COMPUTER TECHNOLOGY

Three computer-automated social psychology laboratory tasks

MICHAEL J STRUBE

Washington University, St. Louis, Missouri

This paper describes three common social psychology tasks and accompanying computer programs that allow standardized administration. The first program administers a contingency judgment task for use in research on covariation assessment; the second administers a concept formation task for manipulation of response-outcome noncontingency. The third program administers a visual discrimination task for manipulation of success and failure.

The purpose of this paper is to describe three standard social psychology laboratory tasks that have been programmed to be conducted by the Commodore 64 computer (or the Commodore C-128 computer in the 64 mode). Each program is written in Commodore BASIC, although with modification the programs can be run on other machines with comparable screen graphics capabilities. The programs are appropriate for research or for teaching. The following descriptions provide brief overviews of each program. The program listings, available from the author, provide additional technical details, and references are provided at the end of the paper, for more complete methodological and conceptual information.

Contingency Judgment Task

An important problem in attribution theory and social cognition is the manner in which human beings assess covariation. The ability to judge the contingency between two stimuli is central to the ability to form causal attributions and to perceive accurately the amount of control one has over the environment. A central question is the degree to which individuals can assess contingencies accurately. A common procedure for measuring this ability is a multiple-trial binary choice task in which the subject attempts to maximize the onset of a light over multiple trials by either pressing or not pressing a button on each trial (see Alloy & Abramson, 1979). In this task, the subject is signalled at the beginning of each trial and then has a specific period of time in which to decide whether to press or not to press the button. After this time period has elapsed, the target light either comes on or remains off. The subject is told that something can be done in the way of pressing or not pressing the button that will maximize light onset, and that the task is to determine that optimal response pattern. At the end of the sequence of trials, the subject estimates how much control was exhibited over

light onset. By manipulating the actual contingency and the overall success rate, the experimenter can assess whether perceived contingency depends (1) on the magnitude of actual contingency, (2) on the direction of actual contingency, and (3) on the success rate.

On the present contingency judgment task program, the investigator specifies the number of trials that will be conducted, the proportion of trials on which a press of the keyboard space bar will be followed by the appearance of a black dot in the middle of the terminal screen, and the proportion of trials on which no press of the space bar will be followed by the appearance of the dot. Careful choice of these two proportions allows the investigator to specify either a noncontingent relation between responses and outcomes (the proportions are the same), or a contingent relation of varying magnitude and direction. The average of the two proportions indicates the overall success rate.

The appearance of the dot in relation to the subject's response is determined randomly within the constraints imposed by the input proportions. The program keeps track of the current proportions of times the dot has appeared following space bar presses and following no space bar presses, and it tailors subsequent trial outcomes in order to match the input proportions better.

Upon task completion, the program prints the input proportions, the actual proportions of symbol appearance or nonappearance as a function of subject response, the obtained correlation between subject response and symbol appearance, and the expected correlation between subject response and symbol appearance based on input proportions. These values allow a check on how well the program is able to match the desired response-outcome relation.

The program has been used successfully in two studies of control judgment among Type A and B personalities (Strube & Lott, 1985; Strube, Lott, Heilizer, & Gregg, 1986).

Correspondence should be addressed to Michael J Strube, Department of Psychology, Washington University, St. Louis, MO 63130.

Concept Formation Task

In learned helplessness research, it is necessary to convince subjects that there is a noncontingency between responses and outcomes, so that the impact of noncontingency on subsequent performance of a transfer task can be assessed. A common procedure for inducing the perception of response–outcome noncontingency is a concept formation procedure using visual stimuli. In this procedure, subjects are shown two stimulus figures, which vary along five dimensions: (1) letter type (T or H), (2) letter case (upper or lower), (3) letter texture (solid or mottled), (4) border shape surrounding the letter (diamond or square), and (5) border texture (squares or circles). The subjects are told that over the course of 20 trials they will attempt to determine what dimension value (e.g., lower case) has been chosen as the correct concept. On each trial, subjects choose the stimulus figure that they think contains the appropriate dimension value, and then feedback is provided. On any one trial, of course, five different dimension values are confounded, but for subsequent trials, different combinations of dimension values appear together in the stimulus figures. Thus, over trials, it is presumably possible to eliminate some dimension values from consideration. At the end of the 20 trials, the subject is asked for the correct dimension value, and feedback is provided. When this task is used in helplessness research, the feedback provided after trials is random, inducing the desired response–outcome noncontingency. Degrees of helplessness training are implemented by varying the number of 20-trial sequences that subjects are asked to perform.

The transfer task commonly takes the form of a list of 20 solvable anagrams, where each anagram has the same order of solution. Thus, on the transfer task, a response–outcome relation is possible, and the impact of helplessness training can be assessed by examining the number of anagrams correctly solved, the times to solution, and the number of trials to criterion.

The concept formation program mimics the procedure just described. The user specifies the number of 20-trial helplessness sequences that should be conducted (2 or 4). Then, the program conducts a practice session that familiarizes the subject with the task and provides accurate feedback (in order to convince the subject that the task is ultimately solvable). On each trial, the two stimulus patterns are placed on the screen and the subject is asked to choose the side that contains the correct dimension value. The computer provides accurate feedback. At the end of the 20 trials, the subject is queried for the correct dimension value, and the computer responds with accurate feedback. Failure to uncover the correct dimension on the practice task is followed by another 20 trials, until the subject achieves the correct answer.

Next, the program conducts the helplessness trials. Feedback is provided only after every fourth trial, in order to make the task more challenging and the subsequent false feedback believable. The feedback provided is predetermined, and it bears no relation to the subjects' choices.

At the end of each 20-trial sequence, the computer responds that the subject's final dimension choice is incorrect.

Following the last helplessness sequence, the program conducts the transfer task composed of 20 moderately difficult anagrams that have a constant order of solution (52413). An example anagram is placed on the terminal screen to accompany explanation of the anagram task. Subsequently, the 20 scrambled words appear one at a time for a maximum of 100 sec. If a word is not solved in 100 sec, the next word is automatically displayed. If a word is solved, the next word can be displayed by pressing the space bar. The solution time for each word is printed after the task is completed.

The instructions that accompany this computer task are described in Strube, Boland, Manfredo, and Al-Falaij (1987, Study 2).

Visual Discrimination Task

Many social psychology experiments require the manipulation of success and failure feedback in a convincing fashion that does not arouse suspicion. For example, studies of performance attributions or the influence of perceived skill on later performance require manipulation of task outcome. The visual discrimination task program was designed for this purpose.

The task requires the subject to count the number of target stimuli that appear on the terminal screen, while at the same time ignoring a constantly changing pattern of distractor stimuli. The subject is provided with trial-by-trial feedback, tailored to create the desired level of performance. The investigator specifies the number of trials and the proportion of correctly counted targets that the subject will be led to believe have been achieved. The beginning of each trial is signalled with a tone, and the identification of the target is made. The target, chosen at random on each trial, is a dot, heart, spade, or diamond. The remaining stimuli are the distractors for that trial. After target identification, the screen clears and begins to fill with 50 distractors that shift location randomly. At a randomly determined period of time following the appearance of the first distractor, a predetermined number of targets appears on the screen and remains stationary while the distractors continue to shift position. The subject has 4 sec to count the targets, after which the screen is cleared of all stimuli. The subject is then queried for the correct number of target stimuli.

After the subject has entered the estimated number of targets, the computer displays the location of the targets but not of the distractors, so that the subject can see the accuracy of the estimate. To create the appropriate feedback, the computer randomly locates an additional number of targets on the target feedback screen; this number allows the proportion correct to equal that specified in advance. The impression is thus given that some of the targets were missed. By their being displayed on the screen, the subject can actually see what targets were not detected, although, of course, these extra targets never

actually appeared. The confusion caused by the shifting distractors can make it seem reasonable to the subject that some of the targets may have been missed. After each feedback screen, the program displays the average performance attained by the subject up to that point.

Two other features of the program allow the feedback to be made even more convincing. First, the user can specify that a practice trial be conducted prior to the actual task. The practice trial, which is fairly easy, allows the subject to experience true success. Second, during the actual task, the program keeps track of the subject's true performance and adjusts the number of distractors to match the subject's actual ability level better. If the subject counts all the targets correctly, more distractors will then be added to subsequent trials, in order to make the task more challenging and the feedback more believable. If the subject is inept at detecting the targets, fewer distractors will be displayed on subsequent trials, likewise in order to match the subject's ability level better.

One final feature of the program is a trial-by-trial determination of the performance feedback that will best allow an overall match to the desired level of performance. This necessary program feature compensates for subject variability in performance and for the failure to count any targets at all on some trials (in which case the program doesn't add any targets to the feedback screen, and performance is reported as 0%).

At the end of the task, the program displays trial-by-trial performance, the number of targets that were displayed on the feedback screens, and the final number of distractors.

Examples of the kinds of instructions that might accompany this program can be found in Strube and Berry

(1985), Strube, Berry, and Moergen (1985), and Strube and Werner (1985).

Availability

The program listings and reprints of articles for which the programs have been used are available from the author. Alternatively, a formatted disk and mailer may be sent to the author, who will return copies of the programs.

REFERENCES

- ALLOY, L. B., & ABRAMSON, L. Y. (1979). Judgment of contingency in depressed and nondepressed students: Sadder but wiser? *Journal of Experimental Psychology: General*, **108**, 441-485.
- STRUBE, M. J., & BERRY, J. M. (1985). Attributional and emotional concomitants of control relinquishment. *Basic & Applied Social Psychology*, **6**, 205-220.
- STRUBE, M. J., BERRY, J. M., & MOERGEN, S. (1985). Relinquishment of control and the Type A behavior pattern: The role of performance evaluation. *Journal of Personality & Social Psychology*, **49**, 831-842.
- STRUBE, M. J., BOLAND, S. M., MANFREDO, P. A., & AL-FALAJI, A. (1987). Type A behavior pattern and the self-evaluation of abilities: Empirical tests of the self-appraisal model. *Journal of Personality & Social Psychology*, **52**, 956-974.
- STRUBE, M. J., & LOTT, C. L. (1985). Type A behavior pattern and the judgment of noncontingency: Mediating roles of mood and perspective. *Journal of Personality & Social Psychology*, **49**, 510-519.
- STRUBE, M. J., LOTT, C. L., HEILIZER, R., & GREGG, B. (1986). Type A behavior and the judgment of control. *Journal of Personality & Social Psychology*, **50**, 403-412.
- STRUBE, M. J., & WERNER, C. M. (1985). Relinquishment of control and the Type A behavior pattern. *Journal of Personality & Social Psychology*, **48**, 688-701.

(Manuscript received March 3, 1988;
revision accepted for publication August 6, 1988.)