Experimenter effects in monitoring performance

WAYNE L. WAAG,* DOLORES M. TYLER
and
CHARLES G. HALCOMB
Texas Tech University, Lubbock, Tex. 79409

Two groups of 34 college students monitored a visual display for 1 h. For the experimental group, E was the instructor for an introductory laboratory course in which Ss were enrolled. For the control group, E was unknown. The experimental group detected significantly more signals and tended toward a fewer number of false alarms. These findings are discussed in terms of perceived social distance between E and S within the context of a superior-subordinate role model.

The past literature suggests that vigilance performance can be enhanced through the introduction of appropriate incentives or aversive controls. Several investigators have reported the use of money to facilitate detection performance (Bergum & Lehr, 1964; Bevan & Turner, 1965), although others have reported no effects (Levine, 1966; Wiener, 1969). Halcomb & Blackwell (1969) reported enhanced performance among college students whose amount of extra course credit was made contingent upon their performance.

Using aversive controls, Pollack & Knaff (1958) reported improved performance whenever Ss received a blast from a GMC truck horn as a result of missing a signal. Smith, Lucaccini, & Epstein (1967) found enhanced performance through the introduction of punishment for different types of errors. Supervisory threats from superior officers (Baker, Ware, Spire, & Osburn, 1966) and the mere observation by a superior officer (Bergum & Lehr, 1963) have also been shown to facilitate performance.

Recently, Halcomb, McFarland, & Waag (1970) studied the effects of participation in a vigilance experiment in which the E was the Ss' classroom instructor. No significant effects were reported. Since Ss in the experimental group were enrolled in a large "monster" introductory class, it seemed possible that the failure to obtain significant effects may have been due to the lack of personal student-instructor interaction which is characteristic of these large classes. The present study attempted to replicate this investigation with one exception: Ss in the experimental group were students enrolled in an introductory laboratory course in which the E was their instructor.

METHOD

Subjects

Ss for this investigation were 68 college students enrolled in first-year psychology courses at Texas Tech University. The experimental group was composed of 34 students enrolled in the introductory laboratory course in which E was their lab instructor. The control group was composed of 34 students enrolled in introductory courses to whom E was unknown. Ss received extra course credit for participation in this experiment.

Apparatus and Procedure

Ss performed the monitoring task individually, although a maximum of four Ss could be tested simultaneously. Upon entering the testing room, E, a 25-year-old male, instructed Ss to remove their watches and not to place their hands on the display in any way. Ss were then seated in three-sided cubicles and told that instructions would be presented over a loudspeaker. After an initial preadaptation period of 2 min, during which time Ss merely relaxed, instructions were presented regarding performance of the task. Ss were then given a 5-min practice period, during which signals occurred at the same rate as that presented during the regular monitoring session. Following the practice session, the experimental monitoring session began.

The task of each S was to monitor a visual display for 1 h in order to detect aperiodic signals occurring against a background of discrete regularly occurring events. An event was defined as the apparent movement of a dot of light .32 cm in diam. The dot moved downward 1.58 cm, returned to its original position, and then repeated the sequence. The dot remained in the downward position for .3 sec, returned to its original position for .3 sec, deflected again for .3 sec, and then returned to its original position for the remainder of the event interval. Event rate was set at 30/min. A signal was defined as an increase in the magnitude of the second deflection from 1.58 to 2.22 cm. The display used to produce the apparent movement was an IEE one-plane readout. Signal rate was set at 24/h. The sequence of signals was presented by paper tape which controlled the operation of automatic programming equipment.

Signals, responses, and the event number were recorded on a BRS-Foringer digital printout counter. The response key was a miniature pushbutton placed in the end of a bicycle handgrip. Throughout the monitoring session, low-level white noise was played through the loudspeaker from recorded tape. Two response measures were obtained: percent correct detections and the number of false alarms. A correct detection was defined to be a response occurring within 1.6 sec after the presentation of a signal.

RESULTS

The data for percent correct detections are presented in Fig. 1. Following an arcsine transformation, the data were analyzed by a split-plot factorial analysis of variance having one between-Ss measure (acquaintance with E) and one repeated measure (time on task). Significant main effects were obtained for acquaintance with E [$F(1,66) = 5.019$, $p < .05$] and time on task [$F(2,132) = 11.226$, $p < .01$], but not for their interaction. A Tukey's honestly significant difference (HSD) test for pairwise comparisons indicated differences between the first and second and the first and third time blocks to be significant ($p < .01$).

Following a log transform, the same analysis was computed for the number of false alarms. A significant effect was obtained for time on task [$F(2,132) = 12.389$, $p < .01$] but not for acquaintance with E [$F(1,66) = 2.370$] or their interaction

*Now at the Naval Aerospace Medical Research Laboratory, Pensacola, Florida.

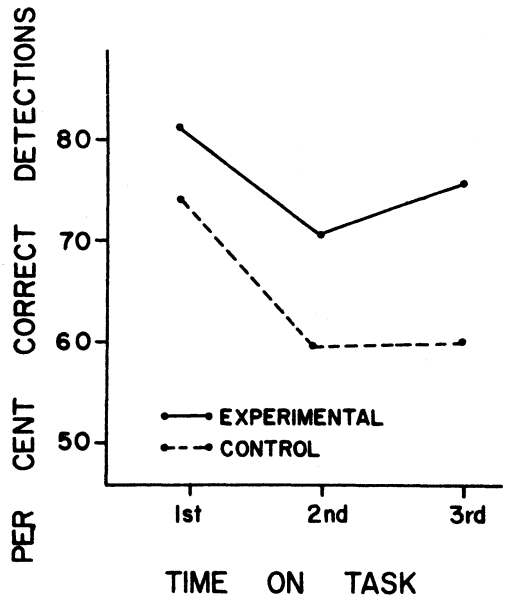

Fig. 1. Mean percent correct detections as a function of acquaintance with E and time on task.

[F(2,132) = .258]. The trend, however, was toward fewer false alarms by the experimental group. A Tukey's HSD test revealed differences between the first and second and the first and third time blocks to be significant ($p < .01$).

DISCUSSION

The results indicate that Ss' acquaintance with the E has a facilitating effect upon monitoring performance. The experimental group, in which the E was the Ss' lab instructor, detected significantly more signals and tended toward a fewer number of false alarms. Since the previous investigation (Halcomb et al, 1970) yielded no difference, it appears that the degree of E-S interaction represents a key variable.

These findings may be interpreted in several ways. Smith (1966) proposed a model of vigilance behavior which attempted to include certain motivational variables. He predicted that Ss identifying with or having high admiration for the E would perform significantly better than control Ss. The present findings would be consistent with this hypothesis if it could be assumed that students actually had respect or admiration for their laboratory instructor. Aside from the unlikelihood of this assumption, such an interpretation seems implausible when the results of the previous study (Halcomb et al, 1970) are considered. In that investigation, the E had the rank of professor and was the lecturer for one of the large introductory classes–a position of higher rank and likely to command greater respect or admiration than a graduate assistant teaching a laboratory class. For these reasons, the hypothesis derived from Smith's model seems an unlikely explanation of these findings.

The findings are consistent with those of Bergum & Lehr (1963), who reported enhanced performance as a result of observation by a superior officer. The student-instructor role relationship can be conceptualized within the superior-subordinate framework. Although often covert, there is the perceived threat of reprisal against the subordinate in the event his behavior does not meet the superior's expectations. The aversive control inherent in the student-instructor role relationship may be responsible for the enhanced performance of the experimental group. It seems likely that the effect of this superior-subordinate relationship is moderated by the student's perceived social distance between himself and the instructor. The greater the perceived distance, the smaller the effect this superior-subordinate role relationship will produce. In the previous study (Halcomb et al, 1970), the perceived social distance was great, even though the basic student-instructor role relationship still existed. In this case, no effects were reported. In the present study, the perceived distance was greatly reduced due to the closer student-teacher interaction necessary for effective laboratory instruction. In this case, significant effects were obtained.

The results of this study, in conjunction with previous findings, suggest that monitoring performance can be enhanced through the application of the aversive controls inherent within a superior-subordinate role relationship. The effects of this basic relationship, however, are moderated as a function of the degree of perceived social distance between subordinate and superior. The less distance the subordinate perceives between himself and his superior, the greater the perceived threat of reprisal for unsatisfactory behavior. Consequently, performance is likely to be enhanced.

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