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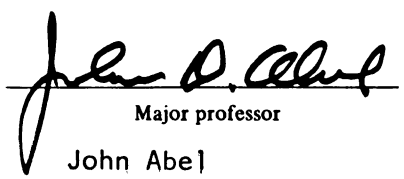

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THE EFFECT OF VIDEO MONITORING UPON PERFORMANCE OF A VOWEL CANCELLATION TASK: IS THE VIDEO MONITORING SYSTEM A SURROGATE AUDIENCE?

By

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ABSTRACT

THE EFFECT OF VIDEO MONITORING
UPON PERFORMANCE OF A VOWEL
CANCELLATION TASK: IS THE VIDEO
MONITORING SYSTEM A SURROGATE AUDIENCE?

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This study investigates the effect of video monitoring upon subjects performing a vowel cancellation task. The effect of video monitoring is measured by: (1) the quantity of the task completed, (2) the number of errors committed and, (3) the reported state anxiety level of the subject.

The experiment contained two conditions: (1) Control - No video monitoring and, (2) Video monitored. The subjects worked on the vowel cancellation task for five minutes at which time a State Anxiety Inventory was administered.

Those subjects performing under the video monitored condition completed significantly more of the task. The subjects in the non-observed condition, however, committed significantly fewer errors.

The study also concluded that the non-observed subjects reported significantly higher state anxiety levels.

This study supports the idea that video monitoring can have a significant effect upon the performance of individuals under experimental conditions.

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CHAPTER I

STATEMENT OF THE PROBLEM

Background of the Study

Much of behaviorial research involves the observation of one or more subjects during an experiment. Traditionally, this observation was accomplished by having individuals observing either with or without the knowledge of the subject of the experiment.

Often the observer was simply in the immediate vicinity of the subject and acted as an "audience" during the experiment. In cases where the subject of the experiment was not to be aware of the observation, the individual may have been clandestinely integrated into the experiment as a "co-worker."

Problems arise, however, due to the effects caused by the introduction of either an "audience" or "co-workers" into the experimental situation. The general paradigm covering these effects is known as Social Facilitation. The specific effects caused either by an audience or co-workers are referred to as "audience effect" and "co-action effect," respectively.

In recent time, technological advances have brought an electronic system called "video monitoring" within financial reach of researchers needing to observe a subject's actions. The definition of video monitoring is: A system comprised of a video camera connected to a video monitor so as to

permit the monitoring of a visual image from a remote location.

While the video system allows the removal of the observing individual from the immediate environment of the subject, recent research suggests that video monitoring, as represented by the presence of the video camera, has certain effects which appear to be associated with the audience effect portion of the social facilitation paradigm.

Purpose

The purpose of this experiment was to determine the effect of the use of video monitoring as measured by the subject's performance of an assigned task. The experiment also was to measure the subject's reported anxiety level at the completion of the task. The effect upon the performance of the task was measured both in terms of the amount of the specified task that was accomplished within the given period of time and in terms of the number of errors that the subject committed while performing the task.

The outcome of the experiment was expected to provide needed insight into one area of audience effect as it relates to the surrogate audience represented by the presence of video monitoring equipment. The results were also to be useful as a reference for future researchers considering the application of video monitoring equipment in experimental design.

The Problem

Video monitoring can be an extremely useful tool of the behavioral psychologist. Video monitoring allows the observation of activities taking place at one or more locations without the physical presence of an observer (other than the video camera) affecting the situation.

The benefits of using video monitoring include the ability to economically record the image "observed" by the video camera through the means of "videotaping." The obvious advantages of this record include the ability to maintain a permanent record of the subject's performance for later evaluation and possible re-evaluation by the same or different observers. Additional advantages of videotaping include, "time compression" and "time expansion."

Time compression techniques allow the recording of the visual image in such a manner that they can be played back at a rate faster than that at which they were recorded. This allows an observer to review hous of visual records in a matter of minutes. Time expansion is commonly known as "slow-motion" and allows an observer to view recorded images to that actions are slowed down and in some cases become more easily evaluated.

The utilization of video monitoring allows for the removal of the observing individual(s) from experimental situations. However, the introduction of the video camera into the situation appears to have an impact upon the experimental outcome. Cohen and Davis (1973), in trying to explain an unpredicted result in their experiment, observed

that the subjects may have been influenced by their existing attitude towards the one-way mirror. A subject's previous experiences with video cameras may be even more of an influence than the influence of a one-way mirror.

A common use of video cameras involves security surveillance in retail stores, banks, elevators and other public places. Some individuals may have experienced anxiety in these situations when they were under observation by a video camera.

In motion pictures and widely read novels such as Orwell's 1984 and Bradbury's Farenheit 451, many people have been introduced to the video camera as a means of enforcing a police state and invading the individual's privacy. In 2001-A Space Odyssey a rather malevolent computer named HAL used video cameras resembling eyes to destroy the human inhabitants of a space craft.

The mental images prompted by the video camera, while they may not all be this fear provoking, are unlikely to be neutral upon the attitude of individuals. It is with this thought in mind that the effect of video camera observation upon a subject is being investigated.

An ancillary issue is the application of video monitoring to situations outside the realm of experimental psychology. Although, such is not the primary rationale behind this experiment, certain of the findings may be useful in areas of business and industry where video monitoring is employed.

CHAPTER II

REVIEW OF THE RELATED RESEARCH

Social facilitation, one of the oldest paradigms of social psychology, relates to the behavioral effects upon an individual which are derived from the presence of other individuals. These effects are most often measured in terms of the subject's performance on one or more tasks.

The tasks may include tests of math ability, word association, physical coordination, memorization and recall, decision-making, word problem exercises and vowel cancellation. Social facilitation has also shown possible effects upon the anxiety level of subjects. Researchers have used both the Palmar Sweat Index (PSI) and the State-Trait Anxiety Index (STAI) as measures of subject anxiety in social facilitation studies.

As early as 1897, experiments were performed which involved pacing and competition as influenced by the presence of others. Allport (1942) investigated two experimental paradigms under the broader heading of social facilitation. The first of these paradigms, "audience effect," is concerned with the effect of passive observers upon the subject's performance of a task. The second paradigm, "coaction effect," relates to the effect when one or more individuals are involved in the same activity as the subject. The audience effect paradigm is relevant to the subject of this thesis.

Studies by Gates (1924), Travis (1925), Burri (1931) and Pessin (1933) supported the existence of an audience effect but were unable to conclusively define the effect.

Gates (1924) attempted to measure the effect of audiences of differing sizes upon performance as measured by four tests. Although the results were not statistically reliable, the evidence suggested that the presence of an audience had the effect of improving the performance of certain subjects. An editorial commentary points out that subjects with the poorest initial performance gained more than the subjects with the best initial performance. The suggestion was that the presence of inactive onlookers may spur the slowest workers while having little influence or a worsening effect upon the more rapid workers.

Travis (1925) investigated the effect of an audience upon subjects in a "pursuit-rotor" task. This task requires the subject to follow a small revolving target with a hand-held stylus. Failure to exactly follow the target counts as an error.

Subjects were trained over several days, until their ability to perform the task reached a stable level. In the final evaluation trial, Travis found improved performance when the subjects were in the presence of an audience.

Dashiell (1930) examined performance based upon tests of math ability, analogies and word association across three experimental groups. Subjects in the control condition worked alone while the experimental conditions had the subject in various group environments. The first condition

added co-workers to the situation. This condition was specifically defined so that the co-workers did not represent a competitive environment to the subject. The second condition, however, contained co-workers that were introduced as competition, resulting in a rivalry situation. A third condition had two individuals merely observing the performance of the subject.

Dashiell's results showed an increased productivity level in both the rivalry and the observation conditions. This increased speed, however, was achieved at the expense of decreased accuracy.

Burri (1931) tried to determine the influence of a subject's "anticipation" of an audience during a future performance upon the subject's speed of learning. The task used was the memorization of word pairs. The results indicated that increased time was needed to learn a task when the subject anticipated an audience to be present during some future performance of the task. Interestingly enough, Burri also reported that the amount remembered is lower when performance takes place before an audience as compared to a condition where the subject is performing in the presence of the experimenter only. Recalling information in the presence of an audience appeared to suffer if learning was conducted in a more private circumstance.

Pessin (1933) measured the effect of "social stimulation" upon a learning situation. The social stimulation consisted of a spectator being present while the subject attempted to memorize nonsense syllables. The control

condition contained no spectator during the memorization process. Pessin also introduced a third condition, one of "mechanical stimulation." The mechanical stimulation consisted of a lamp lighting and a buzzer sounding at regular intervals. Pessin resolves that the control condition (lack of social or mechanical stimulation) was the most favorable for learning, with the mechanical stimulation situation being the least favorable. An additional measure, that of the subject's ability to retain information, suggested that learning in the presence of a spectator or in the presence of noise and light interruption was better retained than learning which took place in quiet and solitary conditions.

Wapner and Alper (1952) attempted to measure the time required to make a decision under varying audience effect situations. The decision-making task required the subject to view a series of phrases, each of which was followed by two words. The subject was to choose the word which fitted the phrase most closely. Two distinctly separate sets of instructions were part of the experimental model. One set implied that the material was being studied, not the subject. A second set of instructions emphasized that the subject was being given a "personality test." Wapner and Alper used two types of audience in addition to a "no audience" control condition. In both of the "audience present" conditions the audience was located behind a one-way mirror. In the first of these conditions, the audience behind the one-way mirror was unseen but the experimenter

informed the subject that the people behind the mirror could both see and hear what was happening in the experimental room. In the remaining condition, a light behind the mirror was turned on so that the audience was readily visible to the subject.

The main finding of this study was that the presence of an audience does affect the time required to make a choice. The greatest amount of time was used in the "unseen audience" situation followed by the "seen audience," then the "no audience" condition.

Wapner and Alper suggest than an unseen audience, one of therefore, unknown composition, may represent a greater threat to self-status than an audience of known composition.

Bergham and Lehr (1963), in a study for the U.S. Army, observed the performance of National Guard trainees under both a "permissive" condition and a condition where "authoritarian" figures were periodically observing and evaluating performance.

As might be expected from earlier research, subjects in the authoritarian situation made significantly fewer errors. Bergham and Lehr also noted that, regardless of the situation, the subject's performance deteriorated significantly over the two hour and fifteen minute experimental period.

Zajonc (1965) reviewed the early social facilitation literature and offered ideas that seemed to fit within the framework of the previous findings. Zajonc suggested that "...performance is facilitated and learning is impaired by the presence of spectators." His theory was that the

presence of an audience increases the probability of the emission of a "dominant response." The dominant response is defined as the response most likely at a given time. While a subject is still learning a task, the dominant response would be an incorrect response, resulting in poorer performance. In a condition when the subject has mastered and is performing a task, the dominant response would be a correct response.

Cottrell, Wack, Sekerak and Rittle (1968), referring to Zajonc's review, wished to determine if the mere presence of persons who are neither spectators nor co-actors would lead to the enhanced emission of dominant responses. In other words, exactly what is it that constitutes an audience relative to audience effect.

Cottrell, et al, used three conditions: subject performing alone, subject performing with an audience observing, and subject performing with two individuals in the same room, but not observing the subject or his performance. The research showed that the presence of an observing audience did enhance the emission of dominant responses, but the mere presence of non-observing persons (of the same status and in the same physical proximity as had been the audience) did not enhance the emission of dominant responses.

Cohen and Davis (1973) investigated the effect caused by differing the audience status, the audience evaluation role, and the time of the audience presence. The subject's performance was measured using a word problem task. Audience status was either a "peer" audience or an "authority figure

audience." The audience evaluation role was either "passive observation" of the subject or a "performance rating" of the subject. The time of audience presence was either a "live audience" (current) observing through a one-way mirror or a "future audience" represented by videotaping the subjects performance on the task. Two control conditions were also included. Palmar Sweat Index prints were administered prior to the start of the experiment and at five points during the course of the experiment. The difference in initial arousal levels (as shown by the PSI data) between the current and future audience situation was both significant and unexpected. Cohen and Davis cited differences in the physical environment which might explain the higher arousal levels of subjects in the current audience of the two conditions. To aid in evaluation of the PSI measure, the intial PSI score for each subject was subtracted from each of the following five PSI scores to determine the amount and direction of change of the subject's arousal level.

Cohen and Davis' results relative to the audience status and evaluation role supported the idea that the presence of an audience increases dominant response emission while the apprehension of evaluation exacerbates the effect. No significant differences were found in the videotaping conditions other than the fact that the initial arousal levels of these conditions were maintained throughout the experiment more so than in the other conditions. Cohen and Davis, in discussing the results of the videotaping, suggest an interpretation of the outcome. They note that the effect

of the videotaping appeared to inhibit the learning of the "set" which was expedient to solving the word problems. Additionally, those in the videotaping condition who did learn the "set" maintained its use even when such use failed to provide an adequate solution. To generalize, the videotaping conditions inhibited learning, but in cases where learning had been achieved, this knowledge was retained to a greater extent. These results are consistent with Zajonc's theory regarding dominant response emission.

Abel and Reagan (1978) inquired as to the effect resulting from the application of three video monitoring conditions upon a vowel cancellation task. In addition to a control condition where no video equipment was present, the experiment used a "camera present," a "taping" and a "monitoring" condition. In the camera present condition, the video equipment was present but was not operational, a fact of which the subject was informed. The taping condition had the video camera and recorder operating whereas the monitoring condition added the feature of an individual observing the video monitor during the videotaping.

Abel and Reagan measured the "quantity" of the vowel task completed within a five minute period and the number of incorrect cancellations or "errors." At the end of the time period, the subject was asked to complete a twenty-item State-Trait Anxiety Inventory - State Form as a measure of current "anxiety" level.

No significant results were found on either the quantity variable or the anxiety measure. Statistically

significant results were achieved on the error measure; however, the results were contrary to the expectations of the researchers. Abel and Reagan found that a significantly greater number of errors were made in the taping and in the monitoring conditions than in either the control or the camera-present conditions. Although no significance was found on the quantity measure, the increase in error rate seen in the taping and monitoring conditions tends to substantiate the research of Dashiell (1930) discussed earlier in this section.

Cohen (1979), again using hidden word problems, measured the anxiety level and effects of "audience status" and "permanence of record" upon a subject's performance. In all conditions, other than the control condition, the subject was observed remotely using a video camera connected to a video monitor. The audience status was either "peer" (undergraduate students) or "authority" (advanced graduate students and a professor interested in this area of research). Permanence of record was achieved by videotaping (permanent) or not videotaping the subject during the performance of the task. The level of anxiety was measured using Palmar Sweat Index prints administered at eight times during the course of the experiment.

Cohen found that the subjects in the permanent record conditions responded significantly more often with the dominant response than did the subjects in the non-permanent record conditions. Also, the anxiety level, as measured by

the PSI scores, was significantly higher in the permanent record conditions.

Cohen combined results from this experiment with the results from Cohen and Davis (1973) leading to an interesting suggestion. According to Cohen, "This summarization of the data from the two studies indicates that the effects of an audience and recording the behavior are additive in nature (i.e., no interaction effect between the two).".

The Hypotheses

The Abel and Reagan (1978) research had tested three hypotheses regarding the effect of video monitoring upon the performance of a vowel cancellation task. Only one of their hypotheses achieved statistically significant results.

The current experiment was modified to increase the likelihood of obtaining statistically significant results on three hypotheses similar to those tested by Abel and Reagan.

Audience effect theory supports the idea that a subject, while being observed, will prform a task with greater productivity, thus it was hypothesized that:

H_1: Subjects in the monitored condition will complete significantly more of a vowel cancellation task than will subjects in the control condition.

Zajonc (1965) suggests that audience effect results in an increased emission of dominant responses. The training procedure of the current experiment was designed to insure a

high level of proficiency at the task. By Zajonc's theory, subjects in the control condition should complete the task with a significantly higher number of errors than subjects in the monitored condition.

Abel and Reagan, however, found that subjects in their control condition committeed significantly fewer errors than subjects in any one of the three monitored conditions. In order to test this apparent disagreement with existing literature it was hypothesized that:

H_2: Subjects in the monitored condition will make a significantly greater number of errors in performing the assigned task than will subjects in the control condition.

Cohen and Davis (1973) found that experimental conditions with a video camera had higher initial arousal levels and that those levels were maintained throughout the experiment. Abel and Reagan did not obtain significance on their anxiety level measure. Based on current findings regarding audience effect, it was hypothesized that:

H_3: Subjects in the monitored condition will have significantly greater reported anxiety at the end of the assigned task than will subjects in the control condition.

A statistical significance of .05 will be necessary to reject the null hypothesis.

CHAPTER III

METHOD

This experiment was designed to test the assumption that the presence of a video camera in an experimental situation would cause effects commonly referred to as Audience Effects under the major research paradigm of Social Facilitation. It was predicted that the effects would be measurable in terms of the amount of a vowel cancellation task completed, the number of errors made on the task and the anxiety level of the subject at the end of the experiment. The experiment was designed to retest the three hypotheses of Abel and Reagan's (1978) research while employing certain modifications to increase the likelihood of obtaining statistical significance. This experiment utilized a post-test only control group design.

This research used a training procedure during which the subject was required to complete a minimum amount of the task with no more than one error (mastery level) before they were allowed to participate in the experiment. Abel and Reagan discussed the problem of subject errors in their research and that this problem might have been due to the on-trial training design. In this experiment, the subjects were trained and re-trained up to three times until the task had been mastered. If they had not achieved mastery level at the end of the third training period, they were dropped from the experiment. No subjects were dropped due to failure to achieve mastery level.

As outlined earlier, research into audience effect suggests that performance in the presence of an audience is improved. In this case, the video camera was an extension of the visual senses of a single observer. The video camera became a surrogate audience and one might presume that the video camera would affect the subject in a manner similar to a "live" audience. The Abel and Reagan research suggests that, in regards to the number of errors on the task, the video camera reverses this effect.

Definitions

The following definitions apply to the experimental method. The "task" was a vowel cancellation task in which the subject was to draw a diagonal line through the letters, a, e, i, o, or u when they were found in a manuscript. The "manuscript" was three typewritten pages of words from Sartre (1966) on 8½ by 11 inch heavy bond paper. A sample of the manuscript can be found in Appendix A. "Mastery level" was the level of proficiency at the task, measured by a test following each training period, that must have been reached before the subject was allowed to participate further in the experiment. "Mastery level training" (training) was the procedure of training and retraining given by the trainer until the subject either reached mastery level or was dropped from the experiment. The "training room" was a room, separate from all other rooms in the experiment, in which the trainer gave the subject the mastery level training. The "task room" was a room in which the subject performed the

mastery level task. The "monitor area" was an area where the experimenter sat during the monitored treatment condition, viewing the subject in the task room through the facility of the video camera and monitor. The "trainer" was the person who administered the mastery level training. The "experimenter" was the person administering the task and, in the monitored treatment condition, monitoring the subject from the video monitor in the monitor area. In this experiment, the trainer was always the same female and the experimenter was always the same male.

The "monitored condition" was the condition of the experiment when the subject was performing the task while being monitored by the video camera with the experimenter watching the video monitor in the monitor area. The "control condition" was the condition of the experiment when the subject was performing the task with no monitoring equipment in the task room.

The "quantity score" for the subject was the number of vowels passed by the subject during the task duration. An "error" was defined as either failing to draw a diagonal line through (cancel) a vowel or cancelling a letter that was not a vowel. The "error score" for the subject was the number of errors made on the task. The "anxiety score" for the subject was the subject's rating on the State-Trait

Anxiety Inventory - State Form[1], (Spielberger, Forsuch and Lushene, 1970). A sample of the inventory is found in Appendix B.

In this research, the effect of the independent variable (the treatment condition) was measured on three dependent variables (quantity of the task completed, errors on the task and state anxiety). This research had one control condition and one treatment condition.

Subjects

A pool of 128 persons was collected. The subjects were obtained on a volunteer basis from undergraduate courses in advertising and telecommunication at Michigan State University. Of this pool, 108 subjects participated in the experiment. In the experiment, sex was controlled for by randomly assigning equal numbers of each sex to each of the experimental conditions.

The experiment was conducted using one subject at a time. The subjects were first given the mastery level training. The training took place in the training room. The trainer handed the subject a one-page manuscript, a one-page sheet of instructions and a pencil. The trainer had an exact copy of the instructions and read them aloud as the subject read the copy. A copy of the instruction sheet is contained in Appendix C. After reading the instructions, the trainer

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[1]Spielberger,Gorsuch and Lushene (1970) report on Cronbach's Alphas (a measure of reliability) varying frm .83 to .92 across differing population subgroups. An Alpha of .89 is reported college undergraduates (p. 10).

asked if there were any questions, replied to any questions and then left the room, telling the subject to practice the task. The trainer would return after a period of one minute. The subjects were not made aware that they were being timed. The material contained in the manuscript was lengthy enough so that the subject would not run out of material during either the training or the task.

At the end of one minute, the trainer re-entered the room and checked the quantity of the task done and the number of errors made on the task. All subjects were required to have completed at least one entire line of the manuscript with no more than a single error in order to continue to the task portion of the experiment. Those subjects failing during their first training session were to be given a maximum of two additional attempts to achieve the mastery level criteria. During the experiment seven subjects required a second training period. In re-training, the subject received a new copy of the manuscript page and the training practice procedure was repeated. Any subject failing to meet the mastery level criteria after the third attempt was to have been dropped from the experiment. No subjects required a third training period.

Following training, the subjects were assigned to one of the two experimental conditions. The first subject of each sex was randomly assigned to one of the conditions. The remaining subjects were assigned on a systematic basis to reach the necessary quota of twenty-seven people of each sex in each condition. The trainer escorted the subject from the

training room to the monitor room where the subject was introduced to the experimenter.

In the control condition, the monitor area and the task room were void of any monitoring equipment. The experimenter immediately escorted the subject to the task room and asked that the subject take a seat at the table.

In the monitored condition, the experimenter first showed the subject the video monitor in the monitor area and explained that he would be observing the subject on the video monitor during the task and that he might take some notes during this time. In front of the video monitor was a clipboard on which a numbered and lined sheet of paper was placed. The experimenter pointed to the manuscript as seen on the screen of the video monitor and explained that the subject would be working in that room. It is important to note that the mere physical presence of the monitoring equipment did not account for what is defined as the monitored condition. An important part of the monitored condition was in making the subject aware that the monitoring was actually occurring. The presence of the video monitoring equipment and the fact that it was working were necessary only to guarantee to the subject that he/she was being monitored.

Next, the experimenter escorted the subject to the task room. Upon entry the experimenter pointed to the video camera, then asked the subject to be seated. The camera position is of importance to the concept of the video camera as a surrogate audience. The hypotheses are based on

previous research in the area of audience effect. The majority of the audiences used in prior research were human with the natural, almost continuous, involuntary movements and actions that tend to draw the attention of a subject. As the video camera does not rock in its seat, sneeze, cough or stretch, the positioning was very important. The video camera was placed prominently in the task room and the subject was always made aware of the camera's presence.

In both conditions, the task room was well-illuminated and equipped with a table and chair. The three pages of manuscript were placed on the table with a cover sheet on top. The cover sheet contained the printed instructions for the task.

From this point, the procedure for both experimental conditions was identical. All subjects were given explicit instructions as to how to complete the task. The experimenter asked if there were any questions, replied to any, then asked the subject to begin the task as soon as he (the experimenter) had closed the door. The experimenter started a stopwatch upon leaving the room. The subjects were not informed nor given any cues that they were being timed. At the end of five minutes, the experimenter re-entered the task room asking the subject to stop working on the task. The experimenter collected all sheets of the manuscript and the cover sheet. The experimenter then handed the subject the State Form of the State-Trait Anxiety Inventory. The subjects were told to take as much time as they needed to complete the form. The experimenter then told the subjects

that once they had completed the form they were to leave the room and the experimenter would collect the form. The experimenter asked if the subject had any questions, provided any needed answers and then left the room. Upon leaving the room the experimenter coded a cover page with the subject's sex, experimental conditions and race (white or non-white). A sample cover page is contained in Appendix C. The experimenter also entered the date and time of the conclusion of the task, initialed the form, and attached this cover page to the manuscript. This group of papers was then placed on top of the clipboard so that, upon exiting, the subject would be unaware of whether any notes had been made by the experimenter.

Upon exiting the task room, the experimenter collected and Anxiety Inventory from the subject and requested the subject's rank in school, academic major and age. After the experimenter had noted these data, the subject was given a short de-briefing about the nature of the experiment. The information supplied was limited to insure that later subjects would not become informed of important details that could affect their performance during the experiment. Each subject filled out an envelope with their home address so that a detailed description of the experiment could be sent to them after the completion of data collection.

Data Analysis

The data from the experiment was computer analyzed at Michigan State University using version 7.0 of the

Statistical Package for the Social Sciences (Nic, Hull, Jenkins, Steinbrenner and Bent, 1975).

T-tests were performed for each dependent variable: the quantity of the task completed, the number of errors committed and the subject's reported state anxiety level following completion of the task.

CHAPTER IV

RESULTS

Based upon the t-tests performed, statistical significance was achieved for each of the three hypotheses. The resultant means, standard deviations, t values and levels of significance are shown in Table I. The degrees of freedom for all t-tests is 106.

The test of hypothesis 1 (quantity of the task completed) resulted in a t value of 2.42, demonstrating a .017 level of significance. Those subjects in the monitored condition completed significantly more of the vowel cancellation task ($\bar{X}$ = 439.52, sd = 80.06) than did the subjects in the control condition ($\bar{X}$ = 402.26, sd = 79.2).

The test of hypothesis 2 (errors committed on the task) resulted in a t value of 3.17 for a level of significance of .002. Those subjects in the monitored condition committed a significantly greater number of errors ($\bar{X}$ = 6.04, sd = 6.7), than did the subjects in the control condition ($\bar{X}$ = 2.80, sd = 3.5).

The test of hypothesis 3 (state anxiety level of the subject of completion of the task) resulted in a t value of -2.18 for a .032 level of significance. This result, although significant, was the opposite of the anticipated effect. Hypothesis 3 assumed that subjects in the monitored condition would report significantly higher levels of state anxiety. In this experiment, those subjects in the monitored condition reported significantly lower levels of state

anxiety ($\bar{X}$ = 35.70, sd = 7.4) than did subjects in the control condition ($\bar{X}$ = 39.04, sd = 8.4).

Table 1: Means, standard deviations, "t" values and levels of significance for all dependent measures. (Degrees of freedom for all tests is 106, N for each treatment condition is 54)

DEPENDENT MEASURE	TREATMENT CONDITION	MEAN	STANDARD DEVIATION	"t" VALUE	LEVEL OF SIGNIFICANCE
QUANTITY	CONTROL	402.26	79.2	2.42	.017
	MONITORED	439.52	80.6		
ERRORS	CONTROL	2.80	3.5	3.17	.002
	MONITORED	6.04	6.7		
ANXIETY	CONTROL	39.04	8.4	-2.18	.032
	MONITORED	35.70	7.4		

Post-hoc analysis included two-way analyses of variance for each dependent variable. The results of these tests are found in Tables 2, 3 and 4. The only test which showed a significant main effect for gender was on the quantity of task completed variable (F = 3.991, df = 1,104, p = .048).

As a group, females completed significantly more of the task than did males. The two-way ANOVA also disclosed a significant interaction between sex and experimental condition (F = 4.031, df = 1,104, p = .047) for the quantity of task completed variable. There were no significant main or

interactive effects with sex for either the error measure or the state anxiety measure.

An additional post-hoc analysis was made based on the ratio of the quantity of the task to the number of errors committed (error ratio). The need for this analysis is best explained if it is first assumed that subjects in both conditions might have had the same proportionate number of errors or error ratio. The analysis of hypothesis 1 showed that subjects in the monitored condition completed significantly more of the task than did subjects in the control condition. Statistically our assumption would follow that the monitored group would have committed a significantly greater raw number of errors even if both groups had the same error ratios.

Table 2: Two-way Analysis of Variance for Dependent variable QUANTITY

SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	"F" RATIO	"F" PROBABILITY
SEX	24120.33	1	24120.33	3.991	.048
TREATMENT CONDITION	37482.82	1	37482.82	6.202	.014
SEX AND TREATMENT CONDITION	24360.04	1	24360.04	4.031	.047
TOTAL EXPLAINED	85963.29	3	28654.40	4.742	.004
RESIDUAL	628497.48	104	6043.25		
TOTAL	714460.67	107	6677.20		

Table 3: Two-way Analysis of Variance for Dependent variable ERRORS

SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	"F" RATIO	"F" PROBABILITY
SEX	.75	1	.75	.026	.872
TREATMENT CONDITION	283.57	1	283.57	9.850	.002
SEX AND TREATMENT CONDITION	.08	1	.08	.003	.957
TOTAL EXPLAINED	284.40	3	94.80	3.293	.024
RESIDUAL	2993.85	104	28.79		
TOTAL	3278.25	107	30.64		

Table 4: Two-way Analysis of Variance for Dependent variable STATE ANXIETY

SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	"F" RATIO	"F" PROBABILITY
SEX	27.00	1	27.00	.421	.518
TREATMENT CONDITION	300.00	1	300.00	4.680	.033
SEX AND TREATMENT CONDITION	13.37	1	13.37	.209	.649
TOTAL EXPLAINED	340.37	3	113.46	1.770	.158
RESIDUAL	6666.82	104	64.10		
TOTAL	7007.19	107	65.49		

The researcher felt it important to determine if the error ratio (number of errors divided by total number of vowels checked) was significantly different for the two groups. For each subject an error ratio was calculated. This error ratio was the error measure divided by the quantity measure. A t-test was then performed on the error ratios for the two conditions. These data are shown in Table 5. Degrees of freedom for the test was 106.

This post-hoc analysis of error ratios shows that subjects in the monitored condition had significantly higher error ratios ($\bar{X}$ = .01289) than did subjects in the control conditions ($\bar{X}$ = .00684). The results were significant at the .01 level (t = 2.968). An additional t-test showed that the difference in error ratios between the male group ($\bar{X}$ = .0104) and the female group ($\bar{X}$ = .0093) was not significant (t = .5011).

Table 5: Post-hoc analysis of calculated error rates. (Degrees of freedom of 106, N for each treatment condition is 54)

DEPENDENT MEASURE	TREATMENT CONDITION	MEAN	STANDARD DEVIATION	"t" VALUE	LEVEL OF SIGNIFICANCE
ERROR RATE	CONTROL	.00684	.00763	2.96	.01
	MONITORED	.01289	.01271		

CHAPTER V

SUMMARY AND DISCUSSION

Hypothesis 1 stated that subjects in a video monitored condition would complete significantly more of the vowel cancellation task than would subjects in the control condition. The results of the experiment support hypothesis 1.

Hypothesis 2 stated that subjects in a video monitored condition would commit a significantly greater number of errors in performing the task than would subjects in the control condition. The results of the experiment also support hypothesis 2.

Hypothesis 3 stated that subjects in a video monitored condition would report a significantly higher level of state anxiety than would subjects in the control condition. The results of the experiment show statistical significance on hypothesis 3, but the outcome is the opposite of the original expectation. The results of the experiment show that the subjects in the video monitored condition reported significantly lower levels of state anxiety than did the subjects in the control condition.

A review of prior research into audience effect resulted in several design considerations utilized by this experiment. The training procedure used in this experiment was of utmost importance to the outcome of the task performance conditions. The training procedure was designed so as to assure that all subjects taking part in the experiment would have mastered the vowel cancellation task.

This experiment utilized a post-test only control group design with only one experimental condition. In the experimental condition, the subject's performance was observed through the facility of a video monitoring setup.

This careful control of procedures and conditions was done to increase the likelihood of achieving statistically significant results. This objective appears to have been achieved.

Quantity of the task

As hypothesized, those subjects in the monitored condition completed significantly more of the vowel cancellation task than did subjects in the control condition.

The measure of the quantity of a task completed within a specific time period (productivity), while of major importance, has seldom been measured by the preceding research regarding audience effect. Even Zajonc's (1965) review of previous research and theory of dominant responses does not regard productivity as a measure. This is due, in most cases, to the nature of the tests chosen. In the majority of prior studies, researchers administered tests which were not designed to be timed. In these experiments the subjects were required to fully complete one or more tests, as opposed to completing that which was possible within a controlled time period. In a few other cases, while individual test items may have been presented for fixed periods, a certain number of items had to be completed and a decision

on each item was required. No measure of productivity was possible using these tests.

The use of the vowel cancellation task in the present experiment provided the opportunity to measure both the quality of the subject's performance (as in previous tasks) and the quantity of the task accomplished within a specific time period. The quality measure allowed evaluation of the results with respect to prior audience effect studies and Zajonc's dominant response theory while the quantity measure helped define the overall performance of the subject. As stated earlier, this experiment's subjects were not informed that they would have a limited amount of time and any cues that timing might be occurring were carefully avoided.

Two prior studies, other than the Abel and Reagan (1978) work, which appear comparable with the current experiment on hypotheses 1 and 2 are Dashiell (1930) and Wapner and Alper (1952). Unfortunately, this comparison leads to little in the way of corraboration.

Dashiell measured the subject's productivity on three tests: math ability, analogies and word association. These subjects were not trained prior to their performance on these tests. Dashiell found, similar to the results of this experiment, that the productivity of the subjects increased when they were under observation. Dashiell's measurement of the quality of the subject's work will be discussed under hypothesis 2 within this chapter.

Wapner and Alper, employing a word association task and no prior training, found dissimilar results. In their

experiment, the presence of an audience increased the time necessary to make a decision. Assuming that vowel cancellation demands that the subject make a decision on the nature of each character (vowel or non-vowel), Wapner and Alper's research suggests that subjects would be able to complete a lesser quantity of the task when under the observation of an audience. This difference in results may be due in part to the different nature of Wapner and Alper's experimental condition. While Dashiell's "alone" condition and the current experiment's control condition had subjects working with no one else in the room, Wapner and Alper's "no audience" condition had the experimenter (a possible authority figure) present during the tests. The possibly confounding effect of the experimenter presence in Wapner and Alper's research disallows direct comparison with the current experiment. Abel and Reagan (1978) had failed to achieve statistical significance on a similar hypothesis.

Errors Committed

The results of this experiment uphold the hypothesis that subjects in the monitored condition will commit significantly more errors on performance of the task. These results provide the opportunity for much conjecture. The idea that video monitoring, previously assumed to have an effect similar to that of a live audience, would result in a subject committing an increased number of errors poses new questions. Additional review of Burri (1931) may provide a starting point for understanding the results.

Burri's research tested subjects on a task of word memorization. The nature of the task was such that a training period was required. The current experiment's vowel cancellation task, however, deals with concepts which are already understood by many of the subjects. The training procedures in these two experiments served different purposes. The present experiment used a training procedure to assure each subject's mastery of the task requirements. Burri used a "learning situation" to train the subjects in memorizing work pairs of which they had no prior knowledge.

In the present experiment training was conducted without an audience while the performance conditions included one with video monitoring and one without video monitoring. For comparison with Burri, the assumption is made that the video monitoring acts as a surrogate audience. Burri reported that:

> "If learning takes place privately, the presence of a group at the time of recall is detrimental to the efficiency of reproduction."

Burri's reference to the efficiency of reproduction deals with the subject's ability to recall the word pairs. If failure to recall the pair can be considered analogous to making an error in the current experiment, then Burri's findings support the current research. Because of the difference in the tasks it might be argued that the efficiency of reproduction could be considered similar to the quantity of the task accomplished. Following Burri's logic

in this case, the video monitored group should have produced a smaller quantity of the task. This interpretation of Burri's work would not be supported by the current findings.

Zajonc's (1965) theory of dominant responses is not supported if what he refers to as an audience or spectator condition is considered similar in effect to the video monitoring condition. The implied similarity between the live audience and the video monitored condition should be the subject of further research.

Reported State Anxiety Levels

While statistical significance was achieved on the anxiety level measure, the results contradicted the original hypothesis. Subjects in the monitored condition reported significantly lower state anxiety levels at the end of the task than did subjects in the control condition. This outcome appears to disagree with prior audience effect research. Closer examination, however, suggests that the differences may be a result in the measurement method.

Research by Cohen and Davis (1973) and Cohen (1979) reported either increased anxiety levels of subjects in observed conditions or no significant difference when compared with non-observed conditions. In these experiments, however, the anxiety level measures (PSI's) were administered at multiple times throughout the experiment. The current experiment had the subject complete a State-Trait Anxiety Inventory form at the end of the performance of the task. The subject was given the form and was informed by the

experimenter that they could leave the room once the form was filled out. Although no initial anxiety level measure was made in the current experiment, the following commentary presents one possible explanation for the results on the anxiety level measure.

Cohen and Davis reported that, in their video monitored condition, the subject's initial arousal (anxiety) levels were maintained throughout the experiment. The assumption will be made that the subjects in the video monitored condition of this experiment also had maintained their initial anxiety levels more so than the subjects in the control condition. Once informed that following completion of the form they would be allowed to leave the room, subjects in the video monitored condition (with the assumed higher anxiety levels) may have felt a greater sense of relief and/or elation in comparison to subjects in the control condition. This could have resulted in the lower reported state anxiety level for the video monitored group.

Cohen's (1979) research also provides support for the current findings when the time at which the anxiety level measurement was administered is taken into consideration. The two groups within Cohen's experiment which most closely resemble those in this experiment are the control group and the "non-permanent record" group. Cohen took eight measures of the subject's anxiety level during the experiment. One of these measurements relates closely to the time of measurement selected for this experiment. Cohen's measure number six was taken at the completion of the task but prior to the

time when the subject was allowed to leave the experimental room. Reviewing anxiety level measure number six for the two groups chosen, Cohen's research showed a considerably lower measure of anxiety for those subjects under observation in comparison with the subjects in the control condition.

Limitations

The limitation having the greatest impact upon this research involves the subjects of the study. All of the subjects were undergraduate students at Michigan State University. The average age of these subjects was 22 years with the oldest subject being 57 and the youngest being 18.

The unanticipated results of the State Anxiety level measure may have been partially the result of the environment surrounding the experiment. The experiment was conducted during the summer term and during evening hours on the campus of Michigan State University. The experiment took place on the third floor of the Student Union building. This particular section of the building was quite desolate during the several weeks of the experiment. Since the completion of this research, it has been the researcher's opinion that the presence of the video camera might have been of some comfort to those subjects in the monitored condition.

Being tucked away in a small room in a mostly vacant building during the evening hours may have been less anxiety provoking if the subjects felt that there was "someone out there" as represented by the video camera. Those subjects in the control condition, not knowing if the experimenter was

really in the area just outside the experimental room, may have felt an increased sense of isolation leading to the increased level of reported anxiety.

Future Research

The results of this experiment provide needed insight into the effects of video monitoring upon an individual's performance. Questions raised by findings of this research also suggest several areas of additional research.

Hypothesis 1, regarding the quantity of the task completed, agrees with some of the prior audience effect literature. While Dashiell (1930) agrees with the increased quantity of work produced by a subject under observation, much of the other audience effect research, including that compiled by Zajonc (1965), suggests that observed subjects are more likely to take a greater amount of time to respond to each decision making situation. This logic would have these subjects accomplishing a smaller amount of a task if the time allowed were limited. The subjects of the current experiment were not aware that they were being timed. If they had known that they had a limited amount of time, the results of this experiment might have been considerably different. Future research into this area might use a condition where the subject is to complete the vowel cancellation task at their own pace, while the amount of time they require to complete the task is measured. In such a condition, it is suggested that the subjects not be informed nor allowed any cues that they are being timed.

The result on the error measure, while agreeing with Abel and Reagan's earlier research, disagrees with much of the existing audience effect literature and certainly does not corraborate Zajonc's dominant responses theory. Zajonc's theory states that with subjects having mastered the vowel cancellation task, the monitored group should have committed significantly fewer errors which indeed they did not.

Dashiell's work agrees with the results of hypothesis 2 in addition to hypothesis 1. The present research supports the idea that a subject under observation by video monitoring equipment will produce a greater quantity of a specified task than will an unobserved subject. This increased quantity, however, will be produced at the expense of lower quality (more errors).

Specifically regarding hypotheses 1 and 2, it is suggested that further research attempt to define the relationship between a live audience or spectator and the use of a video monitor setup. In the video monitored condition, it is suggested that the individual(s) observing the monitor be the same individual(s) present in the live audience situation. It is further suggested that the training procedure be modified to include three experimental conditions. Additional research is needed in which the subjects are "trained" in one of three conditions: video monitored, live observer and no observer. The training procedure should continue to assure that the subject has achieved mastery of the task as was done in the current experiment. The live observer condition should place an individual in the

training room with the subject while the training is taking place. This live observer should have a clipboard for taking notes, but should avoid any possibility of distracting the subject undergoing training. The avoidance of allowing the subject any cue as to whether or not notes were taken is important to maintain the credibility of comparison with the video monitored training condition. In the video monitored condition, the observer should be in an adjacent location where they will observe a video monitor attached to a video camera in the training room. The subject should be introduced to the observer in both conditions and the clipboard should be handled so that following the training procedure, the subject cannot see if notes were indeed made. A third training condition would have neither video monitoring equipment nor observer. It is suggested that, if possible, the observer be someone other than the trainer or the person conducting the performance phase (experimenter).

The performance phase should contain three conditions analogous to those in the training phase: video monitored, live observer and no observation. The video monitored and no observer conditions should be similar to those found in the present experiment. The live observer condition should have the experimenter remain in the experimental room as the observer with clipboard during the performance period. Procedures would have to be developed which will avoid providing the subject with any cues that either the training phase or the performance phase are being timed. Future researchers may wish to consider the possibility, in the performance

phase, of having someone other than the experimenter act as the observer.

The two measures on performance of the task, quantity performed in a specific time period and the number of errors committed, seem to be relevant to both the needs of experimental design and to applicability within real world considerations. The errors measure, however, may provide more valuable information if a prior analysis is performed using the "error rate" measure defined in Chapter IV.

The measure of the anxiety level of the subjects requires further consideration. The current measure is one of the subject's state anxiety level, as measured by administration of the State-Trait Anxiety Inventory (STAI), State Form, at the end of the subject's performance of the task. Two issues need to be considered, the timing of the measurement and the test used for the measurement. If only one anxiety measurement is to be taken, the timing chosen for the current experiment is very defensible. The current timing avoids any interference with the timing of the task performance phase and is at a time when the subject's anxiety level should have been impacted by the experimental condition.

A decision regarding the timing would not be necessary if the use of multiple anxiety measurements is selected. Both as an aid to comparison with existing audience effect research and with the aim of providing coherent information about subject anxiety levels, future researchers should consider the use of multiple anxiety level measures. This

The decision to ask such a question should be made only after consideration of the potential impact of such a question on the subject's performance ability and anxiety level. Analysis of any such measure would provide an interesting comparison with the anxiety level measure.

In summary, several recommendations are made to be considered in any additional research:

Future experiments might measure the amount of time required for a subject to complete a fixed amount of the vowel cancellation task.

A more meaningful measure of errors on the task may be the ratio of errors committed to the total quantity of the task.

To gain greater insight into any interaction between training and the performance of the task, future experiments might include three training conditions and three performance conditions. The information gained in such a study might outweigh the increased complexity of the experiment.

The results of future experiments would be more easily compared with the existing body of research if a different measure of anxiety levels was substituted. The most obvious choice would be the Palmar Sweat Index (PSI). Should the PSI be selected, the final recommendation could be more easily implemented.

Measures of the subject's anxiety level might be taken prior to, during and immediately following the experiment.

Each of the recommendations given are considered to have their own merits. Future researchers should not feel

obligated to implement all of the recommendations into any one experiment.

obligated to implement all of the recommendations into any one experiment.

APPENDICES

BIBLIOGRAPHY

...ontological necessity. This point must be well understood. For this necessity appears between two contingencies; on the one hand, while it is necessary that I be in the form of being there, still it is altogether contingent that I be, for I am not the foundation of my being; on the other hand, while it is necessary that I be engaged in this or that point of view, it is contingent that it should be precisely in this view to the exclusion of all others. This twofold contingency which enbraces a necessity we have called the facticity of the for itself. We have described it in part two. We showed there that the nihilated in itself, engulfed in the absolute event which is the appearance of the foundation or the upsurge of the for itself, remains at the heart of the for itself as its contingency. Thus the for itself is supported by a perpetual contingency for which it becomes responsible and which it assimilates without ever being able to suppress it. Nowhere can the for itself find this contingency anywhere within itself; nor can the for itself anywhere apprehend and know it, not even by the reflective cogito. The for itself forever surpasses this contingency toward its own possibilities, and it encounters in itself only the nothingness which it has to be. Yet facticity does not cease to haunt the for itself, and it is facticity which causes me to apprehend myself simultaneously as totally responsible for my being and as totally unjustifiable.

But the world refers to me the image of the unjustifiability in the form of the synthetic unity of its univocal relations to me. It is absolutely necessary that the world appear to me in order. And in this sense that order is me; it is that image of me which we described in the last chapter of part two. But it is wholly contingent that it should be this order. Thus it appears as the necessity and totally unjustifiable arrangement of the totality of being. This absolutely necessary and totally unjustifiable order of the things of the world, this order which is myself in so far as I am ...

APPENDIX B

No._____

DIRECTIONS: A number of statements which people have used to describe themselves are given beloe. Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel right now, that is, at this moment.

There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	Not at all	Somewhat	Moderately so	Very Much so
1. Right now I feel calm.	1	2	3	4
2. I feel secure at the moment.	1	2	3	4
3. I am tense.	1	2	3	4
4. I am regretful.	1	2	3	4
5. I feel at ease.	1	2	3	4
6. I feel nervous.	1	2	3	4
7. I feel upset.	1	2	3	4
8. I am worrying about something right now.	1	2	3	4
9. At the present time I feel rested.	1	2	3	4
10. I feel tense and anxious.	1	2	3	4
11. I feel comfortable.	1	2	3	4
12. I feel "high strung."	1	2	3	4
13. I feel I am about to go to pieces.	1	2	3	4
14. I presently feel self-confident.	1	2	3	4
15. At this moment I feel happy.	1	2	3	4
16. I feel content.	1	2	3	4
17. I am worried right now.	1	2	3	4
18. I presently feel over-excited and "rattled."	1	2	3	4
19. I feel joyful at the moment.	1	2	3	4
20. I feel pleasant.	1	2	3	4

APPENDIX C

INSTRUCTIONS

You will be doing a "vowel cancellation" task as you learned to do in the training session. You are to draw a diagonal line through vowels in the manuscript you have been given. Vowels, for the purpose of this task, are the letters a - e - i - o - u, but not y.

Go through the manuscript in a manner as though you were reading it, but all you are to do is cross out the vowels. Do not read the material.

EXAMPLE: /nd t/ try /th/rw/s/ w//ld b/ /mp/ss/bl/. F/r th/s r//s/n

If you should make an error and immediately realize it, do not erase, just circle the letter that you have mistakenly cancelled.

EXAMPLE: /nd t/ t(y) /th/rw/s/ w//ld b/ /mp/ss/bl/. (F)/r th/s r//s/n

DO NOT GO BACK OVER YOUR WORK.

When the experimenter leaves the room, begin the task. Begin with the first page after this one and continue through the following two.

APPENDIX D

ITEM	Cols.
ID# _____ (last three digits)	1 - 3
SEX _____ (M=1, F=2)	4
RACE _____ (W=1, N=2)	5
#TS _____	6
COND _____ (C=1, M=2)	7
*AGE _____	8 - 9
*YR. IN SCHOOL _____ (F=1, SO=2, J=3, SN=4)	10
*ACADEMIC MAJOR _____/_____	11 - 13
QUANTITY CHECKED _____	14 - 17
NUMBER OF ERRORS _____	18 - 21
ANXIETY SCORE _____	22 - 23
DATE: ____/____/____	24 - 27
TIME ____:____pm	28 - 31

INIT._____

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