Interpersonal referential communication experiments with a small computer*

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A LINC-8 computer is used with a Tektronix 611 CRT for presenting verbal information, and a slide projector for displaying facial photographs in studies of interpersonal referential communication.

In the Mathematical Psychology Laboratory at the University of Michigan, an integrated set of programs, written in LAP-6 for the LINC-8 computer, has been developed for the on-line control of experiments concerned with information processing in interpersonal referential communication.

This kind of communication is defined as communication between a communicator (speaker, writer, actor) and a receiver (listener, reader, viewer) about a referent. The referent is restricted to an identifiable stimulus in their immediate environment. A probabilistic theory for referential communication was proposed by Rosenberg and Cohen (1966).

Data are now being collected in two experiments using the referential communication paradigm. A third study is planned to follow immediately when the results of these experiments have been analyzed.

In the first experiment, the S is the receiver of a series of written messages, which were previously generated by different communicators describing as referents photographs of an actor who facially expresses various emotions. These photographs were taken from the Frois-Wittmann series of emotional expressions (Hulin & Katz, 1935). The major purpose of this experiment is to study the effects of certain characteristics of the communicator's message (description of the facial expression) on the individual receiver's accuracy of referent identification and his processing time. These message characteristics are based on judgments previously collected from a norm population of college students (Manis & van Rooijen, 1973; van Rooijen & Manis, 1972). Of special interest here are: the description's ambiguity (the number of different

Fig. 1. Schematic representation of the computer-controlled experimental environment.

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Fig. 2. The S's stimulus displays and response units in Study 1.

plausible referents), validity (the probability of correct referent identification), and redundancy (the extent to which different referents are more or less likely to be chosen).

Figure 1 shows a schematic representation of the computer-controlled environment for all three studies.

In the first study, the E selects one of six stimuli presentation sequences for a given S and feeds this control parameter via the console into the LINC-8. The program then reads the particular stimuli presentation sequence table into core from magnetic tape. Four pages of experimental instructions are presented to the S on a Tektronix 611 storage unit (611 CRT), using a software display package by Goode.¹ (The LINC-8 CRT is not used in these experiments.) When the S clearly understands the instructions, the actual experimental session begins. On each trial, one description (previously generated by a communicator about a facial expression photo) is selected by the program from magnetic tape,

and displayed on the 611 CRT as if the description were being written from left to right at a comfortable reading speed. After he has finished reading the description, the S pushes a button, at which time the computer turns off the description display and opens a high-speed shutter (Uniblitz, Vincent Associates). This allows an array of eight photographs to be projected on a wall screen (with a Kodak Carousel slide projector). Figure 2 shows the experimental setup in the first study. To simplify the illustration, the photograph shows both the description and the faces, although they do not actually appear together in the experiment.

The S then pushes one of eight buttons, to select the facial expression picture which he believes was the referent photo described in the message. At the same time, the computer turns off the projection of the eight faces on the screen. His reading time, his choice, and his decision time are recorded. During the intertrial interval, the computer cycles the projector to the next slide of eight photographs, and presents a ready signal on the

Fig. 3. Transition diagram of the experimental sequence in Study 1.

Fig. 4. The S's stimulus displays and response units in Study 2.

611 CRT, after which the S can initiate a new trial by pressing a start button. At the end of the experimental session, the computer saves the record of stimuli and response data on magnetic tape. A copy of this record is printed on the Teletype printer, if desired. A high-speed paper-tape punch is used to transmit the S's stimulus and response data for off-line statistical analysis on the University of Michigan's central computer. Figure 3 shows a transition diagram of the experimental sequence for the first study.

The second experiment analyzes the effects of varying frequencies and duration of referent exposure on subjective judgments about selected attributes of the referent. This experiment is run immediately following the first one, using the same S. The Frois-Wittmann facial expression pictures are now projected one at a time on the wall screen. One set of these photographs has been exposed previously in the first experiment with

different frequencies and at different durations. The other set consists of unexposed facial expressions, which are matched with the first set on two major evaluative dimensions, pleasantness-unpleasantness and attention-rejection, as determined by scale values obtained by Schlosberg (1952). At the beginning of this experiment, the E inputs, via the console, the control parameter for one of two slide projection sequences, which the program reads into core from magnetic tape.

The S makes three series of ratings of each referent picture. First, he evaluates how much he likes the expression in the picture; then, he judges the amount of attention-rejection conveyed by the expression; and finally, he judges how pleasant the man in the picture feels. Each series is preceded by a display of instructions on the 611 CRT, explaining the use of the rating-scale procedure and the particular attribute to be judged. The S then rates each picture on the specified attribute by turning a potentiometer knob on his response unit, which moves a pointer along a labeled scale displayed on the 611 CRT.¹ Figure 4 shows a photograph of the experimental setup for the S in the second study.

Fig. 5. Transition diagram of the experimental sequence in Study 2.

The S initiates each trial after a ready signal on the CRT by giving the potentiometer knob a good turn. When he has turned the knob far enough, the computer opens the high-speed shutter and a facial expression picture is projected on the wall screen. Simultaneously, the labeled rating scale appears on the 611 CRT with the pointer displaced away from where the S previously had positioned it. When the S is satisfied with the position where he has moved the pointer, he presses a button with his free hand. This turns off the projection of the picture and the display of the scale on the 611 CRT. The program records the position of the pointer and the judgment time, and cycles the projector to the next slide during the intertrial interval. The stimulus and response data are saved on magnetic tape, and statistical analysis is once again performed off-line. Figure 5 shows a transition diagram of the experimental sequence for the second study.

A third study in this research program will focus on the way a receiver integrates pairs of referential descriptions from two different communicators. This study will use the same software and hardware as the first experiment, with appropriate controls.

The experimental environment for each of these studies is completely controlled by the computerized system, including the display of instructions to the S at the start of each experiment. This gives complete standardization of the procedure, and allows less possibility of E error and suggestion effects. The system permits great precision in stimulus presentation and timing. There is a clear separation between trials, minimizing interference from other trials. Likewise, there is a definite order of things within a trial, so that the E again knows the informational determinants of the

S's response. This also permits different components of the S's processing time to be separately analyzed. Using the Tektronix 611 CRT for the dynamic presentation of verbal information is extremely efficient, as the information is provided in a better paced, more readable, and in a smoother, quieter way than on other devices, e.g., the Teletype printer.

Computers are not yet able to generate algorithmically on a CRT visual patterns of such high information content as these facial expression pictures. Fortunately, however, a computer-controlled slide projection and shutter system handles the task of presenting this type of stimuli very adequately. The rather elegant rating-scale procedure allows easy, accurate, and finely graded recording, and it is well integrated with the remaining experimental system. The entire procedure is highly interesting to Ss.

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NOTE

1. Goode, F. M. Software aids for computer CRT displays for on-line psychological research. Unpublished manuscript, 1973.