EFFECTS OF SOCIAL FACILITATION AND SEX ON PERFORMANCE QUANTITY AND QUALITY: IMPLICATIONS FOR WORK BEHAVIOR

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Summary:

The present study was a test of Zajonc's (1965) social facilitation theory that the presence of others facilitates task performance for well learned tasks and inhibits performance for novel tasks. Subject sex was added as a third independent variable, investigating effects on performance quantity and quality in a 2 x 2 x 2 factorial design. Multivariate analysis of covariance (MANCOVA) results failed to support Zajonc. Significant main effects for subject sex and task familiarity were found for both performance measures. Also, presence-absence of observer exhibited a main effect on quality and a significant interaction with subject sex on performance quantity. Results are discussed in light of implications for organizational behavior.

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The oldest experimental paradigm in the behavioral sciences is social facilitation. Triplett's (1898) research led him to conclude that people behave differently in the presence of others than when alone. This work served to stimulate interest and further research in social facilitation.

Although much research had been conducted on the social facilitation paradigm until 1965, no formal theoretical statement had been proposed to account for the research findings or explain the underlying dynamics of the process. Zajonc (1965) was the first to offer such a theoretical explanation. He proposed that the mere presence of others during task performance had arousal properties, which was believed to facilitate the emission of dominant responses; the responses highest in an individual's habit hierarchy. Zajonc predicted that when an individual performed a task that was well learned, the presence of others enhanced performance since the dominant response was correct performance. When one performed a novel task, the presence of others was believed to hinder performance, since the dominant response was incorrect. Furthermore, Zajonc asserted that social facilitation effects were due to the mere presence of others and could not be explained by interpersonal or perceptual processes. A number of studies have provided support for this position (e.g., Markus, 1978; Zajonc & Sales, 1966).

Several other explanations have been advanced during the past several years. The alternative stimulating the most research was proposed by Cottrell (1972). He suggested that the mere presence of others may not be a sufficient condition for increasing arousal and subsequent performance. Instead, increased arousal level was proposed to be contingent upon the presence of specific others; those who elicit evaluation apprehension. In support of this argument, several investigations have
demonstrated that expected evaluation, rather than the mere presence of others, was necessary for the facilitation of dominant responses (e.g., Henchy & Glass, 1968; Paulus & Murdoch, 1971). The implication from Cottrell's position is that increased arousal level resulting from the presence of others is learned through social experience.

Ferris, Beehr, and Gilmore (1978) have proposed the most recent alternative explanation which focuses on a cognitive, expectancy theory interpretation of social facilitation. It was proposed that the presence of others in a work setting impacts upon one's expectancies, and thereby affects work performance. The contributions of this theoretical explanation are essentially twofold. First, it brought to light some concern over the predominantly mechanistic nature of current theory and research on social facilitation and the need for a cognitively-based alternative. Secondly, and perhaps more importantly, it represents the first systematic attempt to conceptually relate social facilitation to matters of major interest in organizational behavior. While the present research is not a direct test of the Ferris et al. model, it purports to extend the implications of social facilitation for behavior in work organizations.

A few studies in the organizational behavior literature have investigated the effects of social facilitation on work performance. Fraser (1953) found that vigilance performance of British Navy enlisted men was much greater when the experimenter remained in the room than when he was absent. To extend this research, Bergum and Lehr (1963) examined the effects of authoritarian monitoring conditions on vigilance performance. National Guard trainees worked at a light monitoring task either alone or while observed by a commissioned or noncommissioned officer. Results
showed that detection performance (quality) was significantly greater for trainees observed by officers.

In both studies, it was found that performance quality was improved when an observer with evaluative potential was present during task performance. No attempt was made, however, to examine whether similar effects were obtained for performance quantity.

In a study focusing on performance quantity, White, Mitchell, and Bell (1977) examined the effects of goal setting, evaluation apprehension and social cues on job performance and satisfaction. Their results showed that people with high evaluation apprehension had higher performance quantity than people with low evaluation apprehension.

The purpose of the present investigation was to clarify the processes involved in social facilitation and to consider other relevant factors that might bear on this phenomenon. Since Zajonc's (1965) theory has had the greatest impact on research, it seemed most appropriate to test his proposal that the presence of others facilitates task performance on well-learned tasks and inhibits performance on novel tasks. To address the relative lack of social facilitation research reporting results for both quantity and quality of performance, both dependent measures were examined in this investigation.

There has been a virtual absence of research that has tested for sex effects in the social facilitation paradigm. Carment and Latchford (1970) found no sex differences in motor performance for subjects working in the presence or absence of an experimenter. Hunt and Hillery (1973) examined Zajonc's theory in a coaction setting with subjects working on a maze learning task. They found facilitative performance effects to be extremely pronounced for females, but nearly nonexistent
for males. In an attempt to clarify this inconsistency, the effects of subject sex were examined on performance quantity and quality.

Method

Subjects

Subjects for this investigation were 96 undergraduate business administration students participating as part of a research requirement for an introductory management course. Average age of subjects was 21 years.

Task

The task used in this research was an electronic video game manufactured by Atari. This system can be attached to most any television monitor and has available a number of different game/task cartridges. The cartridge used in this study was the Indy 500 road race. The task is structured so that all trials are timed for 60 seconds each. When the system is reset, a timer in the upper right hand corner of the screen is activated. When the timer reaches zero, the car automatically becomes inoperable until the system is again reset. An additional feature is a lap counter in the upper left corner of the screen. Each time the car completes one trip around the track, the lap counter registers an additional lap.

Procedure

Upon arrival at the predetermined destination, the experimenter greeted the subject, asked him/her to be seated in a waiting area, read a general introduction to the research project, and asked the subject to complete a preliminary questionnaire (primarily to gather background
data). The cover sheet to the questionnaire introduced the experimenter as a graduate student and coordinator of a research project aimed at specifying how the components of different tasks affect peoples' performance on those tasks. The project was described as a joint venture with a professor from the College of Engineering at the same university, who was project director of the research and an expert in the area of human factors engineering. After completing the preliminary questionnaire, each subject was asked to enter another room and be seated at a table facing a television monitor. The experimenter then read instructions to the subject concerning the nature of the experiment and task. The experimenter explained that the subject was to operate the car and maneuver it around the track on the screen for a given number of trials. The subject was also told that he/she would later be asked to complete a mid-task questionnaire, which was designed to assess opinions regarding the task and performance to that point. After giving instructions concerning the hand controls, the subject was asked to do one practice lap.

Independent Variables

Presence-absence of observer

Observed. Soon after the operating instructions were given to the subject, there was a knock at the door and a male entered the room and was introduced as Dr. ______, Assistant Professor of Engineering, an expert in the area of human factors engineering and project director for the research project. Dr. ______ then took a few minutes to describe his area of research interest and explained that throughout the remainder of the experiment, he would be observing and evaluating the subject's
performance on a number of task dimensions, such as manual dexterity and perceptual motor skills. Before the subject began work on the task, the experimenter left the room to pick up some questionnaires which ostensibly were in preparation. The subject was told he/she would be required to do 20 separate trials, recording the number of laps achieved on each trial. After completing five trials, the experimenter returned and asked the subject to complete a mid-task questionnaire. Upon completion of the questionnaire, each subject was debriefed concerning the purpose of the investigation.

**Alone.** Each subject received the same instructions, but when the experimenter left the room, he/she performed the task alone. Subjects were observed through a one-way mirror as a check on their performance.

**Task Familiarity**

**Well learned.** After the subject received the operating instructions and was allowed to complete one practice trial, the experimenter provided the opportunity for the subject to practice further on the task. The subject was told that for purposes of the experiment, it was important that the task be thoroughly learned. The subject was told to do five trials and to let the experimenter know when he/she was finished. The experimenter directed his attention toward putting together materials for later participants.

**Novel.** In this condition, each subject received the opportunity to complete only one practice lap, after which the experimenter resumed instructions concerning the task.
**Experimental Conditions**

Both presence-absence of observer and task familiarity were crossed experimentally to comprise the following four experimental conditions:

- Observed - Well learned
- Observed - Novel
- Alone - Well learned
- Alone - Novel

Additionally, it was considered of interest to investigate the possibility of systematic sex differences, so equal numbers of males and females were randomly assigned to each of the above four conditions, resulting in a $2 \times 2 \times 2$ design.

**Dependent Variables**

Two performance measures were collected for each subject. Quantity of performance was defined as the number of laps completed (i.e., number of complete trips around the track). Subjects recorded this themselves, but as a validity check, the measure was verified by either the "expert observer" in the observed conditions, or by an unobtrusive observer in the alone conditions.

Quality of performance was operationalized as the number of errors or "crashes" compiled by subjects. In maneuvering the car around the track, if the car deviated too much and came in contact with the side of the track, a sound simulating a "crash" was heard and the car slowed up. The number of "crashes" or errors were recorded by either the "expert observer" in the observed conditions, or the unobtrusive observer viewing subjects' performance through a one-way mirror in the alone conditions.
In summary, 48 male and 48 female (N=96) subjects were randomly assigned to one of four experimental conditions. Presence-absence of observer and task familiarity were manipulated in the design. Additionally, sex differences were examined, so equal numbers of males and females were randomly assigned to each of the experimental conditions. The effects of these factors were examined on both quantity and quality of performance.

**Analysis**

Since there was reason to suspect that the dependent variables in this investigation were correlated, multivariate analysis of variance (MANOVA) was decided upon as the appropriate initial analysis. MANOVA provides an overall, omnibus test to investigate systematic differences among groups on more than one dependent variable. Univariate analyses of variance (ANOVA) were used as follow-up tests on significant MANOVAs.

The general popularity of electronic video games suggested that the prior experience as well as the interest of subjects in the assigned task could potentially confound the results. These two variables, therefore, were used as covariates in a multivariate analysis of covariance (MANCOVA), investigating the effects of presence-absence of observer, task familiarity, and subject sex on performance quantity and quality, with task experience and task interest held constant.

Where significant multivariate Fs were obtained and univariate ANOVAs were performed, omega squared ($\omega^2$) values were computed for each statistically significant univariate F. The $\omega^2$ value represents the percentage of variance accounted for by a particular main or interaction effect (Hays, 1963).
Results

Table 1 shows the MANCOVA results of the three independent variables on performance quantity and quality.

Insert Table 1 about here

Quantity

It can be seen from Table 1 that the main effect for presence-absence of observer was the only one not found to exhibit significant effects on performance quantity. There was, however, a significant presence-absence of observer X subject sex interaction, indicating that males had lower quantity when performing the task alone (M=7.42) than while in the presence of an observer (M=8.13). Conversely, females performed better with respect to quantity when alone (M=5.71) than when an observer was present (M=5.08). This interaction explains 3% of the variance in performance quantity and is illustrated in Figure 1.

Insert Figure 1 about here

Task familiarity also demonstrated a significant main effect on performance quantity. As expected, subjects performed significantly lower when the task was novel (M=5.73) than when the task was well learned (M=7.44). The $\omega^2$ value suggests this main effect accounts for 13% of the variance in quantity.

Quality

Presence-absence of observer exhibited its strongest impact on performance quality. Subjects performing alone showed lower quality (M=12.23) than those performing in the presence of an observer (M=8.04). It should
be noted, in interpretation of these mean values, that the quality measure is reverse-scaled. That is, since the quality measure reflects the number of errors, a higher score actually suggests lower quality. Eight percent of the variance in quality of performance is explained by this effect.

A similar result was found for the effect of task familiarity on performance quality. Subjects performing in novel task conditions showed significantly lower quality (M=12.33) than persons performing in well learned conditions (M=7.94). This main effect explained 10% of the variance in quality.

Subject sex also exhibited a significant main effect on performance quality, accounting for 3% of the variance, suggesting that overall, males performed better with respect to quality (M=9.17) than did females (M=11.10).

Discussion

The results of this study failed to support Zajonc's (1965) theory that the presence of others facilitates performance on well-learned tasks and inhibits performance on novel tasks. If supported, this would have suggested a significant presence-absence of observer X task familiarity interaction. This was not found for either quantity or quality of performance.

Presence-absence of observer was found to exhibit a significant main effect on performance quality. As shown in previous research (e.g., Bergum & Lehr, 1963; Fraser, 1953), quality of performance was significantly improved in observed over alone conditions. Even though the "expert observer" told participants that he would be observing and
evaluating their performance, they generally seemed to invest quality with more importance than quantity. These results are inconsistent with findings reported by White et al. (1977). They found significant effects of evaluation apprehension on performance quantity while the present study did not. The present results did show a significant interaction of presence-absence of observer and subject sex on quantity of performance. It is difficult, however, to make meaningful comparisons between the White et al. findings and the present results. The former did not examine sex differences nor did they manipulate task familiarity.

Since previous results concerning sex differences in social facilitation research have been inconsistent (Carment & Latchford, 1970; Hunt & Hillery, 1973), subject sex was examined in the present study. Interestingly, in addition to main effects of sex for both quantity and quality of performance, a significant presence-absence of observer x subject sex interaction was found for performance quantity. This interaction suggests that males and females responded differently to task performance while being observed and evaluated. Performance was lower in alone conditions than in observed conditions, but this was only the case for males. Females tended to perform better when alone than while being observed. Males and females seemed to respond differently to evaluative potential in others. While this interaction was not statistically significant for performance quality, it approached significance as indicated in Table 1. It should be noted that only a male "expert observer" was used in this research. It could be that males and females responded differently to sex of observer or to a combination of sex and evaluative potential. Future research should consider using observers
of both sexes for both sex subjects. Males may be less inhibited by a male "expert observer" than females.

Also, since it has been proposed that performance in the presence of others may be due to drive or arousal level (e.g., Zajonc, 1965), it is possible that there are qualitative differences in drive or arousal as a function of observer characteristics. In this research, the argument could be made that for males being observed and evaluated by a male, drive was translated into working harder or perhaps more intently focusing on task performance. Females being observed by a male may have found the presence of an observer (particularly a male observer) more distracting and inhibiting than facilitative. This aspect, if accurate, could lend some support to the distraction hypothesis of social facilitation recently proposed by Sanders and Baron (1975) and elaborated upon by Sanders, Baron, and Moore (1978), although the effects of sex were not included as part of their formulation. Clearly, more research needs to be done to establish the validity of the present interaction effects. These results do, however, point to some interesting implications for explaining variations of behavior in work organizations.

One area in organizational behavior which could profit from the integration of research results on social facilitation is work design (e.g., Hackman & Oldham, 1980). Social facilitation research typically has examined the effects of others' presence on task performance without investigating differences in individual perceptions of the task. It seems reasonable to speculate that performance differences would be expected due to the presence of others, as a function of the worker's perceptions of task characteristics. Recent research has demonstrated that social cues from coworkers influence worker perceptions of task
characteristics more so than the objective attributes of the job (O'Reilly & Caldwell, 1979; White & Mitchell, 1979). Elaborating on this, in light of the present research, it may be the case that sex of coworker contributes to differential perceptions of the task situation.

Also, it might be predicted that the presence of others will affect task performance only on routine tasks, but not on highly involving tasks. In this research, for example, an electronic video game/task was used and found to be very involving. During the debriefing sessions, subjects reported that they were often oblivious of the "expert observer." Future research, it seems, might examine the hypothesis that social facilitation operates only for routine tasks and not for involving ones. Implications of such research could have considerable utility for differential job placement and work group design, contingent upon task complexity.
References


Table 1
Summary of MANCOVA Results of Presence-Absence of Observer, Task Familiarity, and Subject Sex on Quantity and Quality of Performance with Task Experience and Task Interest as Covariates

<table>
<thead>
<tr>
<th>Effects</th>
<th>F</th>
<th>p</th>
<th>(\omega^2)</th>
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<tr>
<td>Presence-absence of observer (A)</td>
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<td>Quantity</td>
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<td>Task familiarity (B)</td>
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<td>Quantity</td>
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<td>.0001</td>
<td>.13</td>
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<tr>
<td>Quality</td>
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<td>Subject Sex (C)</td>
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<td>Quality</td>
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<td><strong>Interaction effects</strong></td>
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<td>A x B</td>
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<td>Quantity</td>
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*Note. df = 3,84 for multivariate Fs; df = 1,86 for univariate Fs.*
Figure Caption

Figure 1. Interaction effect of presence-absence of observer and subject sex on task performance quantity.
Performance
Quantity

Males
Females

Presence-Absence of Observer

Alone
Observed