker and listener roles. The child acted as both speaker and listener, consistent with Skinner's (1957) interpretation of verbal behavior as it occurs when one talks to oneself.

When Skinner (1957) described the verbal behavior of talking to oneself in his book *Verbal Behavior*, he referred both to covert and overt forms emitted not only by children but also by adults. Clearly, children did respond to a listener and the listener was a role that they provided for their own speaker behavior. The three-dimensional anthropomorphic items set the stage for speaker/listener behavior and for verbal behavior of talking to themselves. The nonanthropomorphic condition did not set the stage for speaker/listener behavior. In this condition, there were occasional references to objects and activities as well as intraverbal bits of nursery rhymes, counting, or saying the alphabet; these were relatively infrequent.

Whether or not adults continue to emit conversational units covertly as a function of audience control remains theoretical, as does the possibility that abnormal self-talk by adults is emitted because of the lack of audience control for those individuals. However, it is clear that these 5-year-old girls emitted self-talk at high rates in the anthropomorphic condition. The three-dimensional anthropomorphic toys created an audience in the form of a listener. This condition resulted in conversational units presumably because these toys prompted the listener role.

The units of measurement were verbal-behavior units, which had their basis in prior research that was in turn based on Skinner's (1957) interpretation. The conversational unit was an extension based on three-term contingencies operating in verbal behavior between speaker and listener. Greenspoon (1962) had already provided evidence that the verbal behavior of individuals was under the control of the verbal behavior of others. Becker and Greer (1988) provided evidence that conversational units were under audience control. The current study extended the conversational unit to a single individual emitting verbal behavior as both speaker and listener. Although verbal behavior can be developed with other species, it is the coin of exchange for humans. Verbal behavior is regarded as a form of complex human behavior but is not so complex when it is treated as behavior per se. When verbal behavior is treated as units of functional behavior, it is an operant that may be counted in frequency much as nonverbal operants are. However, because such units require human transducers (Johnston & Pennypacker, 1980), this type of behavior must first be preserved in audio and videotape forms. When the verbal operants are transduced by humans who are trained, the data show high levels of interobserver agreement for subjects who are children or are developmentally delayed (Becker & Greer, 1988). In this study, the agreed-upon responses varied within conditions; however, the difference between conditions was reliable within participants and was replicated across all 4 participants.

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APPENDIX

Script of the Self-Talk of a Participant and the Response Coded by Verbal Behavior Categories

T = Tact M = Mand A = Autoclitic I = Intraverbal

Anthropomorphic Condition

As Speaker 1: "Okay, you sit here, right in here." (Pointing and making space
A M T
for one of the dolls in her lap.)
As Listener/Speaker 2: "Why are we sitting in your lap?"
M A
As Listener/Speaker 1: "So you could see." (Picks up another doll.) "You sit
T M
in front of all, so you could see."
A A
(3-s pause, picks up another doll) "right in the lap." (adjusts the sitting ar-
T
rangement of the dolls and reaches for another doll on the floor.) "You are going to go last." (End of one conversational unit.)
M A

Nonanthropomorphic Condition

As Speaker: (Picks up picture and matches it on the board.) "There it go."
T
(Picks up another picture.) "Match together." (While trying to place the
T
picture on the board.) "Together, together, together." (Starts looking for
T I
another picture and then finds the picture.) "Match for the queen."
T A