SOCIAL FACILITATION THEORY: COMBINED EFFECTS OF AUDIENCE OBSERVATION AND COACTION & A LOOK AT THE UTILITY OF SELF-PERCEPTIVE MEASURES OF TASK-CAPABILITY

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ABSTRACT

Over the years, a great deal of Social Psychological research has focused upon the effects of observation upon individual task performance. Labeled the Social Facilitation effect, the theory posits that observation should have an incremental effect upon performance of highly task-capable individuals and a decremental effect upon performance of individuals of low task-related capability.

Previous research efforts in the area have considered either of two general sources of observation: Non task-performing audiences and task-performing coactors. The present study was designed to assess the nature of the combined effects of the two variables, something which had not been considered in prior research. In addition, the study considered the relative efficacy of self-perceptive measures of task-capability (questionnaire responses) vs. experimentally manipulated capability (task-related training). One-hundred twelve introductory psychology students served as subjects.

Toward the first end, an analysis of variance was performed, using two levels each of audience salience (present in room vs. behind one-way mirror), coactor monitoring
ability (coactors able vs. unable to monitor other performance), and task-related training (superior vs. inferior). Interaction effects of audience salience x training, monitoring ability x training, and audience salience x monitoring ability x training were predicted. None of these interactions were found to be significant.

In assessing the relative efficacy of perceptive vs. manipulated capability measures, an index of perceived capability (felt competence) was substituted for the training variable utilized in the previous analysis, utilizing a hierarchical regression procedure. Predictions analogous to those in the previous analysis were made, substituting felt competence for training. Again, none of the predicted interactions were evidenced.

The general failure to obtain significant findings was attributed largely to the weakness of the manipulations. An outline of future research directions is provided.
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INTRODUCTION

Perhaps a fundamental tenet of psychology is that human behavior is influenced by the presence of others. The major thrust, then, of social psychological research in particular is focused upon determining the exact nature of this influence process, or more specifically, how the presence of others influences our behavior or performance in a variety of contexts.

Social Facilitation Theory and its Conceptualizations

For many years, social psychologists were at a loss to be able to account for an abundance of seemingly contradictory findings regarding the effects upon individual performance of the presence of others. While several studies demonstrated that the presence of others served to augment performance, many others showed that the presence of others had a detrimental effect upon an individual's performance (Zajonc & Sales, 1968).

In an attempt to reconcile these conflicting sets of findings, Zajonc (1965) incorporated Hull-Spence notions in his "Drive Theory of Social Facilitation." Zajonc posited that the mere presence of others in a behavioral setting has the effect of increasing an individual's level of drive. In
keeping with Hull-Spence Drive Theory, Zajonc proposed that the increased drive emanating from the presence of others has the effect of enhancing the probability that the individual will emit dominant, or well-learned responses, while reducing the probability that the individual will emit subordinate, or poorly-learned responses.

Zajonc went on to state that for tasks in which an individual's characteristic dominant responses are most often the correct responses, as is true of most simple tasks, the presence of others coupled with increased drive level will have an incremental effect upon performance. Conversely, for tasks in which an individual's dominant responses are most often incorrect, as is characteristic of most complex tasks, other presence will have a debilitating effect upon performance.

Zajonc's work stimulated a great deal of research directed toward uncovering the nature of the psychological processes operating to produce these "social facilitation" effects.

In a landmark study by Cottrell and his associates (Cottrell, Wack, Sekerak and Rittle, 1968), the authors found evidence that disputed Zajonc's notion that the mere presence of others was sufficient to produce social facilitation effects. Rather, the authors found that these effects were only produced when the others in the room were capable
of evaluating the individual's performance. They posited, then, that it was the individual's apprehension with regard to being evaluated, rather than simply the elevated drive resulting from the mere presence of another human being, that served to enhance the emission of dominant responses at the expense of subordinate responses.

Weiss and Miller (1971) attempted to refine Cottrell's, et al. notion of evaluation apprehension by positing that this apprehension represented a negative emotional state, characterized by fear, anxiety and/or anticipatory frustration resulting from the individual's perception of potential failure in full view of others. This departed somewhat from the Cottrell, et al. notion that evaluation apprehension is a function of the perception of potential positive or negative outcomes.

Good (1973) obfuscated the issue further with his finding that on a word association task, subjects who were led to believe that they would perform well before an evaluative audience had their performance facilitated by the audience on a low-competition word list. No such facilitative effects were found for subjects who were led to believe that they would perform poorly on the task. The author explained these results in a social reinforcement paradigm, positing that facilitation only occurs when the individual views the audience as a source of positive social reinforcement, and
not when the audience is seen as a potentially negative stimulus.

In their theory of objective self-awareness, Duval and Wicklund (1972) depart from the notion of drive-induced social facilitation effects. They proposed that the presence of others induces a state of objective self-awareness. This state is characterized by the individual becoming more aware of him/herself as an object to be evaluated and creates a greater concern on the part of the individual regarding the extent to which his/her performance meets certain standards of correctness. The authors go on to state that this increase in objective self-awareness is motivational in nature, in that it leads the individual to try and reach the aforementioned standards of correctness, resulting in facilitation of task performance.

Duval and Wicklund present a rather unconvincing argument in attempting to account for performance decrements on complex tasks by stating that the individual exhibiting a performance decrement in the presence of others is simply "trying beyond his capabilities." In order for Objective Self-Awareness Theory to represent a tenable explanation for social facilitation effects, this latter notion dealing with performance decrements must be refined.

Still another theory attempting to pinpoint the nature of the psychological processes operating to produce social
facilitation effects is Distraction-Conflict Theory (Sanders & Baron, 1975; Sanders, Baron & Moore, 1978). The authors suggest that the increase in drive produced by the presence of others is due to the tendency for others to distract task performers as they work on a task. In keeping with Hull-Spence Drive Theory as expounded by Zajonc (1965), this increased drive resulting from distraction will have an incremental effect upon simple task performance and a decremental effect upon complex task performance. Subsumed in this theory are the effects of task-performing coactors as well as observers, the former which will be dealt with in a later section.

Allport (1924) proposed an alternative through which distraction may have incremental effects:

We work so hard to overcome the distraction incident to group activity that we actually accomplish more than we would without these hindrances.

Although Allport failed to account for performance decrements via distraction by making the distinction between simple and complex tasks, this does represent a viable explanation regarding the effects of distraction upon simple task performance.

No resolution of this wide spectrum of theoretical propositions has been put forth. Further clouding the issue is the work dealing with individual differences in response
to public settings (Pederson, 1970; Herold, 1974; Phillips, 1975; Sacco, 1979). This literature mentions such individual difference variables as test anxiety, level of self-esteem, internal-external locus of control, need for affiliation and need for achievement in terms of their mediational effects upon social facilitation of performance.

Empirical support for each of the theories discussed previously, with the exception of Weiss & Miller's (1971) theory, is readily available, a factor that serves to highlight the lack of convergence in the direction of producing an all-encompassing theory regarding the psychological processes underlying social facilitation effects.

With regard to Cottrell's et al. notion of evaluation apprehension, several studies provide support for this notion. Henchy & Glass (1968) found that implied threat of evaluation, operationalized by videotaping subjects for future evaluation, produced identical results (in terms of dominance of responses) to subjects working in the presence of an evaluative audience. Additionally, they found that for subjects who worked in the "mere presence" of a non-evaluating audience, performance levels indicated a trend toward social facilitation effects, but the results were less than significant.

Paulus & Murdoch (1971), in an interesting variation of the Henchy & Glass (1968) and Cottrell, et al. (1968)
studies, utilized a written mode of task response in order to more nearly approach a true non-evaluation condition. They found that anticipated evaluation, and not mere audience presence, was responsible for social facilitation effects. On the other side of the coin, a study by Rajecki, Ickes, Corcoran & Lenerz (1977) found that the mere presence of another person (a coactor working on an identical task who could not monitor the subject's performance) was sufficient to produce social facilitation effects. They did go on to state, however, that the effects become magnified when potential evaluation is introduced as a condition.

In a study by Matlin & Zajonc (1968), the authors were unable to partial out the effects due to mere presence from those due to evaluation apprehension, and thus could not reach any solid conclusions regarding this issue.

Regarding Objective Self-Awareness Theory, Liebling & Shaver (1973) had half of the subjects work at a task while looking into a mirror, which Duval & Wicklund posit should yield the same increment in self-awareness as would viewing an audience composed of others, and thus identical effects in terms of performance facilitation/impairment. The former authors found that under conditions of low evaluation, performance improved in the mirror condition, while under conditions of high evaluation, a decrement in performance occurred. This latter finding would seem to be inconsistent
with Duval & Wicklund's theory, while the performance increment under low evaluation conditions lends only partial support to the theory.

Two studies (Inness & Young, 1975; Paulus, Annis & Risner, 1978) found differential effects for audience-presence vs. mirror-presence conditions, refuting a major tenet of objective self-awareness theory, namely the absence of an expected difference between the two conditions.

Inness & Young (1975) found that audience presence led to a reduction in performance on a mirror-tracing task under both low and high evaluation conditions; mirror presence resulted in enhanced performance under high evaluation conditions, while having no effects under low evaluation conditions.

Paulus, et al. (1978) found that mirror presence led to a reduction in palmar sweating over the duration of mirror-viewing time, while no effects were found in conditions in which no mirror was present. These results are antithetical to the findings of studies utilizing a live audience, leaving the authors to conclude that there are two distinct psychological processes operating in the mirror and audience conditions. As the authors speculate:

Stress produced by audience presence is accompanied by increased attention to the audience members. In contrast, mirror-produced stress may be accompanied
by decreased attention to the mirror and more to the self, as with objective self-awareness.

Objective self-awareness theory thus has received little in the way of empirical support.

If we can arrive at any general conclusions regarding the nature of the psychological processes operating to produce social facilitation effects, they are:

(1) The effects seem to be primarily a result of drive-induced arousal, such that dominant or well-learned responses are facilitated and subordinate, or poorly-learned responses are inhibited.

(2) Although it is possible that mere presence in the absence of evaluation potential may be sufficient to produce these effects, apprehension resulting from evaluation potential will produce effects that are more robust than those evidenced by "mere presence" alone.

(3) The effects have variously been shown to occur in the anticipation of positive and/or negative outcomes; however, this factor may be situation-specific, in that particular experimental designs may yield support for one of these explanations and not the other.

**Coaction Effects**

Prior to discussing empirical support for Distraction-Conflict Theory, we must introduce a body of literature
dealing with the effects of task-performing coactors upon the performance of individuals in that coacting set.

Although Zajonc (1965) made no distinction in his theory regarding the effects of coactors vs. non-task-performing observers, we have chosen to deal with coaction effects in a separate section due to the altered nature of the psychological processes operating in a coaction arrangement as compared to an observing audience arrangement.

One may consider that task-performing coactors (henceforth referred to simply as coactors) may be viewed by a task-performing individual in one of two possible contexts, depending upon, among other things, the nature of the situation and task instructions. In some situations, coactors may be viewed as comrades, especially when engaged in a cooperative venture; in other situations, coactors may view each other as rivals or competitors.

Indeed, several authors have found evidence supporting this notion of contextual determinants of coaction effects.

Kiesler (1966) found that when the subject was in a high state of drive at the outset of the experiment (induced by experimenter presentation of a fearful stimulus), the introduction of a coactor lowered this drive state. When the individual was not presented with this fearful stimulus, and thus was in a relatively low drive-state, introducing a coactor served to increase the individual's drive level.
Carment & Latchford (1970) found that on a simple motor task, coactors performed more rapidly than individuals working alone only when the experimenter was present. When the experimenter was absent, individuals working alone performed more rapidly than coacting individuals. The authors concluded that the presence of the experimenter in the first condition induced a rivalry effect that was lacking in the experimenter absent condition, an effect that was subsequently transferred into superior task performance for coactors in the experimenter-present condition.

With reference to Distraction-Conflict Theory, Sanders, Baron & Moore (1978), in an empirical study, found that social facilitation effects in a coaction arrangement will occur only under two conditions: (1) When subjects are motivated to obtain comparison information, and (2) when such comparison information was available. The authors claim that these results supply ample justification for Distraction-Conflict Theory, since the removal of the subject's motivation or ability to monitor coactor performance, an activity inherently distracting from task activity, results in the disintegration of social facilitation effects.

Although not positing a distraction-conflict explanation, Klinger (1969) found results similar to those of Sanders, et al. (1978) in an experiment designed to test the effects upon a subject's performance of the mere presence of
a coactor who did not have access to information pertaining to the subject's performance against a coactor who had such access. The authors found that social facilitation effects occurred only when coactors had access to subjects' performance information.

In a study by Laughlin & Jaccard (1975), the authors described results that on the face of it would seem to present evidence contradicting a drive-theoretical approach to social facilitation; however, a closer look at the design of the study serves to resolve this discrepancy while illustrating an important distinction regarding coaction effects. In this study, the authors found that for a complex task, performance of coacting groups improved when observed by an audience. This prediction is antithetical to that espoused by drive theorists, who would predict an increment in performance only for simple tasks in the presence of an audience. However, the task in this study was designed to induce cooperative group behavior, which sets this study apart from all those positing drive-like effects, and thus it may not be considered within the same framework. What this study does seem to indicate is that in order for coactors to display any behavior indicative of social facilitation effects, it is necessary that the task design induces a competitive rather than a cooperative set.
In summary then, regarding coaction, the studies described here would seem to indicate certain conditions that may be required for coaction arrangements to induce social facilitation effects:

(1) Coactors must experience a sense of rivalry or competition with respect to their performance vs. other performance. This sense of rivalry may be induced in a number of ways, including presence of potentially evaluative observers (e.g., Carment & Latchford, 1970), utilization of instructional sets designed to induce competition, or the introduction of extrinsic reward contingent upon superior performance relative to others.

(2) Coactors must be motivated to obtain comparison information (Sanders, Baron & Moore, 1978).

(3) Coactors must be able to monitor the progress of others during performance on a similar task (Sanders, Baron & Moore, 1978).

In attempting to explicate the nature of the psychological processes underlying social facilitation effects due to coaction, perhaps Wankel (1972) said it best:

The evaluative interpretation of audience effects may be extended to coaction effects in a like manner. Rather than an "emotional effect of the mere sight and sound of others performing the same task," coaction
effects may also be attributable to some cognitive process of evaluation. The stimuli arising from others performing the same activity may serve to supply the performer with cues or information pertaining to how well he is performing relative to others and may serve to augment his drive to perform well, i.e. rivalry. Thus, coaction, according to this interpretation, cannot affect performance in a manner distinct from rivalry; however, it may help to intensify feelings of rivalry and thus may indirectly influence performance.

Assessment of Behavior and Performance in Group Contexts

One may think of a diversity of real-life situations in which the behavior and/or performance of individuals interacting in a group context is observed and evaluated. Further, we may speculate with respect to the potential effects of both the observers as well as other group members upon the behavior or performance of a given individual within each of these contexts.

One such context is that of an educational institution. Virtually all public and private educational institutions utilize some form of group training, followed by a formal assessment procedure in which each individual's performance is assessed.
With regard to potential effects of evaluative observers, the presence of an instructor may be thought to facilitate proper classroom decorum. Additionally, the fact that the instructor possesses the power of evaluating students, thereby affecting their potential for future success, can be considered an instrumental factor in motivating students to attend to task-related responsibilities. With regard to potential effects of other group members, the fact that students are often assessed relative to others creates a concern regarding the performance of others over and above the concern with their own performance. This concern may be exacerbated when a grading curve system is used. Given these conditions, a student may, for example, decide to work harder if his/her performance fails to measure up to the class norm, even though it may have been considered adequate irrespective of this comparison group.

Another such situation or context is that of an athletic team. Although group measures of performance are often used (e.g. team record), individual performance records are also maintained.

The evaluative observers in this context may be considered the group of spectators. These spectators may be thought to affect performance via the notion of increased adrenaline flow of athletes as a function of heightened crowd noise. The flow of adrenaline may give the athlete a
sense of strength and confidence that may have direct implications for performance. Regarding the effects of other group (team) members, it is quite often the case that salary decisions are partially based upon the contributions of individuals relative to those of other team members. This may have direct implications for behavior or performance—for example, the increased motivation of an individual whose performance may be adequate, but is being overshadowed by other team members.

A third such situation is that of a work organization. Indeed, organizations are continually assessing the behavior and performance of individuals in a variety of contexts and for a variety of purposes.

An employee's supervisor typically appraises his/her subordinate's performance at specified time intervals, and thus would be considered the subordinate's primary evaluative observer. The fact that the supervisor may impact substantially upon this subordinate's position or advancement potential within the company, via these performance ratings, may be thought to have strong implications for the behavior of that individual in the presence of his/her supervisor. Regarding effects of others in the group, the oft-cited phenomenon of workgroup norms in the direction of production-rate restriction (Porter, Lawler & Hackman, 1975) represents a blatant example of the potency with which others in a
workgroup may impact upon an individual's behavior and performance.

A fourth such context, toward which the principles of Social Facilitation Theory may be applied is that of the managerial assessment center. Briefly described, assessment centers are devices used by organizations to identify individuals that are likely to become proficient managers. A typical assessment center involves a series of exercises designed to reflect situations typically encountered by managers on the job, termed "job samples." Participants (assesseees) are instructed to perform in each situation as they would in an actual managerial capacity. In the typical instance, asessees perform in groups, and their performance is assessed and evaluated by a group of assessors with respect to a series of dimensions presumed to characterize the total set of managerial functions (Finkle, Handbook).

The assessment center method is predicated upon a series of assumptions regarding asessesee performance and assessor evaluation; the viability of the method as a decision-making device is contingent upon the satisfaction of these assumptions. One such assumption is that conditions within the assessment center are standardized such that performance in the exercises will reflect maximum capability for all asessees. Thus, since conditions are not varied, it is assumed that they are not biased with respect to any particular
category of assessees. A second assumption is that the inferences made by assessors will be valid, in that they reflect accurate assessment of future performance in a managerial capacity.

However, the literature on Social Facilitation suggests that particular aspects of assessment center structures may create a bias that will be systematically conducive or dysfunctional to assessees performance, depending upon the "true" performance capabilities of the individuals. The notion here is that "standardization of conditions" cannot be equated with "lack of systematic bias," because while conditions may be standardized in a physical sense, they may actually be unstandardized in a psychological sense, in that certain conditions may impact differentially upon the assessees, depending upon their levels of capability. Thus, performance in the assessment centers may be biased systematically, and ultimately, inferences made regarding managerial capability may reflect this same systematic bias.

Two aspects of the assessment center that may readily be considered in the context of Social Facilitation theory are "assessor location relative to assessees" and "ability of assessees to monitor other performance." Regarding assessor location, the typical assessment center positions assessors so that they are in full view of candidates. We may speculate that a highly salient evaluative audience such
as this one may induce strong Social Facilitation effects—an incremental effect upon performance of high-capability assesses, a debilitating effect upon low-capability assesses (Cottrell, et al., 1968). A less salient assessor group, which could conceivably be operationalized via placement of assessors behind a one-way mirror, would be thought to have a less substantial effect upon performance in either direction.

Regarding "monitoring ability," if we can generalize the findings of Sanders, Baron & Moore (1978) to the assessment center, we would posit that if assesses are unable to monitor the performance of others during the exercises, "the distracting effects of coaction would be considerably diminished, eliminating drive-like effects upon performance" (enhancement of well-learned responses, inhibition of poorly-learned responses).

Notion of Felt Competence

One issue that has heretofore not been considered in Social Facilitation research is the relationship between the individual's self-assessment of task-related capability (hereafter used interchangeably with the term "Felt Competence") and experimental manipulations of task-related capability. While we may presume that the two are fairly well correlated, they represent conceptually distinct phenomena.
One may conceive of at least two identifiable classes of experimental manipulations that can be utilized in order to establish systematic differences between subjects in terms of task-capability. These two types of manipulations may be considered to fall under the rubric of "selection vs. training." The selection manipulation would involve pre-testing individuals with respect to task competency, utilizing some measure that is analogous to the actual experimental task, and assigning individuals to conditions based upon their scores. The training manipulation, which was used in the present study, involves the differential training of groups of subjects in order to produce a subset that are presumably better prepared for the task at hand than is the poorly-trained or untrained subset.

The underlying intent in both types of manipulations is to allow the researcher to differentiate among individuals in terms of pure task-related capability. Thus, in Social Facilitation terminology, those at higher levels of capability are the individuals for whom the dominant responses are more often the correct responses than is the case for low-capability individuals.

What both types of manipulations, and indeed much of the Social Facilitation literature, fail to take into consideration to any appreciable degree is the perceptual nature of the Social Facilitation process. That is, an individual's
actual capability at a task and his perceived capability may not be identical. If we consider Social Facilitation effects to be largely cognitive in nature, rather than simply a result of drive-induced response dominance, it would seem imperative that we look at the individual's level of felt competence with regard to a given task. If, as Cottrell, et al. (1968) state, evaluation apprehension is at the root of Social Facilitation effects, it is quite possible that the individual's perception of his task-related competence will have a greater effect upon his anticipation of how he will be evaluated, and subsequently upon performance in the presence of an audience, than will any experimental manipulations of task-related capability.

In this study, we will consider each factor regarding its relative utility toward accounting for performance variance. Toward this end, we incorporate both a differential training manipulation as well as a self-report measure of felt competence, assessing the relationship of each to the dependent measures of performance. Since this comparison is exploratory in nature, no specific hypotheses will be formulated in this regard.

**Hypotheses of the Study**

In assessing performance of behavior of individuals, when measures of process (behavior) as well as product (outcome) are required, it is clear that some form of observation
must be employed. However, some observational arrangements may be considered less intrusive than others, whereby the presence of observers would be less salient in the minds of task performers.

Given this, we would predict that the magnitude of Social Facilitation effects due to audience presence would vary with the salience or perceived degree of presence of the audience. Social Facilitation effects will be strongest when the audience is in direct view of task performers, and thus maximally salient. When the audience is not readily in view of task performers, Social Facilitation effects due to audience presence should be diminished. In terms of performance, then, a highly intrusive arrangement should have an incremental effect upon the performance of persons of high task-related capability and a decremental effect upon the performance of low-capability individuals. A minimally intrusive audience should not yield these effects to any appreciable degree, and thus should have little direct effect upon task performance in either direction.

A second hypothesis that stems from the work of Sanders, Baron & Moore (1978) is that in situations in which individuals are unable to monitor the performance of others while themselves working at a similar task, Social Facilitation effects due to distraction should not be evidenced. When individuals are able to monitor, Social Facilitation effects--
increased performance levels for high-capability individuals and diminished performance levels for low-capability individuals—should eventuate.

A third hypothesis, somewhat exploratory in nature, is that the presence of a highly salient audience coupled with the ability to monitor coactor performance will have a sum-mating effect, such that Social Facilitation effects will be of greater magnitude when both conditions are present than when one or the other is absent. This hypothesis assumes that individuals will be most strongly aroused when both conditions are present, due to the additive effects of eval-uation apprehension with respect to the audience and dis-traction and perceptions of competition with respect to task-performing others.

Another area of interest that will be investigated is the notion of felt competence vs. experimental manipulations of task-related capability discussed earlier. Although this will not be put into the form of a directional hypothesis, due to its purely speculative nature, the intent will be to see whether the use of one measure will enable us to account for a significantly greater proportion of performance vari-ance than the other. This investigation may also provide us with a greater understanding of the true nature and source of Social Facilitation effects.
METHODS

Subjects

Subjects were 112 introductory psychology students, participating in order to fulfill partially a course requirement. Subjects performed in groups of three per session, and were randomly assigned to experimental conditions. No control for sex, race or age composition of groups was exercised.

Task

The task involved the solution or decoding of coded word messages, known as cryptograms. Decoding cryptograms requires the utilization of cues or principles regarding word and sentence formations. The particular cryptograms used were devised by a research assistant. The task is of a highly complex nature, and the baseline of subject performance was found to be extremely low in pilot testing. Thus, the decision was made to provide subjects with a clue for each cryptogram—the solution to one key coded letter. Subjects worked on blackboards and were given twenty minutes to decode two cryptograms (see Figure 1), with no specification as to the order in which they should be solved, though virtually all subjects were observed to work on each in the order
in which they were presented on the boards. Two sets of cryptogram pairs were used (referred to as "Cryptogram Set Type" hereafter) since subjects in certain conditions were able to monitor the performance of others, and thus could not be working on the same cryptogram to be treated as independent data points. Equivalence in difficulty of the cryptogram set types was initially assessed via pilot testing; however, in order to control for possible effects due to differential task difficulty in the study proper, cryptogram set type was equalized within cells.

Study Design and Major Analyses

A 2x2x2 between subjects factorial analysis of variance was used. The three independent variables were audience salience, monitoring ability, and task-related training. The dependent measures were: (1) Total number of letters decoded; (2) Percentage of letters decoded--Cryptogram 1; (3) Percentage of letters decoded--Cryptogram 2. Results of statistical analyses are reported with respect to the first of these dependent variables only, except where results may differ significantly between the dependent measures. In addition, separate analyses were performed for each cryptogram set type in an effort to eliminate some of the within cell variance that may likely have served to weaken the probability of obtaining predicted results when both set types were included in the analysis.
The basic research questions were investigated using ANOVA, studying all possible main effects and interactions. Nested within cells was a variable indicating the particular group that the subject was a part of (groups of three participated in each session).

The relative efficacy of felt competence in comparison to the training manipulation was assessed by deriving a "Felt Competence" composite score from Felt Competence questionnaire responses, and substituting the composite score for the training variable included in the 2x2x2 design described earlier, utilizing a hierarchical regression procedure in the "Felt Competence" analysis. (See Figure 2.)

Other analyses will be discussed in the results section.

Procedures and Manipulations

Subjects were brought into the laboratory and provided a brief verbal description by the experimenter as to the nature of the cryptogram task. Only one experimenter was used per session, although a total of five different experimenters was employed throughout the course of the study (three male, two female). Two types of training modules were used, one much more extensive than the other, and designed to produce task-related capability superior to that which the other was intended to produce (known as superior and inferior training modules, respectively).
TRAINING MANIPULATION

Superior Training Module

In the superior training module, individuals were presented with a short training booklet (see Figure 3) and were told to alternate their viewing during training between the training booklet and large oaktag flash cards that were designed to complement the training booklet. The flash cards were designed to be attention-capturing devices, and were thus made colorful and pleasing to the eye. An audiotape was prepared in which the entire content of the training was recited verbatim, along with instructions regarding alternation of viewing time between training booklet and flash cards. The basic intention was to maximize the probability that the principles underlying cryptogram solution presented would be successfully encoded and stored by subjects. At this point, subjects were told that they would be working on two "practice" cryptograms prior to the actual cryptograms. They were also told that while they would attempt to solve each independently for eight minutes, we would discuss their approaches to the solutions as a group, following their attempts at a solution. The purpose of this "rehearsal" manipulation was to familiarize subjects with the task, and allow them to profit from the insights of the experimenter as well as the other subjects. The mode of discussion following each practice cryptogram was interactive, and thus
could not be standardized across sessions. No data were collected regarding subject performance in the rehearsal period, in order to preserve the practice nature of the period. Subjects were then provided with the Felt Competence questionnaire, designed to measure their degree of felt-capability for the task (Figure 2). They were then guided to the blackboards to begin working on the actual cryptograms. At the end of the twenty minutes, subjects were given sheets with the identical coded cryptograms that they had worked on, and were instructed to transcribe their attempted solutions exactly as they appeared on the board. Following the experiment, the experimenter verified the transcriptions.

**Inferior Training Module**

It was felt that some degree of training was necessary for this condition in order to produce adequate verifiability in performance on this highly complex and unfamiliar task.

The experimenter began by describing the nature of the task, as in the superior training condition, and instructed subjects to read through the training booklet for eight minutes (the time was determined rather arbitrarily by the research team, so that individuals had enough time to read the booklet through once at a "normal" pace. The booklet was identical to that in the superior training condition, except
that the information on the flash cards (which were not used here) was reproduced in the training booklet. No audiotape was used, and subjects were not given any practice. Once the eight minutes had elapsed, subjects were given the Felt Competence questionnaire. Once this was completed, they were guided to the blackboards to begin working on the actual cryptograms. The identical transcription procedure described for the superior training module was utilized here.

The training/rehearsal manipulation may be considered a manipulation of response dominance, thus susceptible to Social Facilitation effects. Precedent was set for such a manipulation by Martens (1969), who, in a within-subjects design, instructed subjects to practice at a task until it was well-learned. Once learning had occurred, Social Facilitation effects in the expected directions were evidenced.

AUDIENCE SALIENCE MANIPULATION

There were two conditions of audience salience: high vs. low. In the high-salient condition, the experimenter circulated around the immediate vicinity of task performers in a manner that was designed to make subjects blatantly aware of the experimenter's presence (i.e. pacing about and looking over subjects' shoulders). The experimenters attempted to divide observation time relatively equally between the three subjects. In the low-salient condition, experimenters instructed subjects that they would be observed
by the experimenters periodically from a position behind a one-way mirror. At this point, the experimenter instructed subjects to begin working and left the room to observe through the mirror.

Although the one-way mirror operationalization has never been used in Social Facilitation research to manipulate audience presence or salience, the mirror would serve to make the audience much less obtrusive and would take attention away from the audience and direct it to the self and to task performance. As mentioned previously, the bulk of empirical findings (Liebling & Shaver, 1973; Inness & Young, 1975; Paulus, Annis & Risner, 1978) has indicated differential effects for viewing oneself in a mirror vs. viewing an audience in terms of arousal and response dominance, in the direction that mirror presence yields no such drive-related effects.

**MONITORING ABILITY MANIPULATION**

Monitoring ability was operationalized by positioning blackboards so that subjects were/were not readily able to view others performing the cryptogram task. As mentioned previously, where subjects were able to view coactor performance, a different cryptogram set type was provided for each subject. By operationalizing monitoring ability in this manner, subjects were often run in different conditions (monitoring, no monitoring) within the same session.
This variable was previously tested in only one study, that by Sanders, Baron & Moore (1978). They manipulated the variable by having subjects work at completely different types of tasks. The manipulation in the present study serves the identical purpose of the Sanders, et al. (1978) manipulation, while making it possible to compare across all subjects, since the tasks are within the same domain.
RESULTS

The present chapter is partitioned into four major sections. The first section consists of checks on the manipulations. The second section deals with the major hypotheses explicated in the introduction. In the third section, we consider additional analyses that are more nearly exploratory in nature. The fourth section presents serendipitous findings, not considered primary research issues at the inception of the study.

SECTION I: MANIPULATION CHECKS

Audience Salience Manipulation

As indicated previously, the particular method of manipulating audience salience utilized in the present study (close physical proximity vs. behind one-way mirror) has not been operationalized in previous research in the Social Facilitation area, to our knowledge. Rather, the typical method of manipulating this variable involves creating a condition in which no live audience observes task performance, although there is variation across studies regarding how performance is actually measured in these conditions. Two prominent examples are the use of a videocamera by Henchy & Glass (1968) and the use of a written mode of task
response to be evaluated subsequent to performance (Paulus & Murdoch, 1971).

Thus, in the present study, it is imperative that subjects perceive the audience to be less salient in the one-way mirror condition than in the close proximity condition (low vs. high salience, respectively) in order for Social Facilitation effects to occur.

Audience salience was tested via three items within a six-item questionnaire (see Figure 4) administered following task performance. The items were designed to elicit information within a content-process-outcome framework. That is to say, the questions assessed the degree to which the manipulations were perceived by subjects (content), the degree to which subjects perceived the intended cognitive and/or physiological effects that the manipulations were designed to elicit (process) and the degree to which subjects perceived the manipulations to affect performance on the task (outcome). The content question here measured the degree to which subjects were aware of the presence of observers during task performance, presumably a measure of the obtrusiveness of observers. The question read: "To what extent were you conscious of being observed while you worked on the task?" It is important to note that the question did not specify the nature of the observer—experimenter or coactor(s), in order to allow us to compare subjects' relative awareness of
observation under all four permutations of the "audience salience" and "monitoring ability" variables.

The "process" item was designed to measure the extent to which the particular mode of observation led to feelings of arousal. It was phrased: "To what extent did you feel nervous or anxious while performing the task?" It was felt that the concepts of nervousness and anxiety were two concepts that are closely associated with arousal, and were more nearly a part of subjects' everyday cognitions and vocabulary than was the concept of arousal; thus, the decision was made to incorporate the former terms into the item.

The "outcome" item was designed to yield a measure of the extent to which subjects felt that their performance was affected by the particular mode of observation to which they were exposed: "To what extent did you feel your performance was affected (in a positive or negative direction) by the fact that you were being observed by experimenters?" This is, quite obviously, a self-report measure, designed only to measure subjects' perceptions of observer effects upon performance; actual observer effects upon performance are considered in the analyses of major hypotheses.

Analysis of the three items yielded the following results: For the item "To what extent were you conscious of being observed when you worked on the task?" the main effect for audience was highly significant in the expected direction
(F = 26.78, p .01, df = 1). For the item "To what extent did you feel nervous or anxious while performing the task?" no significant main effect was evidenced for audience. Thus, while individuals in the high salience or monitoring ability conditions may have been conscious of observers, this did not result in heightened self-reported arousal to any significant degree.

For the item "To what extent do you feel your performance was affected (in a positive or negative direction) by the fact that you were being observed by experimenters?", a significant main effect was found for the audience salience variable (F = 7.45, p .01, df = 1,110).

**Monitoring Ability Manipulation**

As with audience salience, the items designed to assess the efficacy of this manipulation were constructed within a content-process-outcome schema.

Two items were designed to assess the "content" portion. The first item in this vein was also utilized in the audience salience manipulation check, though subject responded to the item at only one point in time: "To what extent were you conscious of being observed while you worked on the task?" The second item read "To what extent were you able to judge how well others were doing while you were performing the task?" Thus, monitoring ability is thought to have two distinct aspects, both of which may have implications in terms
of Social Facilitation effects: The ability to monitor others, as well as susceptibility to being monitored by others.

Regarding the first item, an effect was found for monitoring ability in the expected direction \( (F = 2.98, p < .10, \ df = 1,110) \). Thus, subjects in the monitoring ability "present" condition did experience a greater awareness of being observed than those in the "absent" condition. A second point of interest here regarded whether a significant interaction would be found for this item between audience salience and monitoring ability. No such interaction was found; thus, their effects upon consciousness of observation are presumed to be additive. A check of the mean values reveals such a linear pattern (Table 1).

**TABLE 1**

Self-Reported Awareness of Observation for All Conditions of Audience Salience and Monitoring Ability

<table>
<thead>
<tr>
<th>Audience Salience</th>
<th>Monitoring Ability</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Absent</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>( \overline{x} 1.96 )</td>
<td>( \overline{x} 3.21 )</td>
<td>Absent</td>
</tr>
<tr>
<td>( \overline{x} 2.46 )</td>
<td>( \overline{x} 3.46 )</td>
<td>Present</td>
</tr>
</tbody>
</table>

\( N = 112 \)
With respect to the second item, no significant effects were evidenced for the monitoring ability variable, although the F-value approached significance (F = 2.36) for this variable. Thus, one cannot state with confidence that subjects felt that they were able to assess the performance of others better in the "present" than in the "absent" condition.

The "process" item was stated as follows: "To what extent did you feel a sense of competition with respect to the other students?" The implications of the Carment & Latchford (1970) and Laughlin & Jaccard (1975) studies are that coactors must experience a sense of competition or rivalry with coactors before Social Facilitation effects will operate. Analysis of responses to this item yielded no significant differences between monitoring ability conditions. Apparently, subjects in the monitoring ability "present" condition did not feel any more of a sense of competition with others than did those in the "absent" condition.

The "outcome" item was stated: "To what extent do you feel your performance was affected (in a positive or negative direction) by the fact that there were others working on a similar task?" Again, as was the case with the analogous audience salience item, this is a self-report measure of perceived coactor effects upon performance. No significant differences were found between the two monitoring ability
conditions for this item. Actual performance measures vis-a-vis monitoring ability are considered in the next section (Analyses of Major Hypotheses).

**Training Manipulation**

The training procedures were designed to be a manipulation of task-related capability. In assessing the efficacy of this manipulation, a self-report measure (see Figure 2) was utilized in favor of a more objective measure based upon two factors: (1) The measurement problems inherent in arriving at a "true" measure of capability on a complex task for which no known norms exist, and more importantly, (2) Our interest in studying the relative utility of felt-competence as compared to experimentally-manipulated capability as an explanatory concept for social facilitation effects. Thus, these items represented a check on the training manipulation as well as independent variables in their own right.

Items 1 and 3 were designed essentially for the same purpose, but they approach the problem from slightly different perspectives. Item 1 requires the subject to estimate the number of cryptograms that he/she could solve in a given time period. Item 3 requires the subject to produce a numerical rating on a Likert-type scale regarding task-related capability. The decision to use both items stemmed from some indecision with regard to the type of wording for which
the subject would find it easiest to accurately assess his/her capabilities. The items were found to correlate .67 (p < .001).

Neither item showed significant differences across training, though both did approach significance. For Item 1, F = 2.23; for Item 3, F = 2.01.

Item 2 was designed simply to check subjects' perceptions of the efficacy of each type of training module. As such, it was not an indicator of felt competence by intention. The T-value for this item approached significance in the expected direction (T = 1.73, p < .10) and thus subjects did perceive the "superior" training module to be, in fact, superior.

Item 4 was designed to measure subjects' perceptions of their abilities relative to the average person. The idea behind including this item was to allow us to assess whether felt competence, as a "social comparison" process, whereby individuals judge their own competence by using others as a yardstick, is a more predictable outcome of the training manipulation than is felt-competence as a pure self-assessment measure not employing comparison others.

No significant differences were found for this item across levels of training. Thus, even superior training did not leave individuals with a sense of greater competence at the task than the "average" person. In fact, the mean value
for superior-trained individuals was barely above the scale midpoint for this item (x = 3.12).

SECTION II: ANALYSES OF MAJOR HYPOTHESES

Table 2 presents the mean values and standard deviations for each level of three independent variables: Audience salience, monitoring ability and training. Table 3 presents the results of the analysis of variance procedure used to test the major hypotheses of the study. Overall, the results indicate that the major hypotheses of the study were not borne out.

TABLE 2
Mean Values and Standard Deviations for Audience Salience, Monitoring Ability, and Training

<table>
<thead>
<tr>
<th>Listening Ability</th>
<th>Present</th>
<th>Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ST</td>
<td>ST</td>
</tr>
<tr>
<td>Audience Salience</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Present</td>
<td>61.36</td>
<td>67.85</td>
</tr>
<tr>
<td>Absent</td>
<td>60.14</td>
<td>62.07</td>
</tr>
<tr>
<td>Monitoring Ability</td>
<td>IT</td>
<td>IT</td>
</tr>
<tr>
<td>Present</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>ST</td>
<td>61.00</td>
<td>68.28</td>
</tr>
<tr>
<td>Absent</td>
<td>61.00</td>
<td>61.14</td>
</tr>
<tr>
<td>Absent</td>
<td>18.02</td>
<td>19.75</td>
</tr>
<tr>
<td>sd</td>
<td>17.36</td>
<td>sd</td>
</tr>
<tr>
<td>Present</td>
<td>16.84</td>
<td>20.12</td>
</tr>
<tr>
<td>Absent</td>
<td>25.15</td>
<td>20.26</td>
</tr>
<tr>
<td>N</td>
<td>112</td>
<td></td>
</tr>
</tbody>
</table>

ST: Superior Training
IT: Inferior Training
TABLE 3

2x2x2 Analysis of Variance for Audience Salience, Monitoring Ability and Training:
DV = Total Number of Letters Decoded

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>F-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audience Salience</td>
<td>1</td>
<td>440.03</td>
<td>1.04</td>
</tr>
<tr>
<td>Monitoring Ability</td>
<td>1</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Training</td>
<td>1</td>
<td>350.04</td>
<td>0.83</td>
</tr>
<tr>
<td>Audience Salience x Monitoring Ability</td>
<td>1</td>
<td>1.75</td>
<td>0.00</td>
</tr>
<tr>
<td>Audience Salience x Training</td>
<td>1</td>
<td>240.14</td>
<td>0.57</td>
</tr>
<tr>
<td>Monitoring Ability x Training</td>
<td>1</td>
<td>0.03</td>
<td>0.00</td>
</tr>
<tr>
<td>Audience Salience x Monitoring Ability x Training</td>
<td>1</td>
<td>11.57</td>
<td>0.03</td>
</tr>
<tr>
<td>Error</td>
<td>104</td>
<td>80410.99</td>
<td></td>
</tr>
</tbody>
</table>

N = 112

Now we will turn to the results regarding each of the major hypotheses.

Hypothesis 1

According to this hypothesis, social facilitation effects due to audience presence should be evidenced when the audience is present and should be absent or of significantly lower magnitude when the audience is located behind a one-way mirror. Thus, trained subjects should perform
more successfully under audience present conditions than under the one-way mirror condition (high vs. low salience). Untrained subjects should exhibit the reverse effect (perform more poorly under high salient than low salient conditions).

Thus, an audience salience x training interaction must exist for this hypothesis to be supported. As can be seen in Table 3, no such interaction was found to be significant.

Hypothesis 2

This hypothesis states that Social Facilitation effects due to monitoring ability should occur when such ability is present, and should be non-existent or of lower magnitude when coactors are not able to monitor other performance. By this, then, performance of "superior" trained subjects who are able to monitor performance of others should perform better than "superior" trained subjects not able to monitor coactor performance; among "inferior" trained subjects, those who are able to monitor coactor performance should perform more poorly than those unable to monitor performance.

For this hypothesis to find support, a monitoring ability x training interaction must exist. Table 3 indicates this interaction to be non-significant.
SECTION III: EXPLORATORY ANALYSES

In this section, we consider two analyses that represent explorations beyond what has been considered to date in the Social Facilitation literature, and thus would be considered somewhat tenuous.

Hypothesis 3

The first exploratory hypothesis was that audience salience and monitoring ability would have a cumulative effect upon performance consistent with Social Facilitation theory. Thus, it was predicted that the Social Facilitation effects would be greater under the audience salient-monitoring ability present conditions than under conditions whereby either the audience is of low salience or the ability to monitor is not present. Again, this would imply incremental performance effects for "superior" trained subjects under the high salient-monitoring ability present conditions, and decremental effects for untrained subjects under those conditions.

Support for this hypothesis would require a significant three-way interaction of audience salience x monitoring ability x training. Table 3 indicates a non-significant interaction.
Hypothesis 4

As indicated earlier, this hypothesis, regarding felt-competence vs. experimentally manipulated capability would best be considered non-directional, due to its purely speculative nature. The basic intent in considering these factors is to enable us to assess which of the two factors accounts for a greater percentage of performance variance as stipulated by Social Facilitation theory. Were we to find that felt-competence is a more effective index to use than manipulated capability, this would seem to imply that Social Facilitation effects are tied more closely to individual self-perceptions than response dominance, per se. Were the reverse found to be the case, then response dominance would be supported as the more influential of the two factors.

For this analysis, felt-competence was substituted for the training variable in a hierarchical regression procedure. The variable represented a composite of questionnaire items 1, 3 and 4 from the felt-competence questionnaire (see Figure 2), with appropriate score transformations to equate the scales. The decision to create the composite was based upon high item intercorrelations, as presented in Table 4.
### TABLE 4

Felt Competence Item Intercorrelations

<table>
<thead>
<tr>
<th>Item</th>
<th>1</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>.673</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td>.594</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>.553</td>
<td></td>
</tr>
</tbody>
</table>

### TABLE 5

Hierarchical Regression Procedure for Audience Salience, Monitoring Ability and Felt-Competence Composite:
DV = Total Number of Letters Decoded

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>F-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audience Salience</td>
<td>1</td>
<td>171.76</td>
<td>0.43</td>
</tr>
<tr>
<td>Monitoring Ability</td>
<td>1</td>
<td>113.44</td>
<td>0.28</td>
</tr>
<tr>
<td>Felt Competence</td>
<td>1</td>
<td>303.51</td>
<td>0.76</td>
</tr>
<tr>
<td>Audience Salience x Monitoring Ability</td>
<td>1</td>
<td>138.72</td>
<td>0.35</td>
</tr>
<tr>
<td>Audience Salience x Felt Competence</td>
<td>1</td>
<td>134.01</td>
<td>0.33</td>
</tr>
<tr>
<td>Monitoring Ability x Felt Competence</td>
<td>1</td>
<td>100.40</td>
<td>0.25</td>
</tr>
<tr>
<td>Audience Salience x Monitoring Ability x Felt Competence</td>
<td>1</td>
<td>114.51</td>
<td>0.29</td>
</tr>
<tr>
<td>Error</td>
<td>104</td>
<td>41717.71</td>
<td></td>
</tr>
</tbody>
</table>

N = 112
The hypotheses of interest here are directly analogous to those considered previously using training as an independent variable.

The first hypothesis is that the presence of an audience should have beneficial effects upon individuals with high felt-competence and detrimental effects upon low felt-competence individuals, in terms of performance. Thus, an audience x felt competence interaction would have to be significant for this to be supported. Results in Table 5 indicate a non-significant interaction.

The second hypothesis is that the ability to monitor should have positive effects upon high felt-competence individuals and negative effects upon low felt-competence individuals. The monitoring ability x felt-competence interaction necessary to support this hypothesis is shown in Table 5 to be non-significant.

**SECTION IV: SERENDIPITOUS FINDINGS**

In this section, we present findings that were not expressly considered research issues in the present study, though they may have important implications regarding future Social Facilitation research.

Although these results were not evidenced in treating felt competence as a continuous variable, further analysis utilizing an extreme group split (high and low 33%) on the felt competence variable uncovered a significant performance
difference between the extreme groups \( F = 7.78, p < .01 \), indicating that individuals in these groups were quite accurate in predicting their own levels of performance. While this does not show direct support for any of the hypotheses in the present study, it does seem to indicate that a strong relationship does exist between felt-competence and performance—certainly much more powerful than the relationship between training and performance in the present study. Implications of this finding with respect to the relative utility of felt-competence as compared to manipulated capability are discussed in the following chapter.

One unintended finding was the disparity in difficulty (performance) between the two cryptogram set types \( T = 6.73, p < .01 \). While equivalence of the two sets was presumably established in pilot testing, Set A was found to be significantly more difficult than Set B. The importance of this finding lies in the fact that it represented a powerful additional source of within-cell variance. Analyses were re-performed by splitting the data into two sets based upon cryptogram set type, considering results separately for each set type. No significant effects related to Social Facilitation theory predictions were found for either set type, although this may be attributed in large part to shrinkage in cell size, increasing the likelihood of Type II error.
DISCUSSION

The discussion chapter is partitioned into four major sections. First, the experimental manipulations will be considered. Second, results regarding major hypotheses are discussed. Third, results of exploratory hypotheses and serendipitous findings are discussed. Finally, suggestions are provided regarding directions for future research in the area.

SECTION I: EXPERIMENTAL MANIPULATIONS

The effects for each of the experimental manipulations was assessed via self-report questionnaires. Thus, results must be considered in this light, and we cannot neglect the possible impact of social desirability and the difficulties inherent in gauging internal processes such as arousal level that individuals undoubtedly experienced.

Audience Salience

The results for the audience salience manipulation show that while individuals did report a greater awareness of the audience in the high salient condition, they did not feel more nervous or anxious under audience present conditions. However, they did feel that the present audience had a
greater effect upon performance than did subjects in the one-way mirror (low salient) condition.

These latter two findings are somewhat troublesome to reconcile. The implication, if we are to take the results at face value, is that some process, other than anxiety, is mediating subjects' perceptions of audience effects upon performance. Possible explanations, although purely speculative in nature, are that either (1) Subjects were distracted by the audience, although they did not perceive greater arousal due to distraction, or (2) Subjects felt compelled to concentrate more upon the task in the proximity of the experimenter, and perceived this to yield positive effects upon performance. Although the second hypothesis would seem less likely than the first, it is tenable.

This finding illustrates a serious limitation in questionnaire design. Since subjects were not asked to indicate specifically whether the perceived effects of the audience were in a positive or negative direction, the present data cannot be employed to test the above hypotheses.

However, by way of iteration, social desirability may have been a factor in accounting for the lack of significance for the "nervousness" item. In fact, checking mean response values for this item, we find them to be below the scale midpoint for virtually all conditions (overall $\bar{x} = 2.32$).
Although the aforementioned weaknesses in questionnaire design likely contributed to the failure to uncover evidence that the salience manipulation had its intended effects, we would have to point to the manipulation itself and conclude that the primary cause of this failure was the relative impotency of the "audience salient" condition. The "salient" condition involved observation by a single experimenter who was not portrayed as an "expert". It is likely that the introduction of multiple expert observers would serve to enhance the "salience" effect.

Thus, in summary, failure to produce the intended audience effect was most probably due to the relative weakness of the "audience salience" manipulation. Shortcomings inherent in certain questionnaire items may have aggravated the situation further by reducing the probability of uncovering even minor differences in the expected directions across the two "salience" conditions.

Monitoring Ability

Analysis of the monitoring ability items yielded the following results: (1) Subjects perceived greater awareness of being observed in the "monitoring ability present" condition, though significance was barely reached; (2) Subjects in the "present" condition did not feel that they were better able to judge performance of others than those in the "absent" condition, though the results did approach significance;
(3) Subjects in the "present" condition did not experience a greater sense of competition with respect to coactors than did subjects in the "absent" condition; (4) Subjects in the "present" condition did not perceive a stronger effect of coactors upon performance than did those in the "absent" condition.

Explanations for the latter three results become somewhat apparent when one considers the nature of the instructional set in the present study. At no point was competition between subjects purposefully induced by experimenter or instructions. In fact, in the superior training condition, a cooperative mode may have been induced via the interactive nature of the process. In addition, subjects were not given any instructions regarding the legitimacy of viewing coactor performance. One may speculate that in the absence of such instructions, subjects might assume that such observation was not legitimate or proper, in light of societal norms against viewing other performance during test-taking situations. Questionnaire data pertaining to this notion seemed to substantiate this proposition, although the wording of the item invokes certain limitations upon such interpretation that are discussed below.

In light of the findings of Sanders, Baron & Moore (1978) regarding conditions necessary to induce coaction effects, the lack of significant findings can be explained.
They posit that, in order to obtain such effects: (1) Subjects must be motivated to obtain comparison information, and (2) Subjects must have comparison information made available to them. Apparently, neither of these conditions was adequately realized in the present study; the absence of a competitive set likely resulted in minimal motivation to compare performance, and the lack of explicit instructions condoning performance comparison may have made comparison information, for all intents and purposes, unavailable to subjects.

Aside from these limitations, the wording of the item ("To what extent were you able to judge how well others were doing while you performing the task?") introduced a problem in interpretation. An inability to judge performance in this situation may be attributed to: (1) Constraints against observing others during task performance, or (2) Inability to assess performance effectiveness due to the nature of the cryptogram task—letters apparently decoded may be incorrect; thus, the number of letters apparently decoded cannot be considered an accurate measure of performance, without knowledge as to their correctness. If we assume the latter to be a plausible hypothesis, this would necessitate rewording the item to distinguish between simple observation and judgments regarding performance effectiveness.
In summary, then, the failure to produce intended coaction effects can be attributed to at least two factors: (1) Failure to induce a competitive set on the part of subjects through design and/or instructions; (2) Well-ingrained norms adhered to by subjects regarding the non-legitimacy of observing other performance during a "testing" situation (along with the lack of instructions to the contrary). In addition, the ambiguous wording of one of the questionnaire items may have created problems in interpretation by subjects, and thus not be measuring what it was intended to.

Creating Levels of Competency (Training)

By way of summarization, training (superior vs. inferior) did not have a significant effect upon perceived capability, either in a pure self-assessment vein, or with regard to the "average" person.

Limitations evident in the training manipulation were most likely responsible in large part for the lack of significant results. Some of these are: (1) The superior training module may not have been extensive enough; total training time was approximately twenty minutes, not including the time spent independently solving the "rehearsal" cryptograms; (2) The inferior training module may have been more extensive than it should have been, and thus may have been only mildly inferior to the nominally superior module; (3) No objective measure of task-related capability was used;
such a measure would have facilitated a direct comparison between felt competence and this objective measure.

Although the training manipulation could have been made to be more powerful, we would suggest that this type of manipulation may not be as effective as subject pretesting and assignment based upon a capability measure. This is, in fact, the method used in most past research. It would alleviate many of the problems encountered in the present study.

SECTION II: COMMENTS REGARDING HYPOTHESES 1, 2, 3

Inasmuch as the manipulation checks revealed the fact that none of the manipulations realized their intended effects, extensive discussion of the first three of our hypotheses (audience effects upon performance, coaction effects upon performance, and combined audience and coaction performance effects) would not seem warranted.

Thus, we do not feel that a true test of these hypotheses was accomplished here, and would suggest the possibility that future research utilizing a similar design, with more powerful manipulations, may potentially provide support for these hypotheses. Ideally, such research would incorporate many of the suggestions provided herein regarding improved manipulations.
SECTION III: EXPLORATORY HYPOTHESIS (HYPOTHESIS 4) AND SERENDIPITOUS FINDINGS

Hypothesis 4

This exploratory "hypothesis" was designed to assess the relative efficacies of trained or manipulated task-capability vs. felt competence regarding the task in accounting for performance variance, as an independent variable.

This general hypothesis was tested by substituting a felt-competence index score (high vs. low) for the training manipulation (superior vs. inferior) utilized in previous analyses. None of the effects were found to be significant with felt competence as an independent variable. Thus, felt competence did not interact with audience salience, monitoring ability or their combination in the directions predicted by Social Facilitation theory.

Again, this lack of significance can be attributed in large part to the failure of manipulations. As is expounded upon in the following section, we would not attribute non-significance to subject inability to accurately assess their capability levels, since these assessments were found to be highly accurate.

Serendipitous Findings

Perhaps one of the more important findings coming out of this study is that subjects were quite accurate in assessing their performance capability levels. This would seem to
provide cause for optimism regarding the use of a self-assessment of capability variable in future research, possibly in conjunction with some objective measure of capability. These two types of measures would appear to be more useful in terms of assessing task-related capability than is a differential training manipulation, when the task is not highly amenable to short-term training, as would seem to be the case in the present study.

SECTION IV: DIRECTIONS FOR FUTURE RESEARCH

Future research in the area of Social Facilitation theory would be greatly enhanced were the researchers to heed some of the suggestions that have been presented here. The need for creating a competitive set as well as motivation to compare performance was illustrated via responses to the monitoring ability items. The need for more effective measures and/or powerful manipulations of task-related capability was made clear by the relative weakness of the differential training manipulation. The viability of manipulating audience salience or obtrusiveness through utilization of a one-way mirror was substantiated; even though subjects in the low salient condition were informed that they would be observed, they still perceived the audience to be minimally obtrusive when they observed from behind a mirror.

If we choose to put faith in questionnaire responses indicating a lack of arousal due to audience presence in the
high-salient condition, this begs the question: "What characteristics or properties must the audience or observer possess in order to produce arousal effects?" Personal characteristics such as perceived observer expertise and sex of observer relative to task performers would seem to be fruitful areas of investigation in this vein, as would variations in the number of observers. Although information regarding these variables was not obtained in the present study, such information is not difficult to collect and may likely have an effect upon arousal and thus, possibly performance.

Another area seemingly worthy of research effort is the nature of the contingencies for good and poor performance. In the present study, the outcomes for either level of performance may not have been strong enough to create a significant level of arousal. No external reward or punishment was provided in the present study. High or low regard of experimenter or coactors may likely not have been an anticipated outcome for good vs. poor performance, and even if it were, it may not have been an especially meaningful consideration for subjects, since they were not familiar with the experimenter and in most cases, not with coactors, and most probably perceived future encounters with these individuals to be at best a remote possibility.

Thus, the inability to establish support for the hypotheses articulated in the present study should not serve
as an impediment to future research in the area. Many variables of importance remain to be studied in this vein, some of which have been articulated here. Social Facilitation theory would appear to be rich in its applicability to interests of I/O psychologists. Areas that can be identified with potential application are on-the-job performance observation, assessment center performance and workgroup effects upon performance. It remains the task of I/O psychologists to articulate these applications and design research to test for Social Facilitation effects in these types of contexts.
REFERENCES


APPENDIX A
FIGURE 1
Cryptograms
(Correct Solutions Provided)

CRYPTOGRAM SET TYPE A

1. CDASA'Q BV BAA X CV DKSSI
   There's no need to hurry
   HDAB CDA XEI JQ IVKBF.
   when the day is young.

2. QZZJGAHB T ZK TR SZTKN C TBFH H
   Cooperation is doing with a
   RTVG CFHB DZX FHYG BZ SZ
   smile what you have to do
   HKDC HD.
   anyway.

-----------------------------------------------

CRYPTOGRAM SET TYPE B

1. DCJIJ G IJ FY JGRX KGDCR DY
   There are no easy paths to
   RMAA JR R.
   success.

2. HMA PALH JZG HW LIBBAAQ TV
   The best way to succeed in
   DTRA TL HW ZBH WV HMA ZQFTBA
   life is to act on the advice
   JASTFA HW WHMAKL.
   we give to others.
APPENDIX B
FIGURE 2
Felt Competence Questionnaire

INSTRUCTIONS:
Please answer each of the following questions as honestly and accurately as possible. The results will be kept confidential.

1. If you were given 10 cryptograms to solve, how many do you estimate you would be able to solve completely (10 minutes each)?
   (circle one of these) 0 1 2 3 4 5 6 7 8 9 10

2. How adequate do you feel the instructions were in preparing you for the task? (circle a number from 1 to 5; 1—totally inadequate, 5—highly adequate)
   1 2 3 4 5

3. How would you rate your capability to do the cryptogram task? (circle a number from 1 to 5; 1—totally incapable; 5—highly capable)
   1 2 3 4 5

4. Based on the scale below, how would you compare your ability to solve these cryptograms to what you believe are the abilities of the average person working on this task?

   1 far inferior to the average person
   2 slightly inferior to the average person
   3 about the same as the average person
   4 slightly superior to the average person
   5 far superior to the average person
During this experiment, you will be involved in solving word puzzles of a particular nature known as cryptograms. Shown in slide #1 is an example of a typical cryptogram, including an example of the code used to produce the cryptogram.

---

**CRYPTOGRAM**

<table>
<thead>
<tr>
<th>CODED</th>
<th>HEUNGHX</th>
<th>ATQQOOPA</th>
<th>PGDO</th>
<th>ATQQOAA.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DECODED</td>
<td>Nothing</td>
<td>succeeds</td>
<td>like</td>
<td>success.</td>
</tr>
</tbody>
</table>

**ALPHABET DECODED**

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
j m q p o i x n g b d p k h e f s v a u z r l c t w

As you can see, a cryptogram is a phrase or a sentence transcribed into a coded form, or puzzle, by using a scrambled alphabet to write out the message. Also, observe that in the example shown in slide #1, once a letter in the code is used to stand for a particular letter of the alphabet, it will continue to be used to encode that particular letter, and no other, during the remainder of the cryptogram. In this example, for instance, "E" stands for "O" throughout the cryptogram.
FIGURE 3 (page 2)

At this point, it may appear to you that solving a cryptogram, such as the one shown in the example, may be very difficult or impossible. This is not the case, however, since there are some tricks to solving such problems, above and beyond merely using trial and error methods.

<table>
<thead>
<tr>
<th>Slide #2</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINGLE LETTER WORDS</td>
</tr>
<tr>
<td>CRYPTOGRAM CODED</td>
</tr>
<tr>
<td>DECODED</td>
</tr>
</tbody>
</table>

In slide #2, for example, the cryptogram, "I HAVE A NEW BICYCLE" contains two single letter words. All single letter words are either "A" or "I". The coded letters "G" and "J" must be "A" or "I".

Another type of clue is illustrated in Slide #3, and involves words that contain an apostrophe.

<table>
<thead>
<tr>
<th>Slide #3</th>
</tr>
</thead>
<tbody>
<tr>
<td>WORDS CONTAINING APOSTROPHE</td>
</tr>
<tr>
<td>he's</td>
</tr>
<tr>
<td>it's</td>
</tr>
<tr>
<td>won't</td>
</tr>
</tbody>
</table>

Notice that in those words containing an apostrophe where there are only two letters in front of the apostrophe,
such as HE'S and IT's, the letter immediately following the apostrophe is an "S". Those words with three or four letters preceding the apostrophe usually have an "N" just before the apostrophe and a "T" just after it. Finally, where there are more than four letters before the apostrophe, the last letter is likely to be an "S".

Another important clue involves the recurrence of pairs of letters throughout the cryptogram. An example is shown in Slide #4.

Slide #4

<table>
<thead>
<tr>
<th>RECURRING LETTER PAIRS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CODED</td>
</tr>
<tr>
<td>UNOVO</td>
</tr>
<tr>
<td>UVO</td>
</tr>
<tr>
<td>UNVOO</td>
</tr>
<tr>
<td>KEVO</td>
</tr>
<tr>
<td>EI</td>
</tr>
<tr>
<td>UNOK</td>
</tr>
<tr>
<td>DECODED</td>
</tr>
<tr>
<td>There are three more of them</td>
</tr>
</tbody>
</table>

Notice that the letter pairs "UN" and "VO" each appears three times. In this case, the pair "UN" represents "TH" and the pair "VO" represents "RE", both fairly common two letter pairs. Some other common two letter pairs also form complete words. Examples are shown in Slide #5.
FIGURE 3 (page 4)

Slide #5

COMMON TWO LETTER WORDS

<table>
<thead>
<tr>
<th>IN</th>
<th>TO</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>OF</td>
<td>DO</td>
</tr>
<tr>
<td>AS</td>
<td>AT</td>
<td>BE</td>
</tr>
<tr>
<td>IS</td>
<td>IT</td>
<td></td>
</tr>
<tr>
<td>AN</td>
<td>HE</td>
<td></td>
</tr>
</tbody>
</table>

By identifying one letter in a two letter word, it is often quite easy to guess the word, either by looking at the context in which it appears, or by cross-checking letters identified in other words in the cryptogram.

Finally, after identifying as many letters in the cryptogram as possible using the types of clues just mentioned, you may be in a position to guess most, or perhaps all, of the remaining words.

Slide #6

COMPLETING COMMON WORDS

1. TH_  4. _T'S
2. TH_T  5. _HERE
3. E_ER

In Slide #6, word #1 is probably THE, word #2 THAT, word #3 EVER, word #4 IT's, word #5, either THERE or WHERE. By solving these words, you will also have identified the
code for the additional letters of E, A, I, V, and possibly W. In addition, it is likely that at least some of these letters will be found in other unsolved words in the cryptogram. At this point, you may be in a position to guess at or figure out the remainder of the cryptogram.

In summary, when solving cryptograms, look at (1) words with contractions, (2) single letter words, (3) pairs of letters repeated throughout the cryptogram, (4) two letter words, (5) the logical structure of partially decoded words, and (6) the use of your imagination in guessing the remaining words or letters of the cryptogram through examining the context in which they are used.

(NOTE TO READERS: THIS IS AN EXACT REPRESENTATION OF THE BOOKLET PROVIDED IN THE "INFERIOR" TRAINING MODULE; THE SUBJECTS IN THE "SUPERIOR" CONDITION RECEIVED THE SAME BOOKLET WITH THE EXCEPTION BEING THAT THE SLIDES WERE PRESENTED ON OAKTAG CARDS RATHER THAN IN THE BOOKLET.)
APPENDIX D
FIGURE 4
Audience Salience & Monitoring Ability Questionnaire

INSTRUCTIONS:
Please refer to the scale below in choosing a number for each of the questions.

1 2 3 4 5
very minimal minimal moderate high very high

1. To what extent were you conscious of being observed while you worked on the task?

2. To what extent did you feel nervous or anxious while performing the task?

3. To what extent were you able to judge how well others were doing while you were performing the task?

4. To what extent did you feel a sense of competition with respect to the other students?

5. To what extent did you feel your performance was affected (in a positive or negative direction) by the fact that you were being observed by experimenters?

6. To what extent did you feel your performance was affected (in a positive or negative direction) by the fact that there were others working on a similar task?