

*EFFECTS OF EXPERIMENTER- AND PARTICIPANT-
DELIVERED INSTRUCTIONS ON HUMAN SCHEDULE
PERFORMANCE*

**EFFECTOS DE LAS INSTRUCCIONES ENUNCIADAS POR
EL EXPERIMENTADOR Y EL PARTICIPANTE EN LA
EJECUCIÓN DE UN PROGRAMA EN HUMANOS**

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Abstract

The experiment examined effects of instructions on human schedule performance when providers of the instructions were persons other than the experimenter. Pressing a key by one member of each pair of eight undergraduates produced points on a multiple fixed-interval (FI) FI schedule. Another member of the pair was exposed to a multiple fixed-ratio (FR) differential-reinforcement-of-low-rate (DRL) schedule. After every session, verbal descriptions of how to increase points written by another member of the pair were presented. The final response rates under the multiple FI FI schedule were indistinguishable between the two components in each of four participants although they each received verbal descriptions indicating

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All procedures performed in studies involving human participants were in accordance with the ethical standards of Osaka Kyoiku University research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

that the way to increase points with the key was to respond rapidly in one component and to respond slowly in another. Such weak effects of instructions given from persons other than the experimenter were contrasted with stronger effects of instructions given by the experimenter, that is, the final response rates were higher with the instruction to respond rapidly than with the instruction to respond slowly for three of the four participants. This differential effect across the instruction providers was not found in each of four participants who were exposed to the multiple FR DRL schedule.

Keywords: instructions, verbal behavior, rule-governed behavior, social interactions, schedule contingencies, key press, humans

Resumen

El experimento examinó los efectos de las instrucciones en la ejecución en un programa en humanos cuando las instrucciones las proveen personas distintas al experimentador. La presión a una tecla por uno de los miembros de cada par de ocho estudiantes producía puntos con un programa múltiple intervalo fijo (IF) IF y, por el otro miembro en un múltiple razón fija (RF) reforzamiento diferencial de tasas bajas (RDB). Después de cada sesión, a cada miembro de la pareja se le presentaron las descripciones verbales escritas por el otro miembro sobre como incrementar puntos. Las tasas de respuestas en el programa múltiple IF IF fueron indistinguibles entre los componentes en los cuatro participantes a pesar de que recibieron las descripciones que indicaban como incrementar puntos respondiendo rápidamente en un componente y lento en el otro. Los efectos débiles de las instrucciones dadas por una persona distinta al experimentador contrastaron con los efectos fuertes de las instrucciones enunciadas por el experimentador; es decir, las tasas de respuestas fueron más altas con la instrucción de responder rápidamente que con la de responder lentamente para tres participantes. Este efecto diferencial no se encontró en los participantes expuestos al programa múltiple RF RDB.

Palabras clave: instrucciones, conducta verbal, conducta gobernada por reglas, interacciones sociales, contingencias del programa, presión a tecla, humanos

Instructions are structurally defined as stimuli that consist of words used in a verbal community of listeners, and as antecedents of the behavior of listeners (Catania, 2013, p. 446; Okouchi, 1999). Instructions have significant roles on human behavior both inside and outside the laboratory. For example, some sort of in-

structions must occur in any laboratory experiment with humans (Baron & Galizio, 1983). Control of behavior by instructions is at the foundation of the coordination of activities throughout everyday human activity in education, child rearing, personal relations, and industry (Schmitt, 1998).

For over 50 years, the experimental analysis of behavior has examined the influence of instructions on human operant behavior (e.g., Galizio, 1979; Hayes, Brownstein, Zettle, Rosenfarb, & Korn, 1986; Kaufman, Baron, & Kopp, 1966; O'Hara, Barnes-Holmes, & Stewart, 2014; Okouchi, 1999). Of its outcomes, the following three findings are well known and frequently cited. First, when instructions were accurate, that is, when the instructions specified contingencies actually in effect or responses usually generated under direct control of those contingencies, responses topographically similar to those controlled by the contingencies were established (Galizio, 1979; Hayes, Brownstein, Zettle, et al., 1986; Kaufman et al., 1966). Hereafter, this will be described as the *accurate-instruction effect*. Second, when instructions were not accurate but specified contingencies usually generating responses leading to no aversive consequences under contingencies actually in effect or specified such responses, those responses were established and persisted even though they were not necessary for obtaining or avoiding consequences from the actual contingencies (Galizio, 1979; Hackenberg & Joker, 1994; Kaufman et al., 1966; Okouchi, 1999). Hereafter, this will be described as the *no-contact-inaccurate-instruction effect*. Third, when instructions were not accurate but specified contingencies usually generating responses leading to aversive consequences under the contingencies actually in effect or if the instructions specified such responses, those responses did not persist but responses controlled by the actual contingencies emerged (Galizio, 1979; Hackenberg & Joker, 1994; but see also Hayes, Brownstein, Haas, & Greenway, 1986; Hayes, Brownstein, Zettle, et al., 1986). Hereafter, this will be described as the *contact-inaccurate-instruction effect*.

In almost all experiments of the experimental analysis of behavior that examined the effects of instructions, the instructions were given by the experimenter (for one of the exceptions, see Rosenfarb, Newland, Brannon, & Howey, 1992). Does this practice have no influence on the results? To date, it is difficult to answer this question because no work has been published in the experimental analysis of behavior comparing the effects of instructions as a function of who is providing the instructions. There is, at least, however, one previous finding outside the experimental analysis of behavior suggesting that instructions given by an experimenter may have different effects on human behavior than those given by a person other than the experimenter (Milgram, 1974, pp.93-97). In one of his series of laborato-

ry studies of obedience, which examined whether participants followed orders to shock a victim (who was a confederate), Milgram found that the participants were less likely to follow the orders when the orders were given by another participant (who was a second confederate) than when they were given by an experimenter.

The present experiment examined the effects of instructions on the schedule performance of adult humans when the providers of the instructions were persons other than the experimenter. Of three instructional effects described above, the last two (the no-contact-inaccurate-instruction effect and the contact-inaccurate-instruction effect) were the focus of this experiment because the effects of instructions could be isolated from the effects of contingencies when the instructions were inaccurate (Hackenberg & Joker, 1994; Shimoff, Matthews, & Catania, 1986). If the results were similar to those when the instructions were given by the experimenter, the generality of the classic findings of instructional control (cf. Baron & Galizio, 1983) would be confirmed. As Milgram's (1974, pp.93-97) finding suggests, by contrast, if the results were different, the generality might be challenged.

Method

Participants

Three male and five female undergraduates recruited from educational psychology classes at Osaka Kyoiku University participated. They were 19 to 23 years old, and none had experience with operant conditioning experiments. The participants were assigned to dyads such that members of each dyad would not be acquainted with each other. Informed consent was obtained from all individual participants included in the study.

Experimenter

The first author served as the experimenter.

Apparatus

The experimental room was 3.08 m wide, 5.95 m deep, and 3.00 m high, consisting of a 0.92 m wide and 1.68 m deep space enclosed by partitions (Space A) and a 1.70 m wide, 2.20 m deep, and 2.17 m high cubicle (Space B). Sessions were conducted in Space A for one member of each pair of the participants (Participant A) and in Space B for another (Participant B). A Nihon Electric Company PC-MJ30Y microcomputer, located in a separate space, controlled the experiment. Extraneous sounds were masked by white noise through a speaker located in Space A. A venti-

lating fan and air conditioner in Space B provided additional masking noise. Walls of the cubicle (Space B) shielded visual contacts between the participants.

Each participant sat at a desk facing a color display monitor (340 mm wide by 275 mm high) and a numeric keypad (for Participant A) or a keyboard without a numeric keypad (for Participant B). Identical stimuli were presented on the screen in each space through a video splitter. Stimuli for Participants A and B were presented on the left and right of the screen, respectively. The other side of the screen was covered with a black piece of paper so that neither participant could observe stimuli presented to his / her partner. Only the "5" and "D" keys were operative for Participants A and B, respectively.

When a colored square (25 mm each side) was presented in the center of the black screen (the left and right sides of the screen for Participants A and B, respectively), each press to an operandum key (the "5" key for Participant A and the "D" key for Participant B) was defined as a response. The Japanese Katakana characters pronounced as "tong" were presented above the square as feedback for 0.1 s immediately after the response. A response that met the schedule requirement produced 100 points. Each of the point deliveries and the termination of the timeout was accompanied by a 0.2-s sound through a speaker located on each desk in Spaces A and B. Session cues consisting of the words "READY," "GO," "WAIT," and "GAME OVER," were presented at the top of the screen (the left and right sides of the screen for Participants A and B, respectively) and points accumulated in the session were presented below the session-cues.

Procedure

Participants signed an informed consent agreement that specified the duration of their participation, the average earnings for such participation, and the right to withdraw from the experiment at any time. They agreed to participate in six 90-min experimental periods.

Experimental periods occurred once per week. During each 90-min experimental period, a maximum of seven sessions occurred. Sessions were separated by breaks, during which participants were required to complete guessing sheets. After every experimental period, participants were paid for their performance (1 yen per 100 points, approximately .012 U.S. dollars or approximately 1.516 Mexican pesos). On completion of the experiment, participants were paid for their participation (100 yen per 90 min) and were debriefed. The overall earnings for each participant who completed the entire experiment ranged from 1,455 to 1,653 yen (approximately 17.46 to 19.84 U.S. dollars or approximately 220.56 to 250.62 Mexican pesos).

Table 1.
Stimuli and schedules presented during components of multiple schedules in each condition.

	Prelim		Experimental conditions			
	Stimulus	Schedule	E-Inst		P-Inst	
Participant	Stimulus	Schedule	Stimulus	Schedule	Stimulus	Schedule
FR / DRL	Se-a	FR	Red	FR	Blue	FR
	Nu-mu	DRL	Green	DRL	Yellow	DRL
FI / FI	Se-a	FR	Red	FI	Blue	FI
	Nu-mu	DRL	Green	FI	Yellow	FI

Note. The labels “Prelim,” “E-Inst,” and “P-Inst” describe the preliminary training, the experimenter-instruction, and the partner-instruction conditions, respectively. The labels “FR / DRL” and “FI / FI” describe the FR / DRL and the FI / FI participants, respectively. The labels “Se-a” and “Nu-mu” describe the pronunciation of Japanese two-letter syllables presented in the preliminary training condition.

Table 1 summarizes the conditions of the present experiment. Participants of each pair firstly participated individually in a preliminary training condition, and thereafter in experimental conditions simultaneously. Both participants of each pair were exposed to a multiple fixed-ratio (FR) differential-reinforcement-of-low-rate (DRL) schedule in the preliminary training condition. In the experimental conditions, one of each pair was exposed to a multiple FR DRL schedule (the FR / DRL participant), whereas the other was exposed to a multiple FI FI schedule (the FI / FI participant). The experimental conditions consisted of an experimenter-instruction condition and a partner-instruction condition. Instructions were given by the experimenter in the former condition, and they were given by the other member of the pair in the latter condition. Table 2 shows the schedule in effect and the sequence of the conditions presented for each participant during the experimental conditions.

Preliminary training condition. On the first day of the experiment, each participant was asked to leave wristwatches, cellular phones, and books outside the experimental space. Once in the space, Participant A was asked to read silently the following general instructions (translated here from Japanese into English):

Your task is to earn as many points as you can. A hundred points are worth one yen. Payment for the points will be made at the end of each visit. In addition,

Table 2
Sequence of the experimental conditions in each pair of participants.

Pair of participants	First condition	Second Condition
5A (FR / DRL) & 5B (FI / FI)	E-Inst	P-Inst
6A (FI / FI) & 6B (FR / DRL)	E-Inst	P-Inst
7A (FR / DRL) & 7B (FI / FI)	P-Inst	E-Inst
8A (FI / FI) & 8B (FR / DRL)	P-Inst	E-Inst

Note. The labels “E-Inst,” and “P-Inst” describe the experimenter-instruction condition and the partner-instruction condition, respectively. The labels “FR / DRL” and “FI / FI” describe the FR / DRL and the FI / FI participants, respectively.

you will be paid 100 yen for every 90 min you spend in the experiment. Payment for participation will be made at the end of the last visit.

The only key you may press is “S.” Please do not touch any other keys. It is up to you whether you press “S” key or not. If you press this key, points may increase. Or, the change of the points may be unrelated to pressing the key. The words “READY” and “GO” will appear in sequence on the screen. When the word “GO” disappears, the task will start. The task will continue until the words “GAME OVER” appear on the screen. During the task, the word “WAIT” may appear on the screen. When this word appears, please wait until it disappears.

The general instructions for Participant B were identical to those for Participant A except for describing that the operative key was “D.” The experimenter read the general instructions aloud to each participant while the participant was reading them silently. Questions regarding the experimental procedure were answered by rereading aloud the appropriate sections of the general instructions to the participant. The printed general instructions remained on the desk throughout the experiment. Next, the words “READY” and “GO” were presented in sequence at the top of the screen. After the word “GO” disappeared, a square was presented in the center of the screen.

When the schedule requirement was met, the square was darkened, 100 points were accumulated on the counter, and the word “WAIT” was presented at the top of the screen, followed by a 3-s timeout. Any key press that occurred during the timeout restarted the timeout interval.

A multiple FR DRL schedule was used. Each component was presented once per session. The interval between components was 10 s, during which only the word

“WAIT” was presented at the top of the screen. Any key press that occurred during the inter-component interval restarted the interval. After the second component ended, the words “GAME OVER” appeared at the top of the screen.

Each participant participated in six sessions of the preliminary training condition individually. Two Japanese Katakana two-letter nonsense syllables in black, pronounced as “se-a” and “nu-mu”, superimposed on the white square on the screen, were correlated with the FR and DRL schedule components, respectively (Table 1). The schedule values were increased progressively over four sessions. That is, the values for the FR and DRL schedules in the first, second, and third sessions were 5 responses and 1 s, 10 responses and 2 s, and 15 responses and 3 s, respectively. For Sessions 4 through 6, a multiple FR 25 DRL 5-s schedule was in effect. Each component lasted until 30 reinforcers occurred. The FR schedule component always preceded the DRL.

Following each session, each participant was given a guess sheet with a pencil and asked to complete it (Catania, Matthews, & Shimoff, 1982). The guess sheet had two sentences to be completed. The first was “When the word ‘se-a’ is presented, the way to increase points with the key is to: (a blank to be filled was here)”; the second differed only in specifying the word “nu-mu.” The completed sheet and pencil were withdrawn before the next session.

Experimental conditions. The procedure comprising the experimental condition was identical to that in the final session of the preliminary training condition with the following exceptions. Participants of each pair participated in the conditions simultaneously. On the first day of the first experimental conditions, the experimenter introduced the participants to one another, and thereafter escorted them into their spaces.

The FR / DRL participant was exposed to a multiple FR 25 DRL 5-s schedule, whereas the FI / FI participant was exposed to a multiple FI 5-s FI 5-s schedule (Table 1). Each component lasted for 4 min (including time spent by timeouts). Nonsense syllables were not shown on the screen. The center square on the screen was blue, yellow, red, or green, depending on the conditions and components. The order of the square colors was the same between participants in each pair. The order of the FR and DRL components was random, with the restriction that the same order could not occur for more than three consecutive sessions. A condition lasted for a minimum of six sessions and until the performance was stable in each of the pair simultaneously. A discrimination ratio, the ratio of the response rate (the number of responses per minute) during one of the two components (the component during which the center square on the screen was blue in the partner-instruction

condition and that was red in the experimenter-instruction condition) to the sum of the response rates during both components, was calculated in every session. If each of the discrimination ratios in three consecutive sessions was within 15% of the mean of those three sessions and there was no monotonic upward or downward trend in the ratios across those sessions, then the performance was considered stable (Baron & Perone, 1998; Galizio, 1979).

As shown in Table 2, Pairs 5 and 6 experienced firstly the experimenter-instruction condition then the partner-instruction condition, whereas Pairs 7 and 8 experienced firstly the partner-instruction condition then the experimenter-instruction condition.

Partner-instruction condition. Figure 1 provides a diagram of the procedure of the partner-instruction condition. In this condition, the center square on the screen was blue in the FR 25 schedule component and yellow in the DRL 5-s schedule component for the FR / DRL participants (Table 1). For the FI / FI participants, an FI 5-s schedule was in effect during both components, with the square being blue in one component (the blue component) and yellow in the other (the yellow component). The first sentence of the guess sheet was “When the square is blue, the way to increase points with the key is to: (a blank to be filled was here)”; the second differed only in specifying the color of the square as yellow. Except following the final session, the sheet completed by the FR / DRL participant was presented to the FI / FI participant, and vice versa, with a comment by the experimenter, “This is the sheet your partner wrote.” The sheet remained on the participant’s desk throughout the next session. That is, except for the first session, his / her partner’s instructions were given to each participant.

Sentences on the guess sheets that an FI / FI participant completed and that were given to an FR / DRL participant might likely be contact-inaccurate instructions because they would possibly make the responding contact with aversive consequences. For example, an FR / DRL participant’s low-rate responding following an instruction (a sentence from his / her partner, an FI / FI participant) “when the square is blue, the way to increase points with the key is to press slowly with a pause,” which would not unlikely be written with the exposure to FI schedules (e.g., Lippman & Meyer, 1967), would not produce points because, for the FR / DRL participant, an FR schedule was in effect in the presence of the blue square (see Figure 1). By contrast, the sentences that an FR / DRL participant completed and that were given to an FI / FI participant might likely be no-contact-inaccurate instructions. For example, an FI / FI participant’s high-rate responding following an instruction from his / her partner, an FR / DRL participant, “when the square is

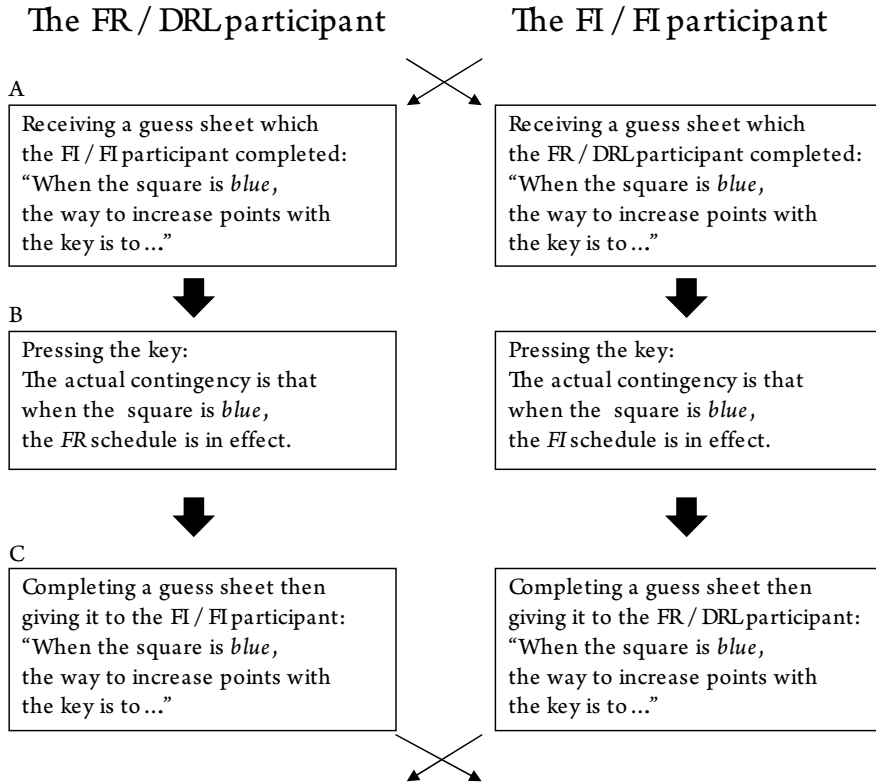


Figure 1. Example of one session in the partner-instruction condition. For a simple illustration, only the case when the square is blue is described. (A) The FR / DRL participant (left) receives a guess sheet which the FI / FI participant (right) completed, whereas the FI / FI participant receives a guess sheet which the FR / DRL participant completed. (B) The FR / DRL participant is exposed to the multiple FR DRL schedule, whereas the FI / FI participant is exposed to the multiple FI FI schedule. (C) Each participant completes a guess sheet and gives it to his / her partner, the FI / FI participant or the FR / DRL participant.

blue, the way to increase points with the key is to press many times rapidly," which would likely be written with the exposure to FR schedules (e.g., Rosenfarb et al., 1992), would not contact aversive consequences. Under an FI schedule, by definition, any response after a constant time (interval) produces reinforcers regardless of the rates of responding emitted before the time elapsed.

Experimenter-instruction condition. The procedure in the experimenter-instruction condition was identical to that in the partner-instruction condition with the

following exceptions. The center square on the screen was red in the FR 25 schedule component and green in the DRL 5-s schedule component for the FR / DRL participant, whereas the square was red in one component of the FI 5-s schedule (the red component) and green in the other for the FI / FI participant (the green component, Table 1). Verbal descriptions on the guess sheet written by his / her partner were presented to neither participant. The following sentences were added to the general instructions for the FR / DRL participant.

Regardless of the color of the square, the way to increase points is press the key slowly with a pause.

For the FI / FI participant, the following sentences were added to the general instructions.

When the square is red, the way to increase points is to press the key rapidly many times. When the square is green, the way to increase points is to press the key slowly with a pause.

These inaccurate instructions were adapted from Okouchi (1999) and from verbal descriptions written by pilot participants who were exposed to the same schedule that the FR / DRL participants were exposed to, that is, a multiple FR 25 DRL 5-s schedule.

Analysis of verbal descriptions

Two naïve raters, psychology major undergraduates, were given verbal descriptions written on the guess sheets and asked to assess independently whether the descriptions specified high-rate responding or low-rate responding. To help in making their decisions, the raters were presented instructions, which covered the following points:

Classify each phrase into one of three types. A phrase describing “press or hit the key (a) more than three times, (b) repeatedly, (c) many times, or (d) rapidly,” should be classified as Type 1. A phrase describing “press the key (a) after waiting for certain seconds, (b) when certain seconds passed, (c) slowly, (d) after counting time, or (e) with a pause,” should be classified as Type 2. If you think that the phrase is not classified as Type 1 or Type 2, you may classify it as Type 3.

Interrater agreement was 97.5%, that is, the classifications of 355 of 364 total descriptions were agreed between the raters. The classifications of nine records with a discrepancy in judgement between the raters were determined by the second author.

Results

Figure 2 shows data from each pair of participants. The participant pairs are shown as columns, with the FR / DRL participant shown in the top graph of each column and the FI / FI member of each pair shown in the lower graph. For each graph, the top frame shows types of verbal descriptions, and the lower frame shows the rates of key presses. Filled and open symbols in the top frame represent verbal descriptions judged Types 1 and 2, respectively, whereas shaded symbols represent those judged Type 3. Filled, open, and shaded symbols in the lower frame represent key-pressing rates under the FR, DRL, and FI schedules, respectively.

Preliminary training condition

During all but the first session, response rates in the preliminary training condition were higher in the FR component than in the DRL component (“Prelim” in the lower frame of each graph of Figure 2). Except for those made after the first two sessions by Participant 8B, verbal descriptions made after every session were Type 1 (hereafter described as “rapidly”) to the FR (“se-a”) component and Type 2 (hereafter described as “slowly”) to the DRL (“nu-mu”) component (“Prelim” in the top frame of each graph of Figure 2).

Experimenter-instruction condition

During all sessions, response rates in the experimenter-instruction condition for the FR / DRL participants were higher in the FR component than in the DRL component, although the rates in the FR component during the first session were considerably lower than those during the remainder of the sessions for Participants 5A, 6B, and 7A (“E-Inst” in the lower frames of the top graphs of Figure 2). Except for those to the FR component made after the first session by Participant 6B, verbal descriptions made after every session were “rapidly” to the FR (red) component and “slowly” to the DRL (green) component (“E-Inst” in the top frames of the top graphs of Figure 2).

Except for Participant 8A, response rates during all sessions in the experimenter-instruction condition for the FI / FI participants were higher in the red component during which the instruction was “rapidly” than in the green component during which the instruction was “slowly” (“E-Inst” in the lower frames of the lower graphs

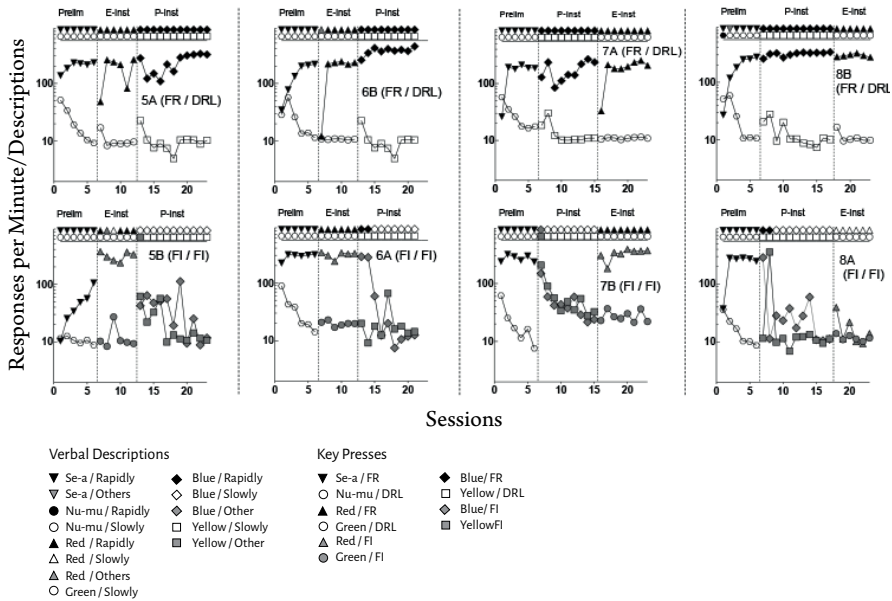


Figure 2. Responses in each session for each pair of participants. The participant pairs are shown as columns, with the FR / DRL participant (5A, 6B, 7A, or 8B) of each pair shown in the top graph of each column and the FI / FI participant (5B, 6A, 7B, or 8A) of each pair shown in the lower graph. The graph for each participant includes verbal descriptions in the top frame and rates of key presses in the lower frame. Inverted triangles, hexagons, triangles, circles, diamonds, and squares, respectively, represent responses (verbal descriptions or key presses) to stimuli “se-a”, “nu-mu”, red, green, blue, and yellow. Top frame (verbal descriptions): filled symbols represent verbal descriptions judged describing that points depended on fast responses, open symbols represent verbal descriptions judged describing that points depended on slow responses, and shaded symbols represent verbal descriptions judged describing others. Lower frame (key presses): filled, open, and shaded symbols represent rates of key presses under FR, DRL, and FI schedules, respectively. The labels “Prelim,” “E-Inst,” and “P-Inst” describe the preliminary training, the experimenter-instruction, and the partner-instruction conditions, respectively.

of Figure 2). For Participant 8A, the response rates in the two components during the last three sessions of the condition were indistinguishable. Of three participants whose response rates under the multiple FI FI schedule were differentiated between the two components, verbal descriptions made after every session were “rapidly” to the red component and “slowly” to the green component, except for the descriptions to the red component made after the second and third sessions by Participant 5B (“E-Inst” in the top frames of the lower graphs of Figure 2). For Participant 8A, whose final response rates were nondifferentiated between the components, verbal descriptions made after every session were “slowly” to both components.

Partner-instruction condition

Verbal descriptions by the FR / DRL participants in the partner-instruction condition were “rapidly” to the FR (blue) component and “slowly” to the DRL (yellow) component (“P-Inst” in the top frames of the top graphs of Figure 2). Except those made after the first two sessions, verbal descriptions by the FI / FI participants were “slowly” to both (blue and yellow) components (“P-Inst” in the top frames of the lower graphs of Figure 2). These results indicate that verbal descriptions given to each participant during the partner-instruction condition were, in general, structurally similar to the instructions given to him / her during the experimenter-instruction condition.

Response rates for the FR / DRL participants were higher in the FR (blue) component than in the DRL (yellow) component during all sessions of the partner-instruction condition (“P-Inst” in the lower frames of the top graphs of Figure 2). The rates for the FI / FI participants were differentiated between the blue and yellow components during some of the early sessions (“P-Inst” in the lower frames of the lower graphs of Figure 2). During the final three sessions, however, response rates in the two components for all FI / FI participants were indistinguishable.

Discussion

The results in the experimenter-instruction condition for the FR / DRL participants were consistent with those of previous experiments using contact-inaccurate instructions (Galizio, 1979; Hackenberg & Joker, 1994; but see also Hayes, Brownstein, Haas, et al., 1986; Hayes, Brownstein, Zettle, et al., 1986). Each of four participants responded at high rates under an FR schedule and at low rates under a DRL schedule even though he / she was given instructions from the experimenter to respond slowly under either schedule (“E-Inst” in the lower frames of the top graphs of Figure 2). Thus, the results show that the contact-inaccurate-instruction effect (Galizio, 1979; Hackenberg & Joker, 1994) was replicated, and that the present procedure was sound for the examining effects of the source of instructions.

These results, by contrast, were not consistent with those of a series of studies that examined effects of instructions on human responding under multiple FR DRL schedules. Hayes, Brownstein, Haas, et al. (1986) and Hayes, Brownstein, Zettle, et al. (1986) instructed their participants to respond slowly irrespective of the contingency of the schedule component in effect, and found that response rates were higher in the FR schedule component than in the DRL schedule component for 5 of 22 participants, demonstrating inter-individual variability in the contact-inaccurate-instruction effect. With respect to procedural differences between the present

experiment and Hayes and colleagues (Hayes, Brownstein, Haas, et al., 1986; Hayes, Brownstein, Zettle, et al., 1986), the present procedure of delayed introduction of the instructions should be noted. While inaccurate instructions were given prior to exposure to the schedule contingencies in the experiments by Hayes and colleagues, in the present experiment inaccurate instructions were introduced after schedule control had been established by the preliminary training. Okouchi (1999) also obtained schedule-controlled responding under a multiple FR DRL schedule with the delayed introduction of inaccurate instructions. Okouchi employed this procedure after pilot data suggested that when inaccurate instructions were given prior to the exposure to the schedule contingencies, responses were not controlled by the contingencies but by the instructions. Other previous demonstrations of contingency control with contact-inaccurate instructions (Galizio, 1979; Hackenberg & Joker, 1994) also have introduced the inaccurate instructions in the middle of the experiment; the inaccurate instructions followed accurate instructions.

With one exception (Participant 8A), the results in the experimenter-instruction condition for the FI / FI participants were consistent with those of previous experiments using no-contact-inaccurate instructions (Galizio, 1979; Hackenberg & Joker, 1994; Kaufman et al., 1966; Okouchi, 1999). Response rates under an FI schedule were higher with the instruction to respond rapidly than with the instruction to respond slowly ("E-Inst" in the lower frames of the lower graphs of Figure 2), replicating the no-contact-instruction effect and demonstrating again that the present procedure was sound for examining effects of instructions.

For the FR / DRL participants, the results in the partner-instruction condition ("P-Inst" in the lower frames of the top graphs of Figure 2) were as those in the experimenter-instruction condition, and those of previous experiments (Galizio, 1979; Hackenberg & Joker, 1994). These results suggest that regardless of their providers, the contact-inaccurate instructions, that is, the instructions not accurate but specified responding leading to aversive consequences under the contingencies actually in effect, had almost no effect on the responding.

For the FI / FI participants, by contrast, the results in the partner-instruction condition were inconsistent with those in the experimenter-instruction condition, and with those of previous experiments (Galizio, 1979; Hackenberg & Joker, 1994; Kaufman et al., 1966; Okouchi, 1999). Final response rates were indistinguishable between the blue and yellow components for each of those participants that were exposed to the multiple FI FI schedule even though he / she was given instructions from his / her partner to respond rapidly and slowly, respectively, in the blue and yellow components ("P-Inst" in the lower graphs of Figure 2). Thus, the no-con-

tact-inaccurate-instruction effect, which has been found when the instructions were given by the experimenter (e.g., Galizio, 1979; Hackenberg & Joker, 1994; Kaufman et al., 1966; Okouchi, 1999; and the experimenter-instruction condition for the FI / FI participants in the present experiment), was not replicated when the instructions were given by individuals other than the experimenter. These surprising results, however, are not inconsistent with a classic finding in the social psychology that participants were less likely to follow the orders given by a person who was not the experimenter (Milgram, 1974, pp.93-97).

The present finding that effects of instructions were different depending on the persons providing the instructions was obtained under limited conditions. Thus, its generality warrants discussion. First, the differential effect of instructions across the instruction providers was not obtained under the multiple FR DRL schedule ("E-Inst" and "P-Inst" in the top graphs of Figure 2), illustrating a limitation of the generality. As with previous results (Galizio, 1979; Hackenberg & Joker, 1994), when the instructions were inaccurate and specified responses leading aversive consequences, response rates were not controlled by the instructions even if they were given by the experimenter in the experimenter-instruction condition for the FR / DRL participants ("E-Inst" in the lower frames of the top graphs of Figure 2). Because the instructions given by the experimenter had no effect in this condition, there would be no room for weakening the effects of the instructions when they were given by the partner.

The history built during the preliminary training condition is a second issue to be discussed in terms of the generality of the present results. One may wonder whether the present results could be replicated if histories other than that of the multiple FR DRL schedule were built during the preliminary training condition. As described, responses controlled by the multiple FR DRL schedule emerged in the FR / DRL participants during the experimental condition seem to be attributable to the prior exposure to the schedule during the preliminary training condition. Therefore, it is difficult to expect that the present results of those participants would be replicated when a schedule in which the contingency is different from that of the multiple FR DRL schedule - a multiple FI FI schedule, for example - is used during the preliminary training condition. With such preliminary training, the experimenter's instructions, rather, may affect the responding under the multiple FR DRL schedule for some individuals as Hayes and colleagues found (Hayes, Brownstein, Haas, et al., 1986; Hayes, Brownstein, Zettle, et al., 1986). The results of the FI / FI participants, by contrast, may have been relatively independent of the history built during the preliminary training condition. Response rates in the experimenter-in-

struction condition for Participant 7B were higher with the instruction to respond rapidly than with the instruction to respond slowly even after the rates were indistinguishable between the components of the multiple FI FI schedule during the partner-instruction condition (“P-Inst” and “E-Inst” in the Participant 7B’s graph of Figure 2). This may be regarded as an example illustrating that the instructions delivered by the experimenter affected responding regardless of the schedule histories.

The present finding that effects of instructions were different when the instructions were given by the experimenter and when they were given by persons other than the experimenter raises a question in terms of the generality of previous findings of instructional control, which have been obtained almost exclusively from experiments in which instructions were given by the experimenter (cf. Baron & Galizio, 1983). It does not suggest, however, that the experimenter should ask someone to contribute as an instructor. Undoubtedly, giving instructions from the experimenter to the participants is very convenient and economical. The present finding suggests the importance of future research contributing to the better understanding of the role of instructions in human behavior.

Tracking and pliance, which Zettle and Hayes (1982) suggested as functional units of instructions, for example, may be useful for identifying variables affecting the differential effect of instructions across the instruction providers. Tracking is instruction following under the control of the correspondence between instructions and contingencies. Tracking is influenced by the history of how instructions have been corresponded with the actual contingencies. Future experiments manipulating correspondence between the instructions from instruction providers and the contingencies may elucidate more precisely the function of the differential effect of instructions across the instruction providers as tracking.

Pliance is instruction following under the control of consequences for a correspondence between instructions and responses (Zettle & Hayes, 1982). Pliance is influenced by the history of how following the instructions has been reinforced and/or how not-following the instruction has been punished by instruction providers. In fact, Hayes, Zettle, & Rosenfarb (1989) cited Milgram’s (1974) obedience experiments as an example of pliance. One of Milgram’s experiments, as described in the introduction, obtained a finding suggesting that instructions given by an experimenter and by a person other than the experimenter had different effects on participants’ behavior. Thus, pliance seems a promising candidate for identifying variables affecting the differential effects of instructions across the instruction providers. Although the present results do not answer the question of whether the experimenter’s instructions functioned as pliance, a recent experiment by Fox and

Pietras (2013) suggests a procedure for experimentally manipulating pliance. They punished responses inconsistent with instructions and found that the punishment of not following instructions enhanced instructional control. As an attempt for identifying the importance of the function of pliance for the differential effect of instructions across the instruction providers, future experiments building some instruction following by social contingencies from the instruction providers may warrant attention.

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