Selection-Based Instruction with Touch-Screen Video and the Emergence of Exact, Recombinative, and Novel Topography-Based Responses to Interview Questions

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Abstract The purpose of the present experiment was to replicate and extend the literature on using selection-based instruction to teach responses to interview questions by (a) evaluating the emergence of recombinative (i.e., combinations of taught) and novel (i.e., untaught) topography-based intraverbal responses, in addition to exact repetitions of taught responses, (b) providing a measure of social validity for the emergent response subtypes, and (c) including a touch-screen video interviewing component. Participants were two young adult males with a learning disability who attended a local vocational development center. Increases in accurate intraverbal responding and decreases in inaccurate responding across most interview questions were observed in both participants at posttest. Increases in the number of accurate recombinative responses were observed for both participants, and increases in accurate exact responses were observed for one participant. One accurate novel response was observed at posttest for each participant. Results suggest that selection-based instruction can generate appropriate topography-based responses that sound unscripted and the addition of a video component was viable.

Keywords Interview skills training · Intraverbal · Lag reinforcement schedule · Selection-based responding · Topography-based responding · Video

During a job interview, one of the most important contributing factors to a positive employment decision is the appropriateness of content by the interviewee in response to an interview question (Hollandsworth, Kazelskis, Stevens & Dressel, 1979). Behavioral

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skills training (BST) has previously been shown to be effective in teaching job interview skills (Hall, Sheldon-Wildgen, & Sherman, 1980; Kelly, Wildman, & Burler, 1980; Matthews & Fawcett, 1984; Mazingo, Ackley, & Bailey, 1994; Schloss, Santoro, Wood, & Bedner, 1988), but the process can be time consuming and arduous for some vocational development centers (VDCs). For example, Matthews and Fawcett reported an average of 2.5 h of instructor time per trainee. One approach to increasing the efficiency of teaching such skills might be to use selection-based (SB) instructional protocols to promote the emergence of topography-based (TB) verbal behavior (e.g., O'Neill, Rehfeldt, Muñoz, Ninness & Mellor, 2015b).

Michael (1985) asserted that SB verbal behavior requires an effective scanning repertoire, a subsequent conditional discrimination between stimuli, and no point-to-point correspondence between the response form and the response product. Therefore, SB verbal behavior can be defined as a response that has no distinguishable topography that results in the selection of a stimulus from a sample of stimuli. In comparison, TB verbal behavior involves an increase in the strength of a distinguishable topography given some specific controlling variable, and point-to-point correspondence between the response form and the response product.

O'Neill and Rehfeldt (2014) suggested that 1 h of exposure to SB instruction was sufficient to promote TB intraverbal responses (i.e., a verbal operant evoked by a verbal discriminative stimulus that does not have point-to-point correspondence with that verbal stimulus and that is followed by generalized conditioned reinforcement) in two individuals with a learning disability. The SB instruction involved a program that operated on a lag reinforcement schedule. In a *lag n* reinforcement schedule, *n* represents the number of previous responses from which the current response must differ in order to contact reinforcement (Page & Neuringer, 1985). Thus, a lag-1 reinforcement schedule was incorporated in order to promote various SB responses to each of three typical interview questions. In other words, participants learned multiple TB responses to each interview question through practice facilitated by the SB instruction. The authors suggested, though, that the necessary and sufficient components of the SB instruction remained unclear. In a follow-up analysis, O'Neill, Blowers, Henson and Rehfeldt (2015a) examined the additive effects of each component (i.e., SB rehearsal, TB rehearsal, and audio) of the program. The authors concluded that SB instruction for responses to interview questions should include a TB rehearsal component and that lag reinforcement schedules can be useful in promoting variable responding during SB instruction. The effects of the audio component were unclear. Similar to the findings of O'Neill and Rehfeldt (2014), each target question came to evoke multiple accurate responses. However, it was suggested that the programmed responses might sound scripted during an interview. The production of novel and recombinative accurate responses was not addressed so a formal analysis of such responses was recommended.

The purpose of the present experiment was to replicate and extend the aforementioned studies by evaluating the emergence of recombinative (i.e., combinations of taught) and novel (i.e., untaught) TB intraverbal responses following SB instruction, in addition to exact repetitions of taught responses. In order to promote generalization, a video-interviewer component was incorporated into the SB instruction in order to more closely emulate an *in vivo* interview experience. In addition, a measure of social

validity was provided by two independent raters in order to determine whether responses sounded scripted or unscripted.

Method

Participants

Two participants were recruited from a local VDC. The center provides instruction in a wide variety of adaptive behaviors including the skills necessary to attain and maintain gainful employment. Participant 1 was a 20-year-old male diagnosed with a learning disability (not otherwise specified) and had a documented WISC III full scale IQ of 72. Participant 2 was a 22-year-old male diagnosed with a learning disability not otherwise specified and had a documented WISC III full scale IQ of 73. Their verbal repertoires were sufficient to vocally communicate vocational interests and experience. Participants were identified by the director of the VDC as being literate in basic computer functions (i.e., operating a mouse) and having some exposure to formal interview instructional programs. Each was in need of additional instruction for interview questions as determined by the director of the program, before the VDC would consider the participants ready for community interviews.

Setting and Stimuli

The experiment was conducted in a private classroom at the VDC. Sessions lasted from 3 to 5 min and were conducted a maximum of ten times per week in the same room. A maximum of two sessions per participant were completed in 1 day with a short break in between sessions. Visual Studio Express 2013© was used to conduct SB instruction on a laptop computer in tent mode. The program consisted of one screen which could be loaded with three to five response options. Response options were randomly assigned their position on screen for each trial. Figure 1 provides an example of the on-screen program loaded with five response options before (left) and after (right) an accurate response by the participant.

Design

A concurrent multiple-probe design (Horner & Baer, 1978) across a set of three questions was employed. Although the experimenter asked all eight questions during each TB test, only responses to the three target questions were trained and graphed. To control the potential for diffusion of the intervention across participants, the order of instruction for questions differed across participants.

Variables

The primary dependent variables were accurate and inaccurate responses to interview questions during TB pretests and posttests. Accurate responses were defined as vocal-verbal responses related to the workplace environment and participant's history of employment. Accurate responses were further classified into three subtypes: (a) *exact*

Fig. 1 Example of on-screen SB Instruction with five response options. The screen-capture displays SB instruction before (*left*) and after (*right*) an accurate response by the participant. Questions were randomly rotated after each SB response

(those with point-to-point correspondence with programmed response options), (b) *recombinative* (those with partial point-to-point correspondence with one or more programmed response options), or (c) *novel* (those with no point-to-point correspondence with any programmed response options). All subtypes had to be understandable in order to be considered accurate. Inaccurate responses were defined as vocal-verbal responses unrelated to the work environment and the participant's employment history. A nonresponse was defined as the vocal-verbal response "no" or other functionally equivalent response (e.g., "not at this time"). Nonvocal responses (e.g., shaking head) in the absence of a vocal-verbal response were not anticipated and did not occur. All sessions were video-recorded so that interobserver agreement (IOA) could be scored. IOA was scored for 100 % of pretest and posttest mock interviews by two independent observers. A total count method of IOA was calculated by dividing the number of agreements by agreements plus disagreements within sessions. The number of sessions with 100 % agreement was then divided by the total number of sessions and multiplied by 100 to acquire a percentage of sessions with 100 % agreement. An acceptable level of IOA was 80 %. Resulting IOA was 81 % of the sessions with 100 % agreement.

Procedure

TB Pretests Pretests consisted of the experimenter instructing the participant that "I am going to ask you a series of questions and I would like you to answer these questions as you would in a job interview. Are you ready to begin?" This statement signaled the start of the test session. An experimenter sat at a table, facing the participant, and asked eight interview questions, one at a time. The director of the VDC identified each of the eight questions as being particularly crucial to the interview process. Examples of accurate and inaccurate responses to each question can be found in Table 1. After each response, a general acknowledgment (e.g., "okay" or "alright") and one vocal-verbal prompt of "anything else?" was provided immediately after the participant's initial response

Table 1 Examples of responses to interview questions

Question	Accurate		Inaccurate
	Exact	Recombinative	
(1) What can you tell me about yourself?	I graduated high school. I went to junior college. I want to take more classes. I have work experience. I have volunteer experience.	I graduated high school and went to college. I want to take more classes at junior college.	I used to play football. I am a quiet person. I like to play video games.
(5) How do you handle pressure and stress?	I ask a coworker for help. I talk with my supervisor. I do one thing at a time. I take a few breathes. Calmly talk about the issue.	I ask my supervisor for help. I calmly take a few breathes.	I don't let it get to me. I'll help you in a minute. Try to deal with it.
(6) What motivates you?	Helping people. Completing the task. Knowing I have done my job. I like to learn new skills. Seeing a finished product.	Helping people learn new skills. Knowing I've completed my task.	Money. My parents will buy me a car. The weekend.
(8) Do you have any questions?	What will you expect of me? What are the hours? Can I follow up in a week? What is a good employee to you? Will I need to purchase a uniform?	What do you expect of a good employee? What hours would I work in a week?	Are you going to hire me? When do I get a raise? No.

to each question. No other feedback was provided during pretest. Three questions to which the participant provided (a) any inaccurate answers or (b) a nonresponse were selected for intervention. Some accurate responses provided during pretest (i.e., familiar stimuli) were retained for inclusion in the SB instructional protocol, but no more than one was retained for any particular question.

SB Instruction The instructional program included the following: (a) video/audio recordings and on-screen text for a single interview question when the play button was pressed; (b) video/audio and on-screen text feedback (e.g., “great answer,” “very interesting”) for accurate selections which also met the lag-1 reinforcement schedule requirement; and (c) textual redirection to the previous screen (“*X (button text) is a good answer but press here to try again*” on an orange background) in response to accurate selections which did not meet the lag-1 criterion. No audio feedback was provided during redirection to a previous screen.

Participants sat at the table with the laptop computer in front of them. Before the start of each session, participants were instructed to complete the following steps for every trial: (a) Press play on the video at the top of the screen and wait for the video/audio recording to play, (b) state aloud the answer you have chosen, (c) press on the answer button you have chosen, and (d) read or listen to any feedback the program provides. Step “a” indicated the onset of a trial and Step “d” indicated the offset. The

experimenter provided an immediate prompt to go back and complete a step if one was skipped.

Twenty trials of an individually trained question were completed during each session. The first trained question had three response options, the second had four, and the third had five. Mastery stipulated that a lag-1 criterion be met on 90 % of trials (i.e., 18 out of 20 trial responses were different than the immediately preceding trial's response). Participants were required to complete three instructional sessions at or above the 90 % lag criterion before moving to posttest for any particular question.

TB Posttests and Follow-up Probes Posttest sessions were identical to pretest sessions. The criteria for moving from posttest for a question to intervention for the next question were (a) emergence of accurate (i.e., exact or recombinative) TB vocal-verbal responses and (b) stable patterns of TB vocal-verbal responding to the remaining questions that were to be exposed to instruction. Follow-up probes were identical to pretest and were conducted at 1 week.

Social Validity Two administrators at the VDC were asked to independently rate all inaccurate, recombinative, exact, and novel responses, presented in transcribed form, by both participants, on a scale of 1 to 7 (1 = not scripted, 4 = somewhat scripted, 7 = very scripted).

Results

Participant 1

Accurate responses provided by participant 1 were of the recombinative type at pretest and recombinative or novel subtype during posttest. Exact accurate responses did not occur. As shown in Fig. 2, participant 1 exhibited a low level of recombinative accurate responses across questions during pretest (range 0–2) and a higher level of inaccurate responses (range 0–3). During SB instruction, participant 1 met or exceeded the lag criterion during the first session for each question and maintained criterion-level performance across three sessions. At posttest, an immediate increase in recombinative responses (range 1–3) was observed on questions 1 and 8, with no increase observed on question 5. One novel accurate response was provided to question 1 at all posttest probes. Inaccurate responses (range 0–2) remained stable across all questions. A decrease in accurate responses across all three questions was observed during follow-up probes.

Participant 2

Accurate responses exhibited by participant 2 were of the recombinative and novel subtype at pretest and were of the exact and recombinative subtypes at posttest across all three questions. As shown in Fig. 3, participant 2 provided a low level of both exact (range 0–1) and recombinative (range 0–1) accurate responses across questions during pretest, with zero accurate responses for questions 6 and 8. Stable low levels of recombinative and zero

Fig. 2 Number of recombinative (closed circle), novel (closed triangle), accurate and inaccurate (open square) responses exhibited by participant 1. Open circles represent the percentage of lag criteria met during instruction

exact responses were observed on question 5. Inaccurate responses during pretest ranged from 0 to 3 for question 6, 0–2 for question 5, and 0–1 for question 8 before SB instruction. Participant 2 met or exceeded the lag criterion during the first SB instructional session for each question and attained criterion-level performance across three sessions. At posttest, an immediate increase in accurate responses (range 1–4) was observed across all questions. A higher level of exact responses than recombinative responses was observed on questions 5 and 6, whereas a higher level of recombinative than exact responses was observed on question 8. There were zero inaccurate responses on questions 6 and 8 and one on question 5. A decrease in accurate responses was observed on questions 6 and 8 during follow-up probes, and one novel accurate response was observed on question 8.

As shown in Table 2, post hoc analysis of SB instructional sessions revealed that all response options were selected. This indicates that participants did not simply alternate between two response options in order to meet the lag criteria. Table 2 also shows that only questions with three response options resulted in the emergence of all SB response options

Fig. 3 Number of exact (closed square), recombinative (closed circle), novel (closed triangle), accurate and inaccurate (open square) responses exhibited by participant 2. Open circles represent the percentage of lag criteria met during instruction

as TB responses, in either exact (*) or recombinative (**) form, across participants during the first TB posttest.

Social validity was addressed by consulting the administrators at the VDC during the design of the instructional material and in the rating of TB responses by two administrators. Table 3 displays the average ratings on a scale of 1 to 7 (1 = not scripted, 4 = somewhat scripted, 7 = very scripted) for all inaccurate, recombinative, exact, and novel responses, across both participants. All types were rated on the lower end of the scale between not scripted and somewhat scripted. Of the accurate subtypes, novel responses received the least scripted ratings, suggesting that future research might examine the conditions under which novel accurate responding might be promoted by SB instruction.

Discussion

The present findings provide further support for the notion that SB instruction can be effective in promoting varied intraverbal responses to interview questions by

Table 2 Percentage of selections per response option across SB instructional sessions

	Question 1	Question 6	Question 5		Question 8	
	Participant 1	Participant 2	Participant 1	Participant 2	Participant 1	Participant 2
Option 1	33.33 ^b	34.43 ^a	28.75 ^b	21.67 ^b	25.00 ^b	22.03 ^b
Option 2	31.67 ^b	29.51 ^a	26.25 ^{a,b}	31.67 ^b	20.00 ^b	22.03
Option 3	35.00 ^b	36.07 ^a	21.25 ^a	30.00	26.67 ^a	16.95
Option 4	–	–	23.75 ^a	16.67	11.67 ^b	15.25 ^a
Option 5	–	–	–	–	16.67	23.73

^a Exact at first TB posttest^b Recombinative at first TB posttest

individuals with learning disabilities. The touch-screen video component provided a more naturalistic learning experience than the previous iterations (O'Neill et al., 2015a; O'Neill & Rehfeldt, 2014) in that it provided face-to-face interaction with the interviewer, but it is unclear if video affected performance. Future research might examine SB instruction with and without a video component.

Data for participant 1 are less robust than for participant 2 and for participants in our previous research. One explanation might be a lack of discrimination training, in that SB instruction did not include non-exemplars as in the previous studies. This suggests that inaccurate responses during pretest might be retained for inclusion in SB instruction in order to promote stimulus discrimination by way of differential video feedback.

Although data for participant 1 did not show an increase in the number of recombinative accurate TB responses to question 5 at posttest, responses were more complex than those provided at pretest in that each recombinative response included partial point-to-point correspondence with not one but two programmed response options. Anecdotal evidence suggests that this occurred due to instruction.

Another interesting observation was that participant 1 not only stated aloud the answer selected during SB instruction (as instructed) but elaborated, with relevant content, upon the programmed responses without any prompt to do so, and thus did not provide any exact accurate response during posttest. This type of responding did not occur with participant 2 nor any of the five participants in the previous studies.

Table 3 Average ratings on a scale of 1 to 7 (1 = not scripted, 4 = somewhat scripted, 7 = very scripted) for inaccurate, recombinative, exact, and novel responses, across both participants, by two independent raters

	Participant 1		Participant 2	
	Rater 1	Rater 2	Rater 1	Rater 2
Inaccurate	1.67	1.00	1.00	1.50
Recombinative	1.80	2.31	1.88	2.69
Exact	N/A	N/A	1.25	3.25
Novel	1.00	1.00	1.00	3.50

Evidence for the recombination of two response options was an interesting finding because responses such as these might sound less scripted than the more generic, exact accurate responses often provided by participant 2. Future research might examine the effects on recombinative and novel responding of an experimenter-provided or otherwise programmed prompt to elaborate upon the on-screen response options during SB instruction. However, it should be noted that for both participants, some recombinative accurate responses occurred at pretest. These may have been a result of prior exposure to formal interview instructional programs.

Similar to O'Neill and Rehfeldt (2014), data did not indicate the necessity of a lag reinforcement schedule to promote variable SB responding. Both participants met lag criterion during the first session, across all three questions, regardless of the differing number of response options available. It is possible that participants had a history of reinforcement for varied responding. Regardless, the lag schedule was in place to promote variability should responding become repetitive at any point during the experiment.

The present study replicates and extends the literature by demonstrating that multiple exact, recombinative, and novel TB responses might result from SB instruction and that all accurate subtypes might sound non-scripted to interviewers. However, instruction utilizing increasing numbers of SB response options did not necessarily increase the number or variability of emergent TB responses. It may be the case that extended SB instruction (i.e., more than three sessions at or above 90 % lag criterion) would result in consistent acquisition of the remaining TB responses. Future research might examine the addition of programmed prompts during SB instruction that might promote variable novel TB responses (e.g., that was a great answer, can you think of any other relevant information?). Finally, further examination of the effects of SB instruction and lag reinforcement schedules in the context of computerized BST for responses to interview questions (O'Neill & Rehfeldt, 2016), as well as other types of complex conversational skills (Aguirre, O'Neill, Rehfeldt, & Boyer, 2014), is warranted due to the paucity of research on SB instruction for people with learning disabilities.

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Compliance with Ethical Standards

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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