THE EFFECTS OF MONITORING AND INCOMPATIBLE CONTINGENCIES
ON SAY/DO CORRESPONDENCE

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This study investigated effects of monitoring on correspondence between nonverbal responding and verbal descriptions of those contingencies, when verbal descriptions and contingencies were compatible and when incompatible. In the Nonverbal Component, the contingency for key pressing was either on a 0.8 s IRT or a 3.4 s IRT. In the Verbal Component, subjects made responses to a statement about the contingency for reinforcement in the Nonverbal Component. Shaping was used to establish targets of 0.8 s and 3.4 s in this component. Results indicated that across 7/8 opportunities subjects exhibited nonverbal and verbal behavior that was sensitive to their respective contingencies regardless of compatibility. This sensitivity to contingencies was not affected by the presence of a monitor.
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CHAPTER 1

INTRODUCTION

Behavior can be established in one of two ways, either by exposure to contingencies or through instructions. Behavior established through direct exposure to contingencies is termed contingency-shaped behavior. Behavior established by instruction is called rule-governed behavior (Skinner 1966, 1969). Rule-governed behavior is further described by Skinner (1969, p. 147) as behavior under the control of “contingency specifying stimuli” that function as discriminative stimuli in 3-term contingencies in which following rules is reinforced. That is, rule-governed behavior is discriminated behavior that has been conditioned through exposure to consequences for complying with rules.

Experimental interest in the effect of rules (contingency specifying stimuli) on nonverbal behavior was one result of laboratory findings that human operant behavior did not always show the patterns of schedule control characteristic of non-human performance (Schmitt, 1974; Streifel, 1972; Weiner, 1969, 1970). This failure to exhibit responding similar to other species was termed as insensitivity to the schedules. Schedule insensitivity has been attributed to the effects of instructions given to the verbal participants (Harzem, Lowe, & Bagshaw, 1978; Kaufman, Baron, & Kopp, 1966). Matthews, Shimoff, Catania, and Sagvolden (1977) manipulated an instruction and
produced insensitivity of key pressing to a subsequent change in reinforcement schedule for pairs of participants on a yoked variable ratio (VR)-variable interval (VI) schedule. Shimoff, Catania, and Matthews (1981) found further that instructions were associated with insensitivity to the removal or relaxation of a differential reinforcement of low rate responding (DRL) schedule superimposed on a random interval (RI) schedule and on a random ratio (RR) schedule. It should be noted that originally experimenters used the term insensitivity to refer to human performance that did not resemble nonhuman performance; however, the term is also used to describe behavior that does not change following a change in contingencies (Madden, Chase, & Joyce, 1998). The latter definition appears to be the one used in the following research and the definition employed in the current study.

With research suggesting that verbal instructions by the experimenter were associated with nonverbal behavior that was insensitive to changes in contingencies, questions arose as to how a participant’s own verbal behavior would affect his nonverbal responding. Would self-instructions also produce insensitivity to contingencies for nonverbal responding? Would how the self-instructions were generated make a difference? Catania, Matthews, and Shimoff (1982) sought to develop a method for answering these questions using a say/do correspondence procedure. Research on say/do correspondence examines the relations between nonverbal behavior and verbal behavior describing the nonverbal behavior.
Catania et al. (1982) asked under what conditions verbal descriptions of nonverbal behavior produced nonverbal behavior that was insensitive to its scheduled contingencies. Specifically, they looked at the effects of instructed verbal behavior vs. shaped verbal behavior on subsequent nonverbal behavior, both when contingencies for nonverbal responding were consistent and when inconsistent with the verbal behavior--shaped or instructed. A multiple RI-RI schedule was in effect for the nonverbal behavior, button pressing. Two buttons were used and, typically, presses on the left button produced points on an RR schedule, while presses on the right button produced points on an RI schedule. When the light above a button was illuminated, presses on that button were eligible for reinforcement provided they met the contingencies. Catania et al. utilized RR and RI schedules because in non-humans exposure to RR schedules typically produces high rates of responding, while exposure to RI schedules typically produces lower rates of responding (Catania, Matthews, Silverman, & Yohalem, 1977; Matthews et al., 1977).

After 3 min of [the cycle of] nonverbal responding (1.5 min/schedule), a cycle of verbal responding began. The verbal responses were written guesses about “the way to turn on” lights associated with reinforcement on each of the two schedules (Catania et al., 1982, p.235). In each verbal responding cycle, participants completed three sentences about how to earn points with left button presses and three sentences about how to earn points with right button presses. Some of the participants were instructed as follows: “To earn maximum points for guessing: Write ‘press fast’ [or ‘slowly’] for the left button and write ‘press slowly’ [or ‘fast’] for the right button” (p.236). Other participants’ verbal
behavior was shaped by differential delivery of points for guesses approximating a verbal response considered correct by experimenters. Participants in the shaping group were given 2 min and told to complete as many sentences as they wished, then to pass the paper through a hole in the wall. The paper was assigned points, and then passed back to the participant, who returned it through the hole [in the wall] after reviewing it. The shaping procedure varied across participants; however, for all participants a guess could earn 0, 1, 2, or 3 points. It is not clear whether each guess was marked with points or the points were summed by the experimenter and given back to the participant as a total.

During the course of the study, experimenters developed the following guidelines: to be eligible for 3 points, a guess had to include the correct rate with no mention of topographical features (force and rhythmic pattern); to earn 2 points, a guess had to specify correct rate, but topographical features could also be mentioned; 0 points were earned for incorrect responses about rate or responses with no mention of rate. For participants in the instructed group, participants were told to write either “press fast” or “press slowly” for one button and the opposite for the other button. Each guess consistent with the instructions earned 3 points.

The overall results of the study suggested that although verbal behavior was more difficult to establish through shaping, once established it controlled nonverbal behavior more reliably than verbal behavior established through instructions. This was evidenced in a higher correlation between verbal and nonverbal responding when the verbal behavior was shaped than when the verbal behavior was instructed. This correlation was observed even when [the] contingencies for the verbal and nonverbal behavior were
incompatible (e.g. when the verbal response “press left button fast” was reinforced, but
reinforcement was scheduled for pressing left button slowly.) Catania et al. (1982)
concluded that shaped descriptions of the contingencies for nonverbal performances were
more likely than instructed descriptions to control subsequent nonverbal responding. So,
nonverbal responding was consistent with the description rather than with the
contingencies when the description was shaped.

Torgrud and Holborn (1990) looked critically at the procedures used by Catania
et al. (1982). They suggested that “poor discriminative schedule control” influenced the
insensitivity of nonverbal responding to contingencies when a verbal description of
contingencies for nonverbal responding was shaped (Torgrud & Holborn, p. 275).
According to these authors, discriminative schedule control was not exhibited because
before the verbal description was successfully shaped, response rates on the two
schedules were approximately the same. In other words, the nonverbal performance did
not show schedule control even before the shaping of the verbal behavior, so attribution
of “insensitivity” to the rules was unjustified. Therefore, Torgrud and Holborn
investigated the effects of schedules they thought would be more likely to produce
discriminative schedule control of nonverbal responding. They hypothesized that less
verbal control of rates of nonverbal responding would be demonstrated.

Sessions were conducted using a computer. A lab attendant initially instructed the
participant to follow the computer’s instructions, saying, “Everything that occurs in this
experiment is between you and the computer.” After that, all instructions and
consequences were delivered via the computer. Prior to starting the experiment,
participants read very detailed instructions regarding the response topography necessary to earn points during the nonverbal component. The behavior to be emitted in the verbal component was described, and participants were told the maximum number of points possible for each verbal component. Finally, participants were told the points they earned would be exchanged for lottery tickets and the lottery was described.

As in Catania et al. (1982) the nonverbal response of interest was key presses. Two keys were in operation. The schedules used were described as “interval DRL” (Martin & Pear, 1988 p. 107; Torgrud & Holborn, 1990 p. 276) and “interval DRH” (Torgrud & Holborn, p. 276). An interval DRL was a schedule that provided reinforcement contingent on fewer than N responses in a given interval. Interval DRH was a schedule that provided reinforcement contingent on more than N responses in a given interval. Number of points delivered depended on rate of responding. A “medium” range of response rate was determined to be 11 to 15 responses/interval. When this was the target rate, responses in this range resulted in the delivery of 5 points at the end of a 5.5 s interval, response rates in the “fast” range (16-20 responses/interval) and in the “slowly” range (6-10 responses/interval) earned 3 points, and response rates in the “very fast” range (more than 20 responses/interval) and in the “very slow” range (1-5 responses/interval) earned 2 points.

In the verbal component a sentence appeared with five possible answers from which the participant to chose. The sentence stem was, “The best way to earn points on key A (or K) is:” with the choices of “press very slowly,” “press slowly,” “press at a 
medium rate,” “press fast,” “press very fast.” Differential delivery of points, as in the nonverbal component, was used to shape the verbal descriptions.

A procedural difference between this study and Catania et al. (1982) was that before participants were exposed to the verbal description, discriminative control of the contingencies for pressing had to be exhibited. Initially all participants earned maximum points by pressing in the medium range for both keys. For 2 participants, after stability was reached on the key press component, the verbal description component was introduced. Verbal descriptions were shaped in opposition to each other (for one key “press very slow, for the other “press very fast”). Then contingencies on rate of key pressing were gradually changed until each contingency for key pressing was in opposition to the corresponding description of rate of key pressing necessary to earn points.

For the other 2 participants, after stabilization of medium rate responding the contingencies for nonverbal responding were changed in opposition to each other. A very fast rate was reinforced for one key and a very slow rate was reinforced for the other key. After stability was exhibited, verbal descriptions were introduced. These descriptions were first consistent with the respective schedules they described, and then the contingencies for verbal responding were gradually changed so that the descriptions receiving maximum reinforcement were in opposition to the scheduled contingencies for key pressing. For all participants, these procedures resulted in schedule control over nonverbal behavior. This is in opposition to the results of Catania et al. (1982). Torgrud
and Holborn (1990) explain these results as a function of the “powerful discriminative control by the schedules employed” (p. 283).

Taking a slightly different stance in his analysis of the results of Catania et al. (1982), Cerutti (1994) identified two factors that may have contributed to the insensitivity of nonverbal responding to contingencies when verbal descriptions had been shaped. He suggested that the frequent interaction of the participant with the experimenter during the shaping procedure constituted a kind of monitoring, which affected performance. He also suggested that the schedules used were not very discriminable to participants. This second point seems somewhat similar to Torgrud and Holborn’s (1990) argument in that both arguments are related to the schedule used in Catania et al. However, Torgrud and Holborn’s discriminability focuses on whether the schedule of reinforcement for nonverbal responding would actually produce different rates of responding than the schedule identified in the instruction; whereas, Cerutti’s point seems to focus on the participant’s ability to identify whether the schedule in effect for nonverbal responding matches with the schedule identified in the instruction.

Cerutti (1994) manipulated monitoring and discriminability of schedules to determine if both or either may account for the relation Catania et al. (1982) found between shaped verbal responding and insensitivity of nonverbal responding to contingencies inconsistent with verbal descriptions. Cerutti recruited university students and offered extra credit for their participation in the study. Participants were not paid for participation or performance in this one-session study.
Participants were assigned to 1 of 3 conditions: fixed interval (FI) group, videotaped FI group, and RI group. The FI participants were exposed to an FI schedule for nonverbal responding; the videotaped FI participants were exposed to an FI schedule for nonverbal responding while being videotaped (i.e., a video camera was placed behind them and was turned on after the participants entered the lab, but prior to the participants beginning the session). The RI participants were exposed to an RI schedule for nonverbal responding. Cerutti utilized FI and RI schedules because of the implicit differences in the pattern of delivery of consequences for the two schedules. Consistency in the delivery of consequences affects the discriminative properties of a schedule. That is, when consequences are delivered in a consistent pattern as with FI schedules, subjects may easily determine if verbal descriptions of the contingency actually match the contingency. Likewise, a schedule that provides reinforcement in a less consistent pattern, like VI schedules, would be less discriminable (subjects may have difficulty determining if verbal descriptions match the contingencies for nonverbal responding). For the purposes of this paper, schedules that lend themselves to this discrimination, either due to consistency of pattern of reinforcer delivery (as in Cerutti) and/or precision of responding required for delivery of reinforcement (as in the current study), are referred to as discriminable. Schedules that are less easily discriminated in this way, either due to variability in scheduling of reinforcement (as in Cerutti) and/or lack of precision in the rate of responding required for delivery of reinforcement (as in Catania et al., 1982 and Cerutti), will be referred to as indiscriminable. Cerutti included the FI group to look at the effects of a discriminable schedule. The videotaped FI group was included to assess
effects of monitoring when a discriminable schedule was used and the RI group, to assess effects of an indiscriminable schedule.

All participants read instructions that identified their task as pressing the clear panels on the console to make a speaker beep. In this way, participants could earn points. This was the nonverbal component of the study and is similar to Catania’s procedures in that the nonverbal response is topographically the same and a multiple schedule is used. Two panels were present and when a panel was illuminated, presses on that panel were reinforceable provided they met the scheduled contingencies. The schedule in effect was either an FI multiple schedule or an RI multiple schedule (30 s for left panel, then 30 s for right), depending on each participant’s group.

Following the nonverbal response cycle, the panels were darkened and the verbal response cycle began. In this component, a multiple choice question appeared on the computer screen, asking the participant to identify the way to earn points by pressing either the left or the right panel. It is likely that Cerutti switched to shaping via the computer to eliminate monitoring of participants in the RI and FI groups. Multiple choice answers were “A) slowly, B) very slowly, C) moderately slowly, D) rapidly, E) very rapidly, F) moderately rapidly.” Participants answered by letter. Each cycle, participants had two opportunities to answer how to earn points on the left panel and two opportunities to identify how to earn points on the right panel. Responses were shaped using differential delivery of points.

Target responses were randomly determined for each participant at the beginning of each condition. For some participants, low rate targets (A, B, or C) were initially
selected for the right panel and high rate targets (D, E, or F) were selected for the left panel. The opposite was true for other participants. The shaping procedure delivered 1-3 points for high-rate guesses (A-C) and 0 points for other guesses when the target was high rate. When the target was low rate, 1-3 points were delivered for low-rate guesses (D-F) and 0 points for other guesses. After the 15th, 25th, and 32nd cycles contingencies for right and left guesses were reversed, with no performance criterion for the reversal. Reversals were implemented whether or not the verbal responding had been shaped. The session ended after 37 cycles.

Cerutti’s results supported his hypotheses. They indicated that the participants who were monitored with a camera (videotaped FI group) demonstrated better correlation between nonverbal and verbal responding than participants exposed to the same schedule of reinforcement, but not monitored with a camera (FI group). The participants exposed to an indiscriminable schedule (RI group) demonstrated a correlation between nonverbal and verbal responding similar to that of the videotaped FI group. These results suggest that both monitoring and randomly scheduled consequences may have contributed to the Catania et al. (1982) results.

Cerutti described correspondence between verbal and subsequent nonverbal responding as compliance with an instrumental-response instruction. He suggested that monitoring might affect compliance because it has been associated with social reinforcement for “correspondence between saying and doing.” That is, unless say-do correspondence is somehow monitored, it cannot be socially reinforced. Randomness in scheduling may also affect compliance with an instrumental response instruction because
randomness in scheduling results in a participant’s inability to discriminate the actual contingencies. When contingencies are not easily discriminable, a participant’s compliant nonverbal responding may be intermittently reinforced. This contact with reinforcement may engender further compliance with the instruction.

Based on these results, it does, in fact, seem that monitoring and indiscriminability of consequences for nonverbal responding result in what appears to be an insensitivity to current contingencies for nonverbal responding when a verbal response that may serve as an instruction for nonverbal responding is shaped. A question arises as to whether the results of Catania et al. (1982) and Cerutti (1990) apply to all instances of monitored verbal behavior. If we monitor participants’ verbal and nonverbal behavior, will there always be insensitivity to the scheduled contingencies? Would more precise instructions or a more discriminable schedule produce different results?

The present study examined whether the effects of monitoring and shaped verbal descriptions on correspondence between verbal and nonverbal responding were still observed when the contingencies were quantifiably precise. Some components of the study were like those of Catania et al. (1982) and Cerutti (1994), but there are some significant changes. Similar to both aforementioned studies, the nonverbal responses of interest in the present study were key presses and the verbal responses were guesses about the contingency for earning points by pressing. A potentially significant difference is that only one key was utilized in the nonverbal component, eliminating the possibility of a multiple schedule. Reinforcement of nonverbal responses was contingent, at various times, either on a long inter-response time (IRT) [3.3-3.5 s] or a short IRT [0.7-0.9 s].
These schedules were chosen for two reasons. First, they were likely to produce very
different patterns of behavior, suggested by Torgrud and Holborn (1990) as essential to
evaluating performance when contingencies for nonverbal and verbal responding are in
opposition. Second, they were likely to be highly discriminable to the participants. Each
schedule required responding at a certain rate for reinforcer delivery. Ratio schedules
(used in Catania et al.) allow a variety of response rates; interval schedules (used in both
Catania et al. and Cerutti) not only allow a variety of response rates, but also, rate of
reinforcement is not related specifically to the participant’s rate of pressing. The
schedules employed in the present study require a participant’s rate of pressing to fall
within a narrow IRT range (0.2 s) in order to be reinforced. Participants in Catania et al.
and Cerutti could press fast or slow and still earn points; however, the instruction
suggested only one type of responding was appropriate and performance was noted only
as sensitive to the schedule if responding met the author’s requirements for “slow”
responding. This seems to be justification for modifying the form of the verbal response.
As noted above, “fast” and “slowly” are not clear and precise descriptions of the
performance required for earning points by pressing. The present study made the
relations between say/do contingencies more precise by defining quantitatively both the
verbal and the nonverbal responses required to meet the contingencies. The shaping
procedure utilized here seems to be more systematic than those used in the other two
studies and was intended to accurately and quickly shape the verbal responding of
participants. Unlike the three studies described above, this study employed a single
participant design so that any differences in responding when a monitor was present
could be directly compared to the same participant’s responding when the monitor was absent. Similarly, reversals of the contingencies for both verbal responses and nonverbal responses were also conducted with each participant.
CHAPTER 2

METHOD

Participants

Seven students from the University of North Texas participated in this study. Two of the students were enrolled in an introductory course in Behavior Analysis. The other 5 students were enrolled in courses in other departments and had no experience in Behavior Analysis. These participants volunteered to participate in the study following a recruitment visit to their classes by the primary experimenter. Four of these 7 participants completed the study-- 3 (of the 5) students from other departments and 1 (of the 2) taking a class in the Department of Behavior Analysis. Of the participants who did not complete the study 1 participant withdrew, while the other 2 were dismissed due to unsuccessful shaping of the target verbal response, which was a prerequisite for continuation in the study.

Participants earned money for performance as well as for participating in and completing the study. During sessions participants earned points for performance. At the end of the final session each day, the points were exchanged for money at the rate of $.10 for every 100 points. Participants were also paid a bonus at the end of the study (or when they were dismissed) in the amount of $1.50/session completed.
Apparatus

Experimental sessions occurred in a human research lab in the Department of Behavior Analysis. Participants sat in front of a computer with a mouse. The computer used specially designed software to present the participant with visual stimuli and record all responses.

Stimuli and Responses

At the beginning of each session a black screen with the words “Hit only the Enter key” was on the monitor when the participants entered the room. Following an initial press of the Enter key, visual stimuli presented during a session alternated between the stimuli described in the following Key Pressing Component and Guessing Component sections.

Key Pressing Component

A green screen appeared and was present throughout this component. A counter in the upper left quadrant of the screen showed the number of points earned and advanced by 1 or 5 points each time the contingencies were met. Participants responded by pressing the “Enter” key. This arrangement is depicted in Figure 1.

Guessing Component

A blue screen appeared and was present throughout this component. A number line ranging from 0 to 5, with intervals of 0.2, appeared at the beginning and remained on the screen throughout this component. The words “Use the mouse to answer” were positioned directly above the number line. Also on the screen was the sentence, “The way to earn points by pressing is to press every ___ seconds.” Participants responded by
clicking on one of the tick marks on the number line. Following a response, the sentence disappeared briefly then re-appeared on the screen. This sentence appeared 6 times/cycle in the verbal component, each time positioned slightly lower on the screen. A counter in the upper right quadrant of the screen advanced each time the contingencies were met. At the end of the session, the two counters appeared with the points earned for each component in the session, along with the words, “Session over. Please, get lab attendant.” This arrangement is depicted in Figure 2.

Experimental Design

A within-participant design with two independent variables (IVs) was used to allow for an analysis of any effects of monitoring on correspondence between nonverbal (key presses) and verbal responding (guesses), both when contingencies for nonverbal and verbal responding were compatible with one another and when they were incompatible. One IV was the compatibility or incompatibility of contingencies for verbal and nonverbal responding. The other IV was the presence or absence of a monitor. The dependent variable (DV) for the nonverbal component was the IRT between key presses and the DV for the verbal component was the value in seconds of participant guesses about the “correct” inter-response time.

The study consisted of four phases (see Table 1). In the Baseline phase, the target responses were 0.8 s IRT for nonverbal responding and 0.8 s for verbal responding. For participants JIAC and JEAC, the next phase was Reverse Contingencies for Nonverbal. In this phase, the target response for verbal responding remained the same, 0.8 s, but the target response for nonverbal responding was changed to a 3.4 s IRT. For participants
AAC and TJAC, the second phase was Reverse Contingencies for Verbal, so the target response for nonverbal responding was unchanged from Baseline, but the target for verbal responding was changed to 3.4 s. The next phase for all participants was Return to Baseline with a target response of 0.8 s for both verbal and nonverbal responding. The final phase for participants JIAC and JEAC was Reverse Contingencies for Verbal (described above), and the final phase for participants AAC and TJAC was Reverse Contingencies for Nonverbal (described above).

The criterion to move from one phase to the next was successful shaping of the verbal response, defined as 1 or fewer errors on the last 30 verbal responses. Stable nonverbal responding was defined as less than 10% variance between mean IRTs for the last 5 nonverbal cycles in a session. If a participant missed 1 or more days between sessions, the participant began where he had ended in his last session even if criterion had been met. An additional requirement, a minimum of 2 monitored sessions and 2 unmonitored sessions during each of the two reversal conditions, was made following JEAC’s performance in the first reversal.

Procedures

Participants participated in a total of 12–14 sessions, with sessions conducted for 1-2 hrs/day, for 3-7 days. Before the first session began the experimenter read the following instructions: “Are you familiar with using a keyboard? Are you familiar with using a mouse? When the screen is green use the ‘Enter’ key on the keyboard. When the screen is blue use the left mouse button. I can’t answer any questions once we begin, but I will be happy to answer any questions at the end of the study.” The underlined portion
of these instructions was typed on paper and taped to the computer throughout the study. As the experimenter read this portion, she pointed to these written instructions. The only exception to this was for AAC, who was the first participant to take part in the study. For AAC the underlined portion was not read to the participant until the beginning of the third session, and at the same time, these written instructions were taped to the computer.

Contingencies in Nonverbal Component (Key Pressing)

In this component participants responded by pressing the ‘Enter’ key. During Baseline phase, Reversal of Contingencies for Verbal Responding phase, and Return to Baseline phase, responses with 0.8 s IRTs were followed by point delivery (0.1 s leeway was allowed, thus making responses between 0.7 and 0.9 s reinforceable). The counter advanced by 1 point each time the contingency was met, and each time the counter advanced a beep sounded. During Reversal of Contingencies for Nonverbal Responding phase responses with 3.4 s IRTs were followed by the counter advancing 5 points (the 0.1 s allowance made IRTs between 3.3 and 3.5 s reinforceable). The point increase for the longer IRT was designed to equalize the number of points a participant could earn during the sessions where the reinforceable IRT was 0.8 and the sessions where in the reinforceable IRT was 3.4. The Nonverbal Component ran for 1.5 min, after which the Verbal Component began.

Contingencies in Verbal Component (Guesses)

Participants responded to the question about the IRT length by placing the cursor on a tick mark (on the number line) and clicking the left mouse button. During Baseline, Reversal of Contingencies for Nonverbal Responding, and Return to Baseline, the target
response was 0.8 s. In the phase named Reversal of Contingencies for Verbal Responding the target response was 3.4 s. Points were delivered in accordance with a shaping procedure. The length of this session was determined by how long the participant took to respond to the six presentations of the question.

Shaping

The first response on the number line above the target response and the first response on the number line below the target response were followed by a 10-point advancement of the counter. After that, to receive points each response had to be at least 1 tick mark closer to the target response than any previous response made to a tick mark of greater or lesser value than the target. For example, if the target was 0.8 and a previous response to a value lower than 0.8 was 0.4, then responses to a value lower than 0.8 were required to be above 0.4 for point delivery. When the target responses changed, the shaping procedure was reset. Also, the experimenter could reset the shaping procedure if the participant was not responding correctly after 2 sessions at a given setting.

Monitoring/ No Monitoring

Conditions of Monitoring and No Monitoring occurred during all phases of the study. Sessions were assigned to the Monitoring or No Monitoring condition in the following quasi-random manner. Papers marked with M (Monitoring) and N (No Monitoring) were placed in a cup and one was selected. If M was drawn first, then the next condition was N, and vice versa. Then both papers were replaced in the cup and each had a 0.5 probability of being drawn for the next session. In Monitoring sessions the experimenter sat in a chair behind the participant with the participant's data folder and a
pencil. During this time, the monitor recorded the participant name, session number, and type of session on a data sheet. Participants did not see what the monitor was recording, but may have heard the marking on paper. In the No Monitoring sessions the participant was in the room alone with the computer.
CHAPTER 3

RESULTS

Figures 3-6 reflect the individual data for the 4 participants who completed the study. The data for those participants whose verbal responding was not successfully shaped are not included in this analysis, as successful shaping was a prerequisite to move to the reversal phase, and the reversal was essential for an analysis of the effects of the two IVs.

Successful shaping and reversals of verbal responding were accomplished in all 4 participants. In all cases, the participants’ nonverbal responding remained under control of scheduled consequences, whether the participants’ self-instructions were compatible or incompatible with the nonverbal behavior. Reversals of nonverbal responding were accomplished in 3 out of 4 participants, with verbal responses remaining consistent with contingencies programmed for those self-instructions, i.e. say/do correspondence was not observed when contingencies for verbal and nonverbal responding were incompatible with each other. These reversals were performed to determine if verbal responding exerted control over nonverbal responding, if nonverbal responding exerted control over verbal responding, or if neither exerted control over the other. With the exception of one reversal session for 1 participant, the results clearly indicate that neither verbal nor nonverbal responding controlled the other, but rather the two types of behaviors were each controlled by their respective contingencies.
During the first baseline, and in any phase during which contingencies for verbal responding were reversed, a shaping procedure was used to shape the verbal response that described contingencies for nonverbal responding. Contingencies for verbal responding were consistent with the contingencies for nonverbal responding during baseline. For all participants verbal responding and nonverbal responding were consistent with contingencies in effect during baseline. Following the first baseline, contingencies for verbal responding were reversed for AAC and TJAC; and after a second baseline, contingencies for nonverbal responding were reversed. During each reversal, contingencies for verbal and nonverbal responding became incompatible, but the incompatibility in the first reversal was due to a change in contingencies for verbal responding while the incompatibility in the second reversal was due to a change in contingencies for nonverbal responding. For Participant AAC (Figure 3) reversing contingencies for verbal responding resulted in a reversal of verbal responding, but did not affect nonverbal responding. Following a return to Baseline (contingencies for verbal responding again consistent with contingencies for nonverbal responding), there was a reversal of the contingencies for nonverbal responding. The reversal of contingencies for nonverbal responding resulted in a reversal of nonverbal responding, but verbal responding was unaffected by this change. Monitoring of AAC’s performance did not affect the correspondence between nonverbal responding and verbal responding. Participant AAC responded in accordance with scheduled contingencies in both components whether or not a monitor was present.
The data for Participant TJAC (Figure 4) show similar results. Reversal of contingencies for verbal responding resulted in reversal of verbal responding with no change in nonverbal responding. Although the reversal of nonverbal contingencies initially disrupted verbal responding, responding in both components was consistent with the respective contingencies by the 5th cycle of the first session of this condition. As observed with Participant AAC, monitoring had no effect on Participant TJAC’s responding.

The other 2 participants (JIAC and JEAC) were exposed to reversals in the opposite order. First, contingencies for nonverbal responding were reversed, and after a return to baseline condition, contingencies for verbal responding were reversed. When the contingencies for nonverbal responding were reversed for Participant JIAC (Figure 5) there was a reversal in nonverbal responding. Also, there was an initial change in verbal responding. However, by the 5th cycle of the first session of this condition, verbal responding was consistent with the actual contingencies for verbal responding. A similar result was seen when the contingencies for verbal responding were reversed. There was a reversal in verbal responding with only a brief initial disruption in nonverbal responding. Then, nonverbal responding returned to IRTs consistent with the contingencies for nonverbal responding. Again, monitoring of performance had no observable effect on Participant JIAC’s responding.

The results for Participant JEAC (Figure 6) are not as clear. Although during the reversal of contingencies for nonverbal responding the participant’s nonverbal responding did come into contact with the new contingencies, IRT values were not
consistent with the actual contingencies. Rather, during the second session of this condition, IRTs of nonverbal responses returned to values similar to those during baseline and consistent with the verbal responding being reinforced in that phase. This is the only evidence of verbal instructions resulting in insensitivity to contingencies for nonverbal responding in this study. The reversal of contingencies for verbal responding produced responding similar to that of the other 3 participants, in that there was a reversal of verbal responding and nonverbal responding remained consistent with the contingencies for nonverbal responding. It is unclear for Participant JEAC whether the presence of a monitor in Session 6 is responsible for the correspondence between verbal and nonverbal responding, despite incompatible contingencies. It should be noted that during Session 5, with no monitor present and directly following the successful reshaping of verbal responding, the IRTs were becoming progressively shorter during the last 3 cycles, and, thus, progressively more similar to responding during Baseline and consistent with the verbal behavior being reinforced in that phase. A clear analysis could only be made had the experimenter conducted more sessions in this reversal phase; however, the participant’s performance seems to suggest that the observed correspondence between nonverbal and verbal behavior is a result of control by instructions, but was probably not influenced by the presence of the monitor, because in the reversal when contingencies for verbal responding were changed effects of monitoring were not observed. Scheduled contingencies appeared to control verbal and nonverbal behavior independently, regardless of monitoring.
CHAPTER 4
DISCUSSION

The Catania et al. (1982) research strongly suggested that shaping a verbal response produced nonverbal responding that was insensitive to the scheduled contingencies for nonverbal responding. The present research does not support that conclusion. It does, however, support Torgrud and Holborn’s (1990) findings of sensitivity of both verbal and nonverbal responding to scheduled contingencies. The two reversal phases for each participant allowed for an analysis of whether verbal and/or nonverbal behavior was under control of the scheduled contingencies (i.e. sensitive), or whether one or the other type behavior was insensitive to a change in its own contingencies. In seven out of eight opportunities, sensitivity to the scheduled contingencies was exhibited. Insensitivity was observed in only one condition for 1 participant (JEAC). Data from this participant’s baseline suggested that contingencies for either verbal or nonverbal behavior may have controlled both kinds of behavior at one time or another in the first reversal of contingencies. If this was the case, the most likely direction of control appears nonverbal to verbal because the most significant change occurred in verbal rather than in nonverbal responding. However, by the 6th cycle of the 1st session of the phase where contingencies for nonverbal responding changed to be incompatible with ongoing verbal responding, nonverbal responding became consistent with the shaped verbal description (insensitive to contingencies of nonverbal responding).
This consistency continued even when verbal behavior returned to the rate description observed in baseline.

It is not clear why this participant initially responded differently than did the other three. Perhaps, this participant had a more extensive history of rule following than did the other participants. Possibly the fact that she was taking an introductory class in the department contributed to the results, although rule-governed behavior is not a topic mentioned in that class. At any rate, the behavior exhibited in the second reversal suggests that the participant discriminated that the verbal descriptions of the necessary rate of nonverbal responding did not match with the contingencies for nonverbal responding. Thus, both verbal and nonverbal behavior came under control of the scheduled contingencies. Taken as a whole, the data for all participants strongly suggest that shaping of verbal descriptions is not a sufficient condition for insensitivity. There must be other conditions present as well.

Cerruti’s (1994) results suggested that both monitoring and indiscriminable schedules produced insensitive nonverbal responding when verbal descriptions were shaped. The results of the present study do not support the monitoring hypothesis. For 3 out of 4 participants the presence of a monitor had no effect on the correspondence between verbal and subsequent nonverbal responding. For the 4th participant, the presence of a monitor had no effect in the 2nd reversal. In the 1st reversal, it is unlikely that the presence of a monitor produced the correspondence between nonverbal and verbal responding. The data indicate that monitoring of a participant’s behavior does not always produce insensitivity to scheduled contingencies. One potential reason for the
discrepancy may be that in Cerruti (1994) the monitoring was present throughout the study. Participants in the present study may have been more likely to “experiment,” in sessions where no monitor was present. So, it may be that only if monitoring is continuous will it contribute to insensitivity to contingencies for nonverbal responding.

A second possibility is that videotaping performance is a more effective form of monitoring than an observer in the back of the room because it is apparent that a permanent record of the participant’s performance is being produced. Another possibility pertains to Cerutti’s point about a monitor serving as a discriminative stimulus for social reinforcement of compliance. What aspect of monitoring actually contributes to the monitor serving as a discriminative stimulus? Is it that the monitor delivers feedback? In the present experiment a human monitor was in the room. In Catania et al. (1982) a “faceless” monitor delivered feedback. There is no feedback component in the present study. Perhaps during Baseline, where participants encountered no social reinforcement for compliance, the discriminative function of a monitor was obviated. Although no feedback was delivered in Cerutti, the videotaping may have suggested that social reinforcement would be delayed. Because Cerutti’s study was completed in 1 session, it is unlikely that participants interacted with the experimenter during the course of the study, and, thus, the absence of social reinforcement was not discernible until the end. Yet another related possibility is that the mere presence of a monitor is not enough to influence sensitivity. In the current study, it is not clear what the monitor is monitoring for. The subject receives no information regarding whether the monitor is looking for the subject to follow the verbal descriptions or to maximize points.
Another possibility is that the effect of monitoring on sensitivity to schedules is overridden when the schedule is not highly discriminable. Perhaps, Cerutti’s interval schedule was not discriminable enough. Although FI schedules are presumably more discriminable than VI schedules, the fact remains that reinforcement delivered on an interval schedule is not contingent on rate of responding. Participants can respond at many different rates and earn the same reinforcers. Perhaps in this context monitoring results in insensitivity, but when the contingencies are more discriminable, the effect of monitoring is overridden.

This brings us to the variable that seems to have the most bearing on whether insensitivity occurs (i.e. discriminability of the schedule of reinforcement for verbal and for nonverbal responding). Cerutti found that in the absence of monitoring a discriminable schedule (FI) produced schedule-sensitive nonverbal responding. The present study, which utilized highly discriminable schedules, resulted in sensitivity to the contingencies in effect for both verbal and nonverbal responding throughout the entire study for 3 of 4 participants. For the 4th participant, such sensitivity was seen in one of two reversals. This supports Cerutti’s (1994) findings as well as those of Torgrud and Holborn (1990).

What is different about the present study and these aforementioned studies that show insensitivity to reinforcement schedules incompatible with shaped verbal instructions (e.g., Catania, Matthews & Shimoff, 1982)? The present study utilized an extremely precise instruction: “The way to earn points by pressing is to press every 0.8 s (3.4 s).” The contingency is specified, the topography is specified, and the exact rate of
pressing necessary is specified. This instruction was used in conjunction with a schedule for nonverbal responding that required the participant to press the key at very precise intervals-- every 0.8 s or every 3.4 s. When these two contingencies were in conflict (e.g., 3.4 s for verbal and 0.8 s for nonverbal) it was very easy for participants to discriminate that the instructions and the contingencies didn’t match. In the present study, sensitivity to the schedule was evident when unambiguous conflicting instructions had been shaped, [and] whether or not monitoring was in effect.

The results of the current study clearly identify conditions under which sensitivity to scheduled contingencies occurred. Questions still remain as to under what conditions insensitivity to scheduled contingencies will occur. Specifically, this study generates questions about the effect of the monitor. What would be the effect if the monitor delivered feedback? What if subjects were told what the monitor was observing?

Perhaps, the most significant result of this study is that it demonstrates that both verbal and nonverbal behavior is a function of contingencies of reinforcement. There may be no fundamental differences between verbal and nonverbal behavior, either in how they are developed or how they are maintained in an organism’s repertoire. Contingencies are fundamental to both. This is not to say that a human will always respond in accordance with the current contingencies. Current contextual conditions may influence current responding. What is being suggested here is that broad statements about verbal behavior (instructions) producing nonverbal behavior insensitive to contingencies-- whether that verbal behavior is shaped or instructed-- obscure important facts about the relation between verbal and nonverbal behavior.
### EXPERIMENTAL DESIGN

**PARTICIPANTS AAC & TJAC**

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<tr>
<th>BASELINE</th>
<th>REVERSE CONT. V.R.</th>
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<th>REVERSE CONT. N.V.R.</th>
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<td><strong>Target Response</strong></td>
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<tr>
<td>NV- IRT 0.8 s</td>
<td>NV- IRT 0.8 s</td>
<td>NV- IRT 0.8 s</td>
<td>NV- IRT 3.4 s</td>
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<tr>
<td>V- 0.8 s</td>
<td><strong>V- 3.4 s</strong></td>
<td>V- 0.8 s</td>
<td>V- 0.8 s</td>
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**PARTICIPANTS JIAC & JEAC**

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<tr>
<td>V- 0.8 s</td>
<td>V- 0.8 s</td>
<td>V- 0.8 s</td>
<td><strong>V- 3.4 s</strong></td>
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Table 1. Experimental design for all participants. Reverse Cont. N.V.R.= Reverse contingencies for nonverbal responding; Reverse Cont. V.R.= Reverse contingencies for verbal responding, Mon. = Monitored, No Mon. = Not monitored, NV= Nonverbal, V= Verbal.
Figure 1. Screen present during Key Pressing Component.
The way to earn points by pressing is to press every _____ seconds.

Use mouse to answer the question:

Figure 2. Screen present during Guessing Component.
Figure 3. Mean IRTs for Nonverbal Component and mean guesses about IRTs for Verbal Component. S= Session #, M= Monitored NM= Not Monitored. The number “48” in the first Baseline phase indicates where the mean IRT for nonverbal responding was 48 s.
Figure 4. Mean IRTs for Nonverbal Component and mean guesses about IRTs for Verbal Component. S= Session #, M= Monitored NM= Not Monitored. The number “32” in the first Baseline phase indicates where the mean IRT for nonverbal responding was 32 s.
Figure 5. Mean IRTs for Nonverbal Component and mean guesses about IRTs for Verbal Component. S= Session #, M= Monitored NM= Not Monitored. The number “37” in the first Baseline phase indicates where the mean IRT for nonverbal responding was 37 s.
Figure 6. Mean IRTs for Nonverbal Component and mean guesses about IRTs for Verbal Component. S= Session #, M= Monitored NM= Not Monitored.
REFERENCES


