THE UNIVERSITY OF MANITOBA

SUBJECTS' ATTITUDES TOWARD PSYCHOLOGICAL RESEARCH AND EVALUATION APPREHENSION AS DETERMINANTS OF PURSUIT ROTOR PERFORMANCE

by

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ABSTRACT

The study was designed to examine the effects of subjects' attitudes toward psychological research (PRS) and evaluation apprehension (EA) upon pursuit rotor performance. The experimental task consisted of 24 trials of 20 seconds of pursuit rotor tracking with 20-sec. rest periods between trials. Ninety subjects were divided into three groups (high, medium and low) according to their attitudes toward psychological research. An equal number of subjects in each PRS group then received either the low (control) or high (experimental) evaluation apprehension manipulation before performing the pursuit rotor task. HIgh EA was aroused by a "Student Medical Sheet" and a "Background Information Sheet", both pertaining to brain damage. In the low EA condition subjects merely completed a "Student Information Sheet" consisting of ostensibly neutral, non-arousing questions. All subjects then completed a post-experimental questionnaire to ascertain their awareness and behavioral intent.

It was predicted that the high EA manipulation would reduce the performance level of the subjects relative to their performance without this manipulation. Similarly, a significant difference in pursuit rotor performance between PRS groups was expected. It was also expected that aware subjects would perform better than unaware subjects in the low EA condition but that unaware subjects would perform better in the high EA condition. Finally, it was hypothesized that high PRS subjects would exhibit more awareness and positive behavioral

intent than low FRS subjects.

In general, the results failed to confirm any of the six hypotheses. Of particular importance was the lack of a significant main effect for either EA or FRS. It was also inconsistent with prior research to find that awareness of the experimental hypothesis did not differentially effect the performance of FRS groups or that between EA conditions. The only significant finding was a negative correlation between FRS scores and total performance scores for aware subjects in the high EA condition. Although non-significant a negative correlation between performance and FRS scores were also obtained for aware subjects in the low EA condition. In contrast, non-significant positive correlations for unaware subjects were obtained in all conditions. Presumably aware subjects encountered difficulty in responding in accord with the hypothesis.

In conclusion neither the EA manipulations nor subjects attitudes toward psychological research appeared to affect subject pursuit rotor performance. Presumably, the attempt to experimentally manipulate EA failed to create conditions which represented extremes in levels of subject concern. It was suggested that this failure was due to either the ineffectiveness of the high EA condition in arousing concern or to the fact that the experimental procedures unintentionally aroused subject concern in the control (low EA) condition. To explain the non-significant main effect for FRS, however, was more difficult. Tests of the reliability removed the possibility

that the large within subject variability was due to problems in the PRS scale. Thus, it could only be speculated as to the reasons for the failure of obtaining a main effect for PRS.

In conclusion, it was proposed that more effective and possibly more sophisticated experimental manipulation may be necessary to make a more definitive test of the hypotheses proposed in this study. Several suggestions in this regard were presented.

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CHAPTER I

INTRODUCTION

The conception of the typical subject within psychological research has undergone significant changes in the transition from the introspective psychology of Wundt and Titchner through the objective behavioral psychology of John B. Watson. Whereas in Titchner's laboratory the human subject functioned as an observer, the subject of Watson's laboratory was demoted to the status of the one being observed. The subject thus became a tabula rasa who functioned as "a stimulus-response machine: you put a stimulus in one of the slots and out comes a packet of reactions" (Burt, 1962, p. 32).

In recent years a new view toward the psychological experiment and the human subject has emerged which attempts to integrate elements of these extreme positions. This new approach has not only accounted for the concern for observable behavioral elements but has also realized the need for attention to the cognitive processes of the human subject. In addition, this new view has taken into account the social nature of the experiment and the fact that the results of some studies are artifacts of the interaction of some or all of these factors. The artifact research on Demand Characteristics (Orne, 1962), Evaluation Apprehension (Rosenberg, 1965), and Experimenter Effects (Rosenthal, 1966), has exemplified this position. Hence the social psychology of the psychological experiment has emerged as a substantive area of concern in contemporary psychology.

Actually the social psychology of the experiment had a much earlier expression than the contemporary work by Orne and Rosenthal. Rosenzweig in 1933 described much the same contaminating variables that are dealt with in the research on artifact today. In light of Rosenzweig's concerns the question arises as to why such criticism of psychological methodology went relatively unnoticed and unaccepted for approximately three decades. Silverman and Shulman (1970) suggest a logical explanation for these reticent attitudes.

> "It would appear that the reason is tied to the influence of the physical sciences model upon psychology, for we came to regard putting input into a human subject as something akin to putting chemicals into a test tube. We are now coming to full awareness that the analogy holds only with the profound qualification that we are inevitably working with an unclean test tube, contaminated by all the needs, anxieties, self-deceptions and intentions of someone who is aware that his behavior is being scrutinized as part of a psychological experiment." (p. 98)

With the contemporary awareness of the social nature of the psychological experiment a more vocal criticism of research methodology has emerged (Orne, 1962; Rosenberg, 1965; Rosenthal, 1966). This criticism was based on the fact that psychology in dealing with human subjects must acknowledge the fact that the subject is a thinking, aware organism, possessing motivational and attitudinal capacities. The research supporting this criticism has thus examined certain subject characteristics which affect experimental performance such as perceptions of the task, cognitions of what is required, and most importantly subject motivation within the psychological experiment. These subject characteristics have also been considered in relationship to certain experimenter variables. Of particular importance in

such studies of the psychological experiment is the notion that the subject is aware that he is participating in an experiment. Because of this awareness the subject views the experiment in a stereotyped manner and develops a motivational orientation toward the experiment that biases his performance.

Subject Motivation in the Experiment

What is the motivation underlying subject behavior in the psychological experiment? Several attempts have been made to describe the characteristic behavior of subjects within experiments. (Orne, 1962; Maaling, 1966; Rosenberg, 1965). According to one view subject motivation is based on the subject's "high" regard for the aims of science and experimentation (Orne, 1962). From this perspective, most subjects are motivated to cooperate with the experimenter in order to further the aims of science. This can be accomplished generally by validating the experimenter's hypothesis. Within any given experiment there are a number of cues such as the type of task instructions which guide the subject to a particular hypothesis. Orne has referred to these cues as "demand characteristics". These characteristics convey to the subject what the experimenter wants. Given his motive to further the aims of science, these characteristics also indicate or demand certain hypothesis-confirming behavior from the subject. Thus according to Orne, demand characteristics orient the subject's attention and enable him to act cooperatively to further the aims of science.

Although Orne maintains that all subjects are motivated to

cooperate with the experimenter, to suggest that all hypotheses will be validated by all subjects would appear rather naive. As a consequence, Orne proposed that differences in cooperative behavior may be produced by idiosyncratic perceptions of the demand characteristics. Thus, the experimental hypothesis may not be validated because the subjects misperceived the hypothesis conveyed by the demand characteristics. Alternatively, apparent non-cooperation may be the result of subjects bending over backwards to be honest and in so doing disconfirming the hypothesis. In this case the hypothesis was not validated. Rather than misperceiving the demand characteristics, the subjects chose to ignore them in order to be honest and in this way to be true to the aims of science.

Although the influence of demand characteristics on subject performance has been researched intensively (e.g., Orne & Scheibe, 1964) it is of secondary importance in this study. Of primary concern in this thesis is the description of subject motivation by Rosenberg (1965) in which he develops the concept of evaluation apprehension. Thus, although the subject frequently does cooperate with the experimenter to confirm his hypothesis, other researchers (Riecken, 1962; Rosenberg, 1965) have suggested that subjects are also often motivated to obtain a positive evaluation from the experimenter. For example, Riecken (1962) proposed that the subject attempts "to put his best foot forward". This notion has been elaborated further by Rosenberg who suggested that the typical subject may enter the experiment "with a preliminary expectation that the psychologist may undertake to

evalute his, 'the subjects,' emotional adequacy, his mental health or lack of it" (Rosenberg, 1965, p. 27). Thus the subject would be motivated by "an anxiety-toned concern" that he "win a positive evaluation from the experimenter, or at least that he provide no grounds for a negative one" (Rosenberg, 1965, p. 28).

This particular motive, referred to as Evaluation Apprehension (EA) (Rosenberg, 1965), underlies much subject behavior as indicated by the concerns expressed by many subjects. With respect to these concerns it must be remembered that most psychological research subjects are late adolescent freshmen, who are concerned and apprehensive about the normalcy of their psychological functioning (Gustav, 1962). It is not surprising then, that a large majority of this subject population is motivated to respond in the perceived normal manner. For the subject to respond in any manner contrary to experimental expectations usually involves the subject perceiving that the experimenter is attaching implications of deviancy to his performance in the psychological experiment. Thus, these motivational concerns of the subject may aptly be described as an attempt "to put his best foot forward" (Reicken, 1962).

The concept of Evaluation Apprehension first originated in research on attitude change and cognitive dissonance theory and has had an apparently substantial impact upon the reinterpretation of these studies. For example, cognitive dissonance theory (Festinger & Carlsmith, 1959; Cohen, 1962) proposed that a small reward will produce greater counterattitudinal advocacy than a large reward.

Rosenberg suggested that the procedure used in such studies facilitated evaluation apprehension, i.e., a large monetary reward produced the perception that the experimenter was investigating the subject's honesty and integrity. In contrast, the subjects in the small reward condition did not perceive that their integrity was being investigated because of the minimal pay received and greater counterattitudinal advocacy was obtained. Thus EA was posed as an alternative to a cognitive dissonance explanation and a form of subject motivation quite different from a pure cooperation (Orne, 1962) was proposed.

Other researchers (Silverman, 1966; Silverman and Marcantonio, 1965) have extended the concept of evaluation apprehension to an understanding of its influence on consistency theory (Aronson and Carlsmith, 1962; Ward and Sandvold, 1963). Similarly, evaluation apprehension has also been suggested as a plausible interpretation of attitude change and of the effect of distraction on persuasability (Festinger and Maccoby, 1964; Freedman and Sears, 1965; Silverman, 1968; Silverman and Regula, 1968). All of these studies (Silverman, 1966; 1968; Silverman and Marcantonio, 1965; Silverman and Regula, 1968) suggest that research on attitude change may be particularly susceptible to bias because of subjects who are motivated to look good to the experimenter and therefore produce the desired attitude change.

Attitude change is not the only area of research effected by EA. It has been found to be a strong source of subject motivation in several recent studies. This research has added to our understanding of how EA operates to influence subject behavior. For example, in a

series of studies (Rosenberg, 1969), in which EA was actively manipulated, a "Background Information Sheet" was utilized which informed the subjects that the task would have some particular significance concerning their own personalities. Subjects were also told what was the typical manner of response for "normal" and "mature" individuals or for "abnormal" and "immature" persons. In three separate studies: a perception task, a finger-tapping task and an arithmetic task (Rosenberg, 1969), the arousal of evaluation apprehension produced responding in the direction suggested by the "Background Information Sheet". This occurred only when the directive was perceived as being the appropriate manner of response for a "normal" subject. Thus, this research suggests that in order for EA manipulation to be effective, it is necessary that the subject perceive the situation and the suggested normal way of responding as being both plausible and possible in everyday situations (Rosenberg, 1969).

Although much research on EA manipulation (Rosenberg, 1969) suggests that this form of subject motivation facilitates task performance, this may not necessarily be the case. For example, exactly opposing results were obtained in two verbal conditioning studies (Hall, 1960; Page, 1970) in which EA was aroused. Both studies used the Taffel (1955) verbal conditioning procedure in which subjects composed 80 sentences using a different past tense verb and one of four pronouns. Each verb and the four pronouns were typed on 80 cards. After the initial 20 baseline trials the experimenter reinforced the pronoun "I" by saying "good" after sentences beginning with that

pronoun. In one of these studies (Page, 1970) EA was aroused by a "Personality Self-Report Test" while in the other (Hall, 1960) task instructions referring to intellectual ability aroused subjects' evaluation apprehension. Page found that aware subjects did not condition and increase their frequency of "I" responses whereas Hall found the opposite results, i.e., his aware subjects conditioned and increased their output of "I" responses. These contradictory results may be explained by considering the effect of the different EA manipulations on subject performance. For example, it is conceivable that Page's manipulation aroused in the subject a concern that composing sentences which began with "I" would convey to the experimenter personal information with which he could be evaluated negatively. Because of this concern the subjects did not condition. On the other hand, in the Hall study, the EA manipulation aroused in the subjects a desire to discover the correct intellectual response to make and thus led to greater conditioning. Thus it appears that the arousal of EA may either interfere with or facilitate task performance, depending upon the subject's perception of the appropriate response to make.

This conclusion is supported by a study (Henchy and Glass, 1968) in which the threat of EA associated with the presence of others during task performance enhanced the emission of dominant responses at the expense of subordinate responses. This was particularly evident when the other individual present was introduced as an expert in the area investigated. Thus, the particular response which is aroused in a given situation and which may also be referred to as the dominant

response will be the one which subjects make. This may either facilitate or impede the experimenter's hypothesis.

While subject performance within the psychological experiment has often been described as an artifact of either demand characteristics or EA (Orne, 1962; Rosenberg, 1965), in many experimental situations both motives may operate. Frequently, for example, the subject can both cooperate with the experimenter's purpose and present a favourable impression of himself. But what of the situation in which cooperation prevents the subject from presenting himself in a favourable light? In the only study in which both motives were simultaneously aroused (Sigall, Aronson & Van Hoose, 1968), it was found that EA exerted a greater influence on subject behavior than complying with demand characteristics.

Recent research on subject motivation has indicated that subjects do not always feel concerned about self-presentation and evaluation or wish to cooperate. Because of past experience they may become completely apathetic and just go through the motions in order to leave the experimental room as quickly as possible (Argyris, 1968; Shultz, 1969). Other more seriously disenchanted subjects may adopt a "screw-you" attitude (Masling, 1966), the antithesis of the cooperative attitude. However, such descriptions of subject motivation, which focus on a single aspect of behavior (e.g., the cooperative subject, EA or "screw-you" subject), ignores individual differences in reaction to the experimental situation. It is preferable to conceptualize these singular and mutually exclusive views of subject

motivation (Masling, 1966; Orne, 1962; Rosenberg, 1965) as points on a continuum of possible behavior. In contrast, subject motivation viewed on a continuum suggests that depending upon how the subject perceives the cues in the experiment, different subject motives or strategies may be developed. Thus, the final response that the subject makes in any given experiment "is determined to a large extent by his motivation or strategy", (Adair, 1971) and by his perception of the experimental cues.

Research on Subject's Attitudes Toward Psychological Research

In addition to the influences within the experimental situation the subject also brings to the experimental situation, expectations and attitudes about experiments. Subject sophistication may also influence his participation and performance in a particular experiment. For example, previous experimental experiences may lead to preconceptions about a given investigation in which a subject is about to participate. In order to determine the effect of a prior experience on subsequent experimental performance, Holmes, (1967; Holmes and Appelbaum, 1970) has attempted to manipulate subject experience. These results suggest that a positive prior experience may lead to a positive attitude which produces a cooperative strategy within the present psychological experiment.

Another possibility, is that subjects may have an attitude toward psychology prior to their experience as experimental subjects. Thus, subject differences in cooperation may be due, in part, to differences in pre-experimental attitudes toward psychological research

(Adair, 1970a; 1970b). These pre-experimental attitudes may predispose the subject to respond in either a positive or negative fashion, or, once the subject enters the experiment, may guide the subject to use one of several suggested strategies (Adair, 1971). In other words, the subject's perception of the experimental cues may be a consequence of his original attitude toward psychological research. Furthermore, a subject's pre-experimental attitude as well as the demand characteristics of the experimental situation may interact to determine the subject's final response (Adair, 1971).

To measure subjects' attitudes toward psychological research, a five choice, 52 item, Likert type scale was developed (Adair and Fenton, 1971). This scale was referred to as "The Psychological Research Survey" (PRS). Hypothesis relating awareness and PRS have been varified in a series of studies on attitude change and verbal conditioning (Adair, 1970a). The findings of these studies indicated that subjects who were aware of the experimenter's hypothesis had to have more positive attitudes toward psychological research than subjects who were unaware.

In addition, the relationship between PRS and cooperation has also been investigated. In a conformity study (Adair, 1969), it was demonstrated that among suspicious subjects, those who conformed most had significantly more positive attitudes toward psychological research than subjects who conformed least. This hypothesis was also substantiated in a series of attitude change studies, on vivisection (Adair, 1970a) where again it was found that subjects with more positive

attitudes toward psychological research would cooperate by showing greater opinion change than subjects with less positive attitudes. These results suggest that attitudes towards psychological research may be a determinant of subject's cooperative behavior.

Subjects attitudes toward psychological research has also been investigated in two verbal conditioning studies (Adair, 1970a; 1970b) using a Taffel (1955) design. In the first study (Adair, 1970b) aware subjects with positive attitudes towards psychological research conditioned less than aware subjects with negative attitudes. Thus, in contrast to previous research positive attitude subjects did not cooperate even though they were aware of what was required in the verbal conditioning study. Therefore, by not cooperating, positive attitude subjects conditioned less than negative attitude subjects. These findings may be the result of the subjects' perception of the experiment as being too simple for a scientific investigation. Making up sentences using the appropriate pronoun and a past tense verb in order to get the experimenter to say "good" more often, may not be what a subject expects from a serious psychological investigation. Because of the simplicity of the experimental task, subjects with positive attitudes toward psychological research may not be willing to cooperate but may rather feel that they should perform independently and honestly. On the other hand subjects with negative attitudes toward psychological research may cooperate and play the "game" in order to complete their participation requirement with as little effort as possible.

The results of this study were replicated in a second verbal conditioning study (Adair, 1970a). Once again, aware subjects with positive attitudes toward psychological research conditioned less than subjects with negative attitudes toward psychological research. However, when a confederate was employed to inform the subjects of the serious nature of the study and the details of the experiment, subjects with positive attitudes were then willing to cooperate by giving the results the experimenter wanted. In other words, once assured of the seriousness and validity of the study by the confederate, the perception of the task as being too simple no longer occurred and the differences between positive and negative attitude subjects disappeared. Thus in view of these findings and the results of the previously cited conformity study (Adair, 1969) and the attitude change studies (Adair, 1970a), it appears that a subject's attitude toward psychological research is not only related to his awareness and perception of the experimental situation, but also seems to be related to the type of strategy he will adopt.

Finally, in accordance with this prior research, it was hypothesized in a pursuit rotor study (Meltzer, 1970), that high FRS subjects would perform significantly better than low FRS subjects on 24 trials of distributed practice. A significant relationship was obtained ($r = -.341$, $p < .01$), but in the direction opposite to that predicted. Thus subjects with positive attitudes toward psychological research performed at a significantly lower level than subjects with less positive attitudes. Although the high FRS subjects showed sig-

nificantly greater awareness of the hypothesis, (i.e., that their performance should increase over trials) and stated cooperative behavioral intentions on a post-experimental questionnaire, the high PRS group did not perform as well on the pursuit rotor. This result is in direct contrast to prior research (Adair, 1969; 1970a).

If high PRS subjects stated on a post-experimental questionnaire an awareness of the experimental hypothesis that their performance should increase over trials and also stated that they attempted to cooperate with the experimenter then the question arises as to why these subjects performed poorly in comparison to low PRS subjects. It is possible that high PRS subjects, concerned about their performance, may have tried too hard to perform well. This concern or evaluation apprehension (EA) may have led high PRS subjects to perceive the task as being very difficult, while low PRS subjects perceived it as much less threatening. For example, the sudden speed of the moving target, especially on initial trials, may have disturbed a concerned subject more than an apathetic or relaxed subject. This perceived greater difficulty and concern would have interfered with the normal efficient functioning of the high PRS subject on a complex task, such as the pursuit rotor, causing them to perform poorly.

Prior research on the pursuit rotor supports this interpretation. For example, it has been suggested, (Ammons, et al., 1958) that the less effortful or stressful the particular conditions of the task, the more nearly performance will approach the optimum. Thus attitudinal differences in Meltzer's (1970) study may have led to differential

perceptions of task difficulty with the effect that high PRS subjects perceived the task as being more effortful than low PRS subjects. This perception of task difficulty in conjunction with the presence of EA may have produced responses which interfered with performance of high PRS subjects. On the other hand, the more relaxed low PRS subjects had less task interference because they were not concerned about their performance. Thus, it would seem that three conditions are necessary to obtain results of this nature (Weltzer, 1970): 1) subjects with positive attitudes toward psychological research, 2) who are concerned about their experimental performance or are in a situation where EA is aroused (i.e., tests of skills, abilities or personality functions) and 3) a situation in which the arousal of EA actually interferes with task performance (Page, 1970). The present study is designed to test this possibility.

In view of the similarity between EA and anxiety, it may prove to be instructive to first examine the research on anxiety and pursuit rotor performance. Unfortunately, however, research does not present a clear picture. Whereas several studies (Noble et al., 1958; Matarrazo and Matarrazo, 1956) reported no relationship between MAS and pursuit rotor performance, others have found subjects low in anxiety superior on perceptual-motor tasks (Shephard and Abbey, 1958; Wiggens et al., 1962). This confusion may be due to the conception of MAS as a personality characteristic rather than as a situational variable such as evaluation apprehension. Two studies (Calvin et al., 1956; McGuigan et al., 1959) have attempted to relate MAS, Palmer

Perspiration Index (PPI) and stylus-maze learning in experiments where a situational type of anxiety is aroused. The results suggest that when anxiety is of a temporary, ego-involved, situational nature (as in the studies on EA by Page, 1970; Hall, 1960; Meltzer, 1970), the PPI and not the MAS is the better index of anxiety. Furthermore, one specific study (Mouller & Chatten, 1962) has demonstrated that high PPI scores are related to low pursuit rotor performance. This negative relationship between PPI scores (as a measure of a situational type anxiety) and pursuit rotor performance further supports the plausibility of the interpretation of subject performance suggested by Meltzer (1970). It also appears feasible to state that subjects aroused by EA (also a form of situational anxiety, Rosenberg, 1965) do not perform as well as non-aroused subjects. Since it was posed that high PRS subjects are aroused and concerned more than low PRS subjects, it should logically follow that the performance of the high PRS subject should be inferior to all other PRS groups. Thus, although the research is confusing, when anxiety is defined as a temporary, ego-involved, situational variable similar results are obtained and one must consider the similarity between EA and situational anxiety.

A program of research on subject anxiety, motivation and achievement set and learning performance (Sarason, 1956; 1960; Sarason & Palola, 1960) also suggests an answer independent of the social psychology of the psychological experiment. In general the research suggests that highly motivated test anxious subjects seem to be more disturbed by personally threatening conditions, in serial learning

tasks, than less anxious subjects.

This research appears to be congruent with the interpretation of the pursuit rotor study (Maltzer, 1970), in that both studies view anxiety or EA as interfering with task performance. As previously stated, the type of task with its particular demand characteristics, when perceived differentially by subjects having dissimilar attitudes, seem to be crucial in determining subject performance. It is the aim of the present study to examine in some detail this relationship between PRS and EA within a pursuit rotor experimental situation.

RATIONALE AND STATEMENT OF THE PROBLEM

A recent study (Maltzer, 1970) has investigated the effects of subjects' attitudes toward psychological research on pursuit rotor performance. The results of that study indicated that subjects with negative attitudes toward psychological research performed significantly better than subjects with positive attitudes. This finding was contrary to what has been demonstrated previously in a series of studies investigating subjects' attitudes toward psychological research (Adair, 1969; 1970a; 1970b), in which high PRS subjects have generally performed better than low PRS subjects.

To account for this discrepancy in the pursuit tracking performance of high PRS subjects it was suggested that individual differences in concern about performance (EA) may have been a determinant. Thus it was reasoned that subjects with positive attitudes toward psychological research, because of their concern or overzealous desire to do well in the experiment, may have perceived the task as being more

difficult or effortful than unconcerned subjects, i.e., those with less positive attitudes. Previous pursuit rotor research (Ammons, 1958) supports this interpretation. In this research it was found that the more effortful the task the less likely performance approached the optimum. Thus, for example, in the present study, the sudden speed of the moving target, especially during the early trials, may have disturbed a concerned subject more than an apathetic one. As a consequence, in his desire to perform well on this complex task, the subject with positive attitudes finds that his concern actually causes him to do poorly.

These interfering effects have been demonstrated in other studies in which this concern or EA has been experimentally manipulated. It has been found in many of these studies that subjects who are concerned about their evaluation in the experiment performed at a superior level (Henchy and Glass, 1968; Page, 1970). On the other hand, it has also been shown (Page, 1970; Weltzer, 1970) that this concern (EA) may also interfere with task performance. In particular the occurrence of task interference rather than facilitation, appears to depend upon either: 1) the subjects perception of the appropriate response to make (Adair, 1970a; 1970b; Hall, 1960) or 2) the extent to which EA elicits responses which interfere with successful task performance (Ammons, 1958; Mouller and Chatlin, 1962).

The pursuit rotor study appears to fit into the latter category. In that study the conditions necessary for the demonstration of the interference effects of subject concern seemed to be present: subjects

who are concerned about their experiment performance, i.e., those with positive attitudes toward psychological research, in a situation in which this concern of EA actually interfered with task performance.

This interpretation of the pursuit rotor study would be strengthened by a manipulation of EA which led to performance differences in subjects with different attitudes toward psychological research. The present study is thus an attempt to further examine this possible relationship between EA and subjects' attitudes toward psychological research (PRS) in the pursuit rotor task in which EA is actively manipulated. It is hoped that this will help to determine which subject characteristics (e.g., subjects' attitudes toward psychological research), [illegible] experimental instructions and tasks tend to facilitate or diminish performance under the influence of evaluation apprehension.

Active manipulation of EA should have certain predicted effects on the pursuit rotor performance of subjects who differ in their attitudes toward psychological research. Subjects with positive attitudes, being more concerned about their experimental performance, presumably are more prone to interference effects due to the arousal of EA, than negative attitude subjects. When EA is not aroused, however, as in the previous pursuit rotor study (Meltzer, 1970), such interference should still occur for the positive attitude subjects because of their concern about evaluation. Therefore it is hypothesized:

(1) that subjects' with positive attitudes toward psychological research will perform at a level below subjects with negative

attitudes, both in the low EA (control) condition and in the EA manipulated (high EA - experimental) condition. (The high EA condition is a situation in which the subjects are led to believe that the pursuit rotor will measure brain damage whereas the low EA condition is a typical pursuit rotor procedure without the deception.)

(2) that high and low PRS subjects will perform, when EA is aroused, at a level significantly inferior to their performance when EA is not aroused.

Awareness of the experimental hypothesis, has proven to be an important variable in determining subject performance (Adair, 1970b). In the present study awareness was defined as an expression by the subject on the post-experimental questionnaire that his performance should increase over trials. It was felt, that in order for the EA manipulation to be effective, the subject must be aware that his performance should improve. This awareness is also essential for subjects of different PRS groups to perform differently. In other words, how can a subject who is motivated by the EA manipulation act upon that motive unless he is aware of the appropriate response suggested by the experimental hypothesis. Similarly, high PRS subjects who are motivated to cooperate and concerned about their performance also must be aware of how to respond in order to act upon those motives. Therefore, when the subjects are classified according to awareness, it is hypothesized:

(3) that the hypothesized effects of EA and PRS stated above should be even more pronounced.

(4) that subjects with positive attitudes toward psychological research will show greater awareness of the experimenter's hypothesis than subjects with negative attitudes, both in the low and high EA conditions.

(5) that aware subjects will perform better than unaware subjects in the low EA condition but aware subjects will perform at a significantly lower level than unaware subjects in the high EA condition.

Finally, in accordance with the pursuit rotor study, it is hypothesized:

(6) that high PRS subjects will show greater positive behavioral intent (a post-experimentally expressed desire to substantiate the experimenter's hypothesis) than low PRS subjects under both the control and experimental conditions. Also that positive behavioral intent would be greater for the high PRS subjects in the high EA condition as compared to the low EA condition.

In the research on PRS, three groups are normally used; high, medium and low PRS. However, because of the similarity between the high and medium PRS groups in Meltzer's (1970) study, it is impossible to propose specific hypotheses for the medium group except to specify that their performance should be similar to that of the high PRS group. Thus, although the medium PRS group was run and data analyzed, no hypotheses as to their performance were proposed.

CHAPTER II

METHOD

Subjects

The subjects were 90 male undergraduates in the Introductory Psychology course at the University of Manitoba who participated in this study as part of the course requirement. All subjects had previously taken the Psychological Research Survey (PRS) as part of a psychometric test battery conducted by the Psychology Department at the beginning of the academic year. Participation in the psychometric test battery provided credit equivalent to that for an experiment. Although participation was voluntary almost all subjects appeared for testing. Thus the population from which the subjects were drawn was relatively free from any volunteer bias.

Experimenters

The same male graduate student served as experimenter for all testing on the pursuit rotor task and for the collection of post-experimental questionnaire data. To insure that the experimenter was blind as to the PRS group to which the subject belonged and to the EA manipulation which had been previously presented, an assistant was employed to greet each subject and present him with the EA manipulation materials. Because of scheduling difficulties three assistants were employed in this capacity and were randomly assigned to equal thirds of the experimental population. In addition, to insure that the three assistants did not bias their presentation of the EA manipu-

lation they were kept uninformed as to which PRS group each subject belonged.

Design

The subjects were divided equally across three levels of PRS (high, medium and low) and were randomly assigned to either the high EA (experimental) or low EA (control) conditions. Fifteen subjects were assigned to each of the six conditions. The subjects performed on the pursuit rotor task for 24 trials of 20-sec. duration each. These trials were grouped together to form 8 trial blocks of 60-sec. duration each. Thus, the experiment consisted of a 3 x 2 x 8 design.

Apparatus

The standard pursuit rotor was employed in this study (Ammons, 1950; 1955). The pursuit rotor was mounted on a low stand, one foot high, such that the subject was looking down on the turntable when seated. The black hard rubber turntable was 12 inches in diameter and rotated in a counter clockwise direction at 60 rpm. The brass target was three quarters of an inch in diameter and the distance from target to centre to turntable centre was 3 1/2 inches. The stylus had a plastic handle and was hinged such that the brass stylus would bend at a 90 degree angle to the handle. A standard timing apparatus (Ecklee, 1951) was employed such that any contact on the target with the stylus during the 20-sec. trial, registered on Stoelter Clocks. The motor controlling the turntable was set with Hunter timers such that the turntable would automatically rotate and stop alternatively for 20-sec. intervals.

Procedure

The low (control) and high (experimental) EA manipulations were administered by the assistants employed to greet the subjects and to administr an initial questionnaire. In the low EA condition, the subject was taken to the first experimental room where he was asked to provide some information on a "Student Information Sheet". (see Appendix A). The "Student Information Sheet" dealt with several academic questions such as plans for the future, course of studies and major in University. Presumably the relatively neutral value of these questions would not arouse EA in the subjects.

For the high EA condition, the subject was greeted by one of the assistants who this time wore a white laboratory coat. The subject was taken to the first experimental room where he was asked to provide some information on the "Student Medical Sheet". (see Appendix B). This sheet dealt not only with academic questions but also questions potentially relevant to brain damage such as headaches, dizzy spells and blurred vision. After the "Student Medical Sheet" had been filled out, the subject was given the "Background Information Sheet" to read (see Appendix C). This sheet informed the subject that the study in which he was about to participate was being investigated as a possible test for brain damage to be included in an already developed test battery. The subject was also presented with fictitious research which supposedly had investigated this brain damage test with institutionalized individuals. Presumably the medically-oriented questions and the detailed information as to the purpose of the experi-

ment in which the subjects were about to participate would arouse EA in these subjects.

Following the EA manipulations the subject was taken to another room for the pursuit rotor task. Here the experimenter wore a white laboratory coat for all subjects. He asked the subject to be seated in front of the pursuit rotor and presented tape recorded instructions similar to those used previously (Ammons, 1950). These instructions told the subject to follow the target with a relaxed swinging motion of the arm, so that not only would accuracy increase but fatigue would be prevented. The subject was also informed that there would be a short rest period between trials and that he would be warned 5 seconds before the turntable started to rotate again. These instructions are found in Appendix D. Each subject was then given 24 trials of 20-sec. duration with a 20-sec. rest period occurring after each trial. This distributed practice method was a standard procedural technique used in most pursuit rotor studies (Ammons, 1955).

At the conclusion of the experiment all subjects were asked to complete a post-experimental questionnaire of nine questions (Appendix E), answering each question frankly and honestly before proceeding to the next question. The purpose of the questionnaire was to obtain ratings of subject awareness and behavioral intent. Three independent judges were employed to rate the subjects' questionnaires for awareness of the experimenter's hypothesis and their behavioral intent. Subjects were classed as aware if they indicated that they thought performance should increase over trials.

Any other response, e.g., that this was a test of coordination or of fatigue, was rated as unaware. Positive behavioral intent was defined as an expression on the part of the subject to behave as he thought the experimenter wanted him to behave. Negative behavioral intent was defined as an expressed intention to respond in a manner opposite to that expected by the experimenter. All other responses were placed in an unclassified category. With both ratings, the majority rating of the three judges was required to class a subject as aware or unaware and in the appropriate category of behavioral intent.

CHAPTER III

RESULTS

The dependent measure was the number of seconds the stylus was on the target as the turntable rotated. Since the turntable rotated 24 trials of 20 seconds each the total possible time on target was 480 seconds. For purposes of analysis of trials in the learning of pursuit rotor tracking, the data for the trials were grouped together into eight trial-blocks of 60 seconds each. These data for the eight trial-blocks were analyzed across three levels of subjects attitudes toward psychological research (high, medium and low PRS) and two levels of evaluation apprehension (high and low) in a 3 x 2 x 8 analysis of variance with repeated measures across the last factor. The means for these groups are graphically represented in Figure 1 and the summary for the analysis is presented in Table 1.

It was hypothesized that subjects with positive attitudes toward psychological research would perform at a lower level than subjects with negative attitudes in both the low and high EA conditions. The mean performance scored for each PRS group in both EA conditions are presented in Appendix F, Table 5. It should be stated that these means tended to be in the opposite direction than that predicted. Thus the non-significant F for PRS groups in Table 1 indicates that this hypothesis was not supported.

The obtained internal consistency reliability estimate (coefficient alpha, Cronbach, 1955) for the PRS was .898. This finding was comensurate with previous reliability estimates obtained by Adair and Fenton (1971) which ranged from .89 to .93. Given this substantial

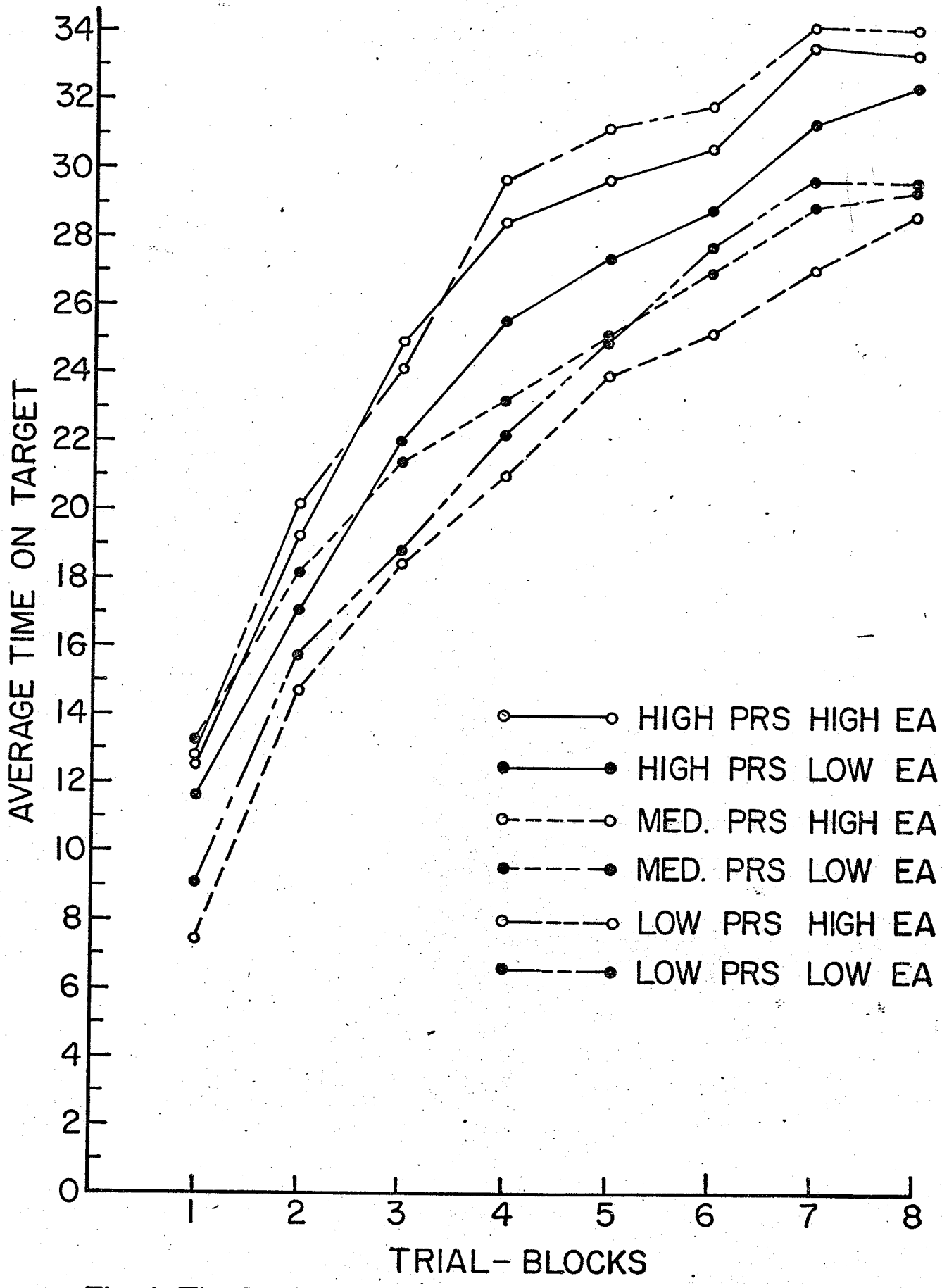

Fig. 1. The Performance Levels at each Trial-Block for PRS Groups without each Level of EA.

TABLE 1

Summary of the Analysis of Variance for Eight Trial-Blocks of Pursuit Rotor Performance by PRS Groups Over EA Conditions

Source	df	SS	MS	F
Subject Attitude Groups (PRS)	2	1596.46	793.23	1.67
Evaluation Apprehension (EA)	1	415.34	415.34	.87
PRS x EA	2	1779.33	889.67	1.87
Error	84	40051.91	476.81	
Trial-Blocks (T-B)	7	31167.33	4452.50	294.16*
PRS x T-B	14	272.75	19.48	1.29
EA x T-B	7	135.30	19.33	1.28
PRS x EA x T-B	14	111.68	7.98	.53
Error	588	8900.30	15.14	

*$p < .001$

internal consistency of the PRS it would be unlikely that within subjects variability would have been sufficient to preclude differences among the PRS groups. The mean attitude scores for each PRS group and both EA conditions is presented in Appendix F, Table 6. These means for each PRS group were as expected with the high PRS group having the highest mean PRS score.

It was also hypothesized subjects experiencing the high EA manipulation would perform at a level significantly inferior to that of subjects in the condition when EA was not aroused. As Table 1 indicates, however, differences due to the EA effects failed to reach significance.

Inspection of Figure 1 reveals that most groups began the tracking task at approximately the same level. Within the first four trial-blocks however, they diverged to a maximum point. Then, as they approached asymptotic performance, the differences between groups became less pronounced. This pattern of performance suggests that the effects of EA and PRS operated only at an early stage of learning. To test this post-hoc observation, separate analyses were computed for the first four trial-blocks. The summary of this analysis is presented in Table 2 and neither main effects for PRS nor EA were significant. However, a significant interaction of evaluation apprehension x trial-blocks was obtained ($F = 2.7$, $df = 3,52$ $p < .05$). This result is graphically represented in Figure 2. The interaction suggests that although performance increased over the first four trials in both EA conditions, subjects in the high EA condition performed at a higher

TABLE 2

Summary of the Analysis of Variance for Pursuit Rotor Performance on the First Four Trial-Blocks by PRS Groups Over EA Conditions

Source	df	SS	MS	F
PRS Groups	2	532.75	266.37	1.26
Evaluation Apprehension (EA)	1	164.23	164.23	.78
PRS x EA	2	1277.59	638.80	3.02*
Error	84	17794.74	211.84	
Trial-Blocks (T-B)	3	9702.08	2324.03	232.26***
PRS x T-B	6	157.21	26.20	1.88
EA x T-B	3	113.28	37.76	2.70**
PRS x EA x T-B	6	14.61	2.43	.18
Error	252	3508.96	13.92	

*p<.10
**p<.05
***p<.001

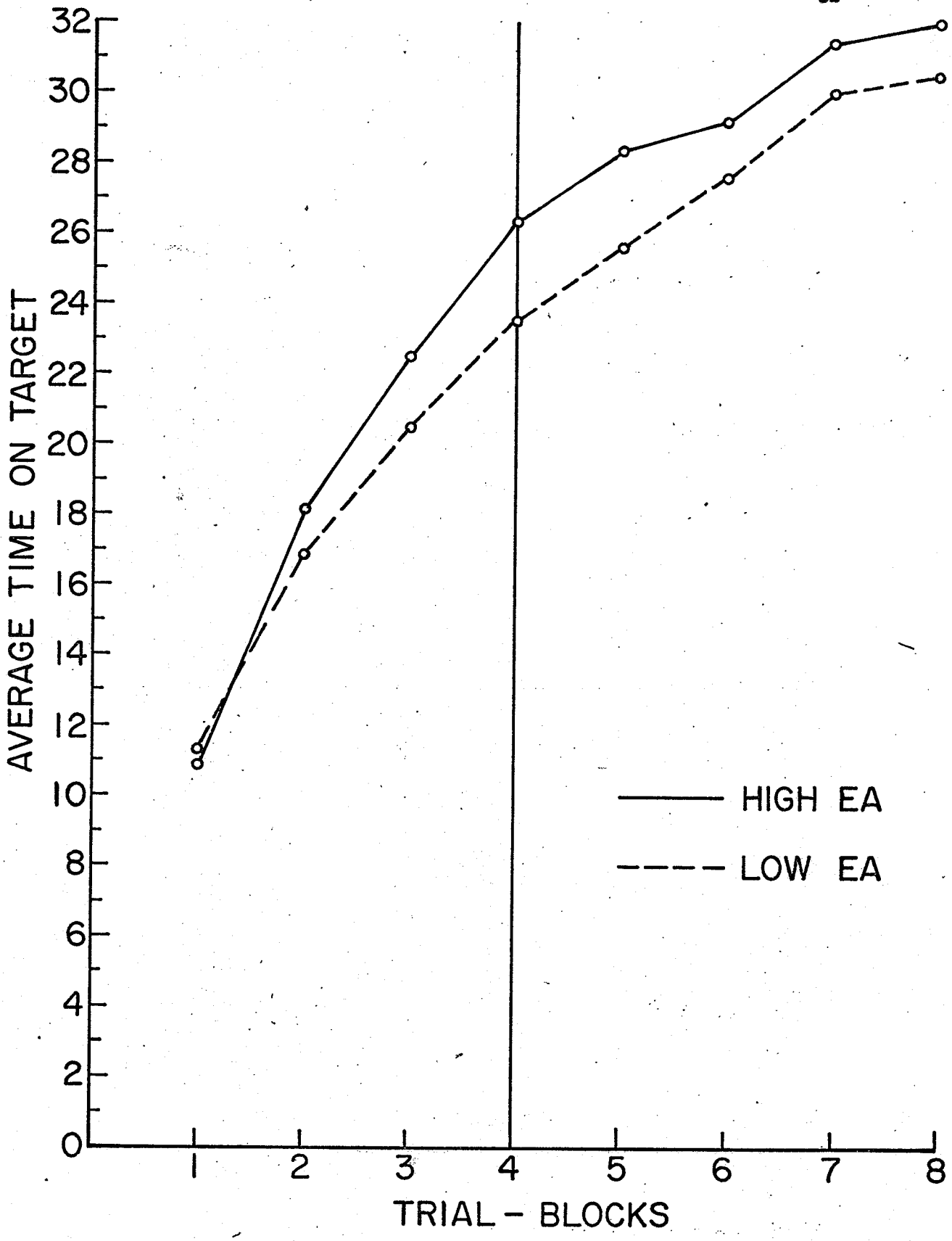

Fig. 2. The Performance Level at each Trial-Block for both EA Conditions.

NOTE: The first and last four trial-blocks have been separated to indicate early differences in learning rates.

level than subjects in the low EA condition.

It was also expected that aware high PRS subjects would perform at a level inferior to that of aware low PRS subjects. Furthermore, it was hypothesized that all aware subjects would perform better during the low EA condition as compared to similar subjects in the high EA condition. An interaction between awareness and levels of EA was also predicted, i.e., it was expected that aware subjects would perform better than unaware subjects during the low EA condition but that the reverse would be true under the high EA condition. In order to test these hypotheses, it was necessary to classify the subjects according to awareness. Thus, three judges were employed and rated the subjects on this variable. The majority rating of the three judges was utilized to determine awareness. Approximately 47% of the experimental population was rated as aware of the hypothesis that performance should increase over trials. The actual ratings of subject awareness for the three PRS groups and both EA conditions are presented in Appendix F, Table 7. The analysis of variance for which is summarized in Table 3 reveals only a significant effect for trial-blocks ($F = 286.61$, $df = 7,546$, $p < .001$). This result suggests that for all subjects performance did increase over the eight trial-blocks. Therefore, the hypotheses dealing with awareness were not supported. An analysis of variance performed on the first four trial-blocks also failed to substantiate these hypotheses.

It was also expected that more high PRS subjects would be aware of the experimental hypothesis than low PRS subjects in both

TABLE 3

Summary of the Analysis of Variance for Eight Trial-Blocks of Pursuit Rotor Performance by PRS Groups Over EA Conditions Following a Post-hoc Rating of Awareness

Source	df	SS	MS	F
PRS Groups	2	1394.84	697.42	1.41
EA	1	255.74	255.74	.52
PRS x EA	2	1696.14	848.07	1.71
Awareness (AWR)	1	267.19	267.19	.54
PRS x AWR	2	1133.85	566.92	1.15
EA x AWR	1	105.10	105.10	.21
PRS x EA x AWR	2	32.31	16.15	.03
Error	78	38592.45	494.77	
Trial-Blocks	7	30981.88	4425.92	286.61*
PRS x T-B	14	264.67	18.90	1.22
EA x T-B	7	126.80	18.11	1.77
PRS x EA x T-B	14	127.88	9.13	.59
AWR x T-B	7	202.70	28.95	1.88
PRS x AWR x T-B	14	157.87	11.28	.73
EA x AWR x T-B	7	48.48	6.93	.45
PRS x EA x AWR x T-B	14	65.86	4.70	.31
Error	546	8431.62	15.44	

*p<.001

conditions. The number of aware subjects were approximately the same for the PRS groups in each EA condition. However, a chi-square performed on the data presented in Appendix F, Table 8, did not support this hypothesis ($X^2<.10$). A similar chi-square was computed to test the hypothesis that high PRS subjects would show more positive behavioral intent than low PRS subjects under both EA conditions. In addition, it was anticipated that the high PRS subjects would have more positive behavioral intent in the high EA condition than those in the low EA condition. As stated earlier positive intent was defined for the judges who rated the post-experimental questionnaire as an attempt on the part of the subjects to behave as they thought the experimenter wanted them to behave. A test of this hypothesis, computed for the data presented in Appendix F, Table 9, revealed that the hypothesis was also not supported ($X^2<1.0$).

Of secondary interest in the present study was the relationship, if any, between PRS scores and pursuit rotor performance. To this end Pearson-Product-Moment Correlations were computed between PRS scores and total performance scores. Only the correlation between PRS and total performance scores for aware subjects in the high EA condition proved to be significant ($r = -.467$, $p < .05$). However, the correlations generally followed the same pattern, with total performance scores of aware subjects in both EA conditions having a negative relationship with PRS scores. In contrast, for unaware subjects the relationships were positive (see Table 4). Tests of the differences between correlation coefficients for aware and unaware

TABLE 4

Correlations for PRS vs Total Performance Score

	High EA	Low EA	Combined High & Low EA
Aware Ss	N = 18 r = -.467*	N = 24 r = -.020	N = 42 r = -.203
Unaware Ss	N = 27 r = .194	N = 21 r = .288	N = 48 r = .240

*p<.05

subjects were not computed. Since these correlations were non-significant, the meaning of such tests appeared to be questionable.

CHAPTER IV

DISCUSSION

The study was designed to examine the effects of subjects' attitudes toward psychological research (PRS) and evaluation apprehension (EA) upon pursuit rotor performance. Specifically, it was hypothesized that subjects would perform better under low EA than subjects in the high EA condition. Presumably, subjects in the high EA condition being overly concerned about their performance would attempt to perform to the best of their ability. It was expected that this desire to perform well would interfere with their performance and cause them to perform poorly relative to the performance of the less concerned subjects in the low EA condition. Furthermore, it was hypothesized that subjects with positive attitudes toward psychological research, i.e., also concerned subjects, would not perform as well as unconcerned negative attitude subjects in both EA conditions. The data failed to support either of these hypotheses. In fact, not only was the expected difference in subject performance between EA conditions not obtained, but the results were in the opposite direction. In addition, the mean performance scores over the eight trial-blocks were similar for the high and low PRS groups. This was the case in both EA conditions.

Inspection of the performance curves for all PRS groups and EA conditions suggested that the experimental manipulations had an early effect on subjects behavior but that these differences disappeared as performance approached the asymptote. During the last four trial-blocks

performance of all groups appeared to become similar. Therefore the data for PRS groups and EA conditions were analyzed over the first four trial-blocks. Although neither the effects of PRS nor EA was significant, a significant EA x trial-block interaction was obtained. This interaction indicated that over the first four trial-blocks subjects in the high EA condition performed better than subjects in the low EA condition.

Two additional variables examined in the present study were the subject's awareness of the experimental hypothesis and his expressed behavioral intentions of acting upon that hypothesis. It was predicted that the effects of EA and PRS outlined above would be enhanced among subjects classified as aware of the experimental hypothesis. However, all effects of these variables and their interaction with PRS and EA were not significant. It was also predicted that a greater number of concerned subjects, i.e., those with high PRS scores or those in the high EA condition would be aware and would express positive behavioral intent as compared to unconcerned subjects in the low EA condition or with less positive PRS scores. Once again, the judges ratings of these variables revealed no differences between PRS groups or EA conditions in the number of subjects aware or expressing positive behavioral intent.

Of secondary importance in this study was the possible relationship between PRS and total performance scores. The only significant correlational finding was obtained for aware subjects in the high EA condition. For this group, a significant negative correlation between

PRS scores and total performance was obtained. Although not significant, a negative correlation for aware subjects was also obtained in the low EA condition. In contrast, non-significant positive correlations were obtained for unaware subjects in both EA conditions.

Clearly, the results suggest that the EA manipulation was not effective in arousing subject concern about performance. One possible explanation is that subjects did not believe the brain damage deception. On the one hand, the instructions and brain damage information sheets may have been inadequate to arouse subject concern. Alternatively, brain damage, an infrequent condition associated with traumatic experiences, may be something about which university students are not concerned. In either case, subjects in the high EA condition would not have been aroused to greater concern about their performance. In addition, those subjects aware of the deception may have been unwilling to cooperate with an experimenter who had attempted to delude them.

Alternatively, the apparent ineffectiveness of the EA manipulation may not have been due to a failure to arouse subject concern in the high EA condition, but to an unexpected arousal of substantial subject concern in the low EA condition. Although it had been intended to create a "control group" of subjects whose concern was minimal, this may not have been accomplished with the procedures employed. For example, to make the subject-experimenter interaction and instructions somewhat equivalent in the two EA conditions, subjects given low EA manipulation were required to meet an assistant and answer some supposedly neutral non-arousing questions on a "Student Information Sheet."

While it was hoped that these procedures would not arouse subject concern, the neutrality of meeting an assistant and his asking of some personal questions may be suspect. Previous research (Hall, 1960; Page, 1970) has demonstrated that presenting a simple questionnaire prior to performing an experimental task can effect task performance. Thus these additions to the procedure of the previous pursuit rotor study (Meltzer, 1970) may have altered the low EA subject's perception of his role in the experimental task. This perception could have made the two conditions virtually identical.

Finally, it should be noted that the failure of the EA manipulation may have been due to a combination of the alternatives suggested above. For example, it could be that not only did the high EA condition arouse less subject concern than anticipated but at the same time the low EA condition may have unexpectedly aroused more concern. In whatever combination the net effect was the same, i.e., virtually identical performance from subjects in the two treatment conditions.

Evidence documenting the similarity of behavior of subjects in the two EA conditions is contained in their responses to the post-experimental questionnaire. It had been expected that subjects whose concern had been aroused would express a desire to do well in the experiment. On the other hand, unconcerned subjects in the low EA condition would not have been as highly motivated to cooperate. Thus, a greater number of subjects in the high EA condition than in the low EA condition should have expressed positive behavioral intentions

on the post-experimental questionnaire. The fact that equal proportions of subjects in both conditions expressed an intention to cooperate further indicates the similarity of the EA conditions in arousing subject concern.

The failure to find performance differences among subjects of different attitudes toward psychological research is difficult to explain in view of its previously demonstrated effects upon experimental performance in other studies (Adair, 1969; 1970a; 1970b; Weltzer,1970). The results are even more difficult to explain in light of the high alpha reliability coefficient obtained for the PRS in this study. As a result of this analysis, the similarity in performance between PRS groups can not be attributed to within subject variability due to an unreliable measure of subjects attitudes toward psychological research. Therefore the only plausible explanation appears to be related to the effects of the experimental procedures on the subjects' understanding of their role in the experiment. The fact that the subject was confronted with the experimenter's assistant, the request for information, the experimenter in a white laboratory coat, the tracking task, and the post-experimental questionnaire may have led the subjects to develop many different hypotheses concerning the true purpose of the experiment. Therefore, those subjects who were concerned about their performance could not perform consistent with that concern because they were unaware of the appropriate response.

Evidence to support this interpretation is contained in the subjects'

responses to the post-experimental questionnaire. On the basis of this data, less than half of the subject population was judged as being aware of the experimental hypothesis. Furthermore equal numbers of subjects in all PRS groups were aware. The consequence of these different perceptions of the hypothesis would be to cancel the effects of motivational differences between PRS groups. It should be noted that this explanation applies only to subjects who were unaware of the hypothesis. Among aware subjects, especially in the high EA condition, the effects of attitudes toward psychological research were consistent with previous studies.

In fact, the only statistically significant finding in the present study was the negative correlation between PRS scores and performance for aware subjects in the high EA condition. This result was in accord with the prediction that the arousal of EA would interfere with the task performance of the concerned subjects, i.e., those with more positive attitudes toward psychological research. The fact that this correlation was found only with aware subjects in these groups is also consistent with the prediction that subject awareness would enhance the effects of EA and PRS. Finally, it should be noted that in addition to this significant relationship, the negative correlation for aware subjects in the low EA condition and positive correlations for unaware subjects in both EA conditions, although non-significant, were in the same direction as the correlations obtained in the previous pursuit rotor study (Meltzer, 1970).

These correlations, however, were in the opposite direction to those obtained in a conformity study (Adair, 1969) in which FRS scores correlated positively with conformity scores for aware (suspicious) subjects and negatively with unaware (unsuspicious) subjects. Presumably, the arousal of EA interfered with task performance among aware subjects in the pursuit rotor study, while subject concern facilitated task performance in the conformity study. While the results of subject concern on performance in these studies appear to be contradictory, they are consistent with prior research on EA (Hall, 1960; Page, 1970) which has demonstrated that the effects of subject concern may vary according to the task or situation. In concluding, however, these findings should be considered to be merely suggestive since the negative correlation was the only significant result in the entire study.

In conclusion, neither the EA manipulations nor subjects' attitudes toward psychological research appeared to effect pursuit rotor performance. However, because of the negative correlation between FRS and total performance scores for aware subjects in the high EA condition, one cannot discard subject concern as a variable with potential to interfere with performance. Apparently what is required is a carefully designed study in which the levels of EA are clearly discriminated, a more credible EA manipulation is employed and in which the experimenter's hypothesis is clearly perceived by the subjects.

Most important in such a study is the manipulation that is employed to produce EA. For example, a deception based upon non-verbal

intelligence rather than brain damage, may prove to be more realistic to university students. Certainly, it may appear reasonable to the subjects, that a motor skill involving eye-hand coordination, such as pursuit rotor tracking, may be a non-verbal measure of intellectual functioning. Also, the fact that psychologists are perceived to possess the ability to measure an individual's intellectual ability should make such a deception appear more credible and arouse the subjects' concern about performance.

To ensure that the low EA condition does not arouse subject concern also requires special efforts. In this condition every effort should be made to ensure the subject does not feel he is being evaluated. Pre-experiment questioning of the subjects and elaborate experimental procedures should be avoided. Certainly, the experimenter should not wear a white laboratory coat. Even describing the study to the subjects as a pilot project may be necessary to ensure minimal subject concern. The utilization of distinctive procedures of this type may result in differential pursuit rotor performance.

The proposed procedures may also effectively communicate the true hypothesis to the subject and thus provide greater opportunity for motivational effects of subjects attitudes to operate. For example, the proposed non-verbal intelligence deception would afford the opportunity to relate to the subjects the fact that for intelligent people performance should increase over trials. This information would not only produce greater subject awareness but may also effectively add

to their EA. On the other hand, in the low EA condition, the procedure designed to reduce subject concern by simplifying the task should also have the effect of increasing subject awareness. Certainly, the simple procedure should reduce the number of various hypotheses the subjects perceived under the complex task.

By implementing this proposed design in which EA is more effectively aroused in one condition than in the other, it may be that the hypothesized distinction in performance between the two manipulations will be clearly demonstratable. The suggested changes in procedure may also produce greater subject awareness such that the expected differences in performance between FMS groups would also be obtained.

CHAPTER V

SUMMARY AND CONCLUSION

The study was designed to examine the effects of subjects' attitudes toward psychological research (PRS) and evaluation apprehension (EA) upon pursuit rotor performance. The experimental task consisted of 24 trials of 20 seconds of pursuit rotor tracking with 20-sec. rest periods between trials. Ninety subjects were divided into three groups (high, medium and low) according to their attitudes toward psychological research. An equal number of subjects in each PRS group then received either the low (control) or high (experimental) evaluation apprehension manipulation before performing the pursuit rotor task. High EA was aroused by a "Student Medical Sheet" and a "Background Information Sheet", both pertaining to brain damage. In the low EA condition subjects merely completed a "Student Information Sheet" consisting of ostensibly neutral, non-arousing questions. All subjects then completed a post-experimental questionnaire to ascertain their awareness and behavioral intent.

It was predicted that the high EA manipulation would reduce the performance level of the subjects relative to their performance without this manipulation. Similarly, a significant difference in pursuit rotor performance between PRS groups was expected. It was also expected that aware subjects would perform better than unaware subjects in the low EA condition but that unaware subjects would perform better in the high EA condition. Finally, it was hypothesized that

high PRS subjects would exhibit more awareness and positive behavioral intent than low PRS subjects.

In general, the results failed to confirm any of the six hypotheses. Of particular importance was the lack of a significant main effect for either EA or PRS. It was also inconsistent with prior research to find that awareness of the experimental hypothesis did not differentially effect the performance of PRS groups or that between EA conditions. The only significant finding was a negative correlation between PRS scores and total performance scores for aware subjects in the high EA condition. Although non-significant a negative correlation between performance and PRS scores were also obtained for aware subjects in the low EA condition. In contrast, non-significant positive correlations for unaware subjects were obtained in all conditions. Presumably aware subjects encountered difficulty in responding in accord with the hypothesis.

In conclusion neither the EA manipulations nor subjects attitudes toward psychological research appeared to affect subject pursuit rotor performance. Presumably, the attempt to experimentally manipulate EA failed to create conditions which represented extremes in levels of subject concern. It was suggested that this failure was due to either the ineffectiveness of the high EA condition in arousing concern or to the fact that the experimental procedures unintentionally aroused subject concern in the control (low EA) condition.

To explain the non-significant main effect for PRS, however, was more difficult. Tests of the reliability removed the possibility that the large within subject variability was due to problems in the PRS scale. Thus, it could only be speculated as to the reasons for the failure of obtaining a main effect for PRS.

In conclusion, it was proposed that more effective and possibly more sophisticated experimental manipulation may be necessary to make a more definitive test of the hypotheses proposed in this study. Several suggestions in this regard were presented.

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APPENDIX A

STUDENT INFORMATION SHEET

NAME:

STUDENT NO.:

ADDRESS:

SCHOOL YEAR AND MAJOR:

FACULTY:

PLANS AFTER OBTAINING YOUR DEGREE:

APPENDIX B

STUDENT MEDICAL SHEET

NAME:

STUDENT NO.:

ADDRESS:

SCHOOL YEAR AND MAJOR:

FACULTY:

PLANS AFTER OBTAINING YOUR DEGREE:

ON THE AVERAGE HOW OFTEN DO YOU HAVE HEADACHES A MONTH?

DO YOU OFTEN GET PERIODS OF DIZZINESS AND/OR BLURRED VISION?

HAVE YOU EVERY BEEN IN ANY TYPE OF ACCIDENT WHICH HAS RESULTED IN SOME FORM OF HEAD INJURY?

APPENDIX C

BACKGROUND INFORMATION SHEET

The experimental task which you will perform in this experiment is being investigated as a possible test of coordination ability for the inclusion in a battery of tests for the Organically Brain Damaged. Although the research by Dr. H. Wilcoxon at the Vanderbilt University Hospital, Nashville, Tennessee has investigated this task using a large sample of Organically Brain Damaged institutionalized individuals, little research has been done using this test outside of an institutionalized population.

As you know, in order for a test to be both successful and useful, psychologists must develop a measure which reveals all the degrees of organic impairment in the overall population. In this experiment we are interested in developing such a normative continuum of performance by imploying one of Dr. Wilcoxon's tests. To relate back to what was said earlier, this task is a good indicator of the degree of coordination of which each subject is capable.

APPENDIX D

PURSUIT ROTOR INSTRUCTIONS

"In front of you is what is called a pursuit rotor. This machine will measure both your coordination and accuracy in a motor performance task. On the table you will also find a metal pointing pen commonly referred to as a stylus.

Now take a good lood at the black rotation disk on the pursuit rotor. It will be your task to keep the stylus on the metal target found on the rotation disk. Your performance will be measured by the amount of time the stylus is on target as the disk rotates.

Before we start there are several points about the use of the apparatus and the procedure which should help to improve your accuracy. As you attempt to keep the stylus on target, do not press down hard on the stylus, but follow the target with a relaxed swinging movement of the arm. Not only will accuracy increase, but fatigue will be prevented.

There will be a warning five seconds before the start of each trial and then the disk will rotate. When the warning is given place the stylus on the target in order to be ready for the start of that trial. Follow the target until the disk stops, at which time there will be a short rest period. You will be warned again five seconds before the next trial starts and this procedure will continue until the task is completed.

Are there any questions?"

APPENDIX E

POST-EXPERIMENTAL QUESTIONNAIRE

NAME _____ STUDENT NO. _____

SUBJECT'S QUESTIONNAIRE

The results of an experiment are more meaningful to us if we know what your ideas, thoughts and understandings of the experiment just completed were. Please answer each of the questions on the following pages frankly and honestly. Please answer them in their numbered order and do not go on to the next question until you have given an answer to the previous question.

1. The experimenter usually conducts a study expecting certain results. This is referred to as the hypothesis.

   (a) What did you think the hypothesis for this experiment was?

   (b) Exactly how do you think you were expected to respond?

2. (a) Every psychological experiment is designed to measure some variable or variables. What do you think this experiment was designed to measure?

   (b) How do you think the experimenter measured this variable?

3. (a) What do you think was the purpose of the stylus and rotating target?

   (b) How would you rate how hard you tried to keep the stylus on target?

As Hard as Possible _____ As Little as Possible

4. What do you think was the purpose of so many periods of target rotation?

5. Was there any change in your performance, the longer you worked on the task? Please explain your answer.

6. Did you respond so as to give the experimenter the results you thought he wanted? The results opposite to what he wanted? Or did you not respond in any particular manner?

7. (a) Did you try to improve your performance on later trials over your performance on early trials? Or did you try to do about the same? Or did you not try to do as well?

   (b) How do you think you actually performed? In other words as the experiment progressed, do you feel your accuracy

   _____ increased

   _____ stayed about the same

   _____ decreased

8. We are also interested in how you felt about the pursuit rotor task. In terms of interest, how would you rate the pursuit rotor section of this experiment? Check the box on the continuum which best represents your feelings about the pursuit rotor task.

Extremely Interesting _____ Extremely Boring

(b) How significant do you feel this study was?

Very Significant _____ Very Insignificant

9. (a) How successful do you feel you were in keeping the stylus on target?

Very Successful _____ Very Unsuccessful

(b) Have you participated in this or any other pursuit rotor study before? _____ Yes _____ No

Note: All questions were presented on separate half-sheets of paper - not as typed in thesis.

APPENDIX F

TABLE 5

Mean Performance Scores for PRS Groups x EA Conditions

	High PRS	Medium PRS	Low PRS	Grand Mean
High EA	212.29	167.06	218.10	199.16
Low EA	197.37	185.11	177.81	186.79
Grand Mean	204.83	176.09	197.95	192.96

TABLE 6

Mean PRS scores for PRS Groups x EA Conditions

	High PRS	Medium PRS	Low PRS	Grand Mean
High EA	213.27	191.80	172.87	192.64
Low EA	211.73	194.73	173.13	193.20
Grand Mean	212.50	193.27	172.97	192.91

TABLE 7

Number of Aware and Unaware Subjects

	Aware Subjects			Unaware Subjects		
	High PRS	Medium PRS	Low PRS	High PRS	Medium PRS	Low PRS
High EA	5	7	6	10	8	9
Low EA	8	8	8	7	7	7
Total	13	15	14	17	15	16

TABLE 8

Contingency Table of Number of Aware Subjects for High and Low PRS Groups by EA Conditions

	High PRS	Low PRS
High EA	5	6
Low EA	8	8

TABLE 9

Contingency Table of Number of Positive Behavioral Intent Subjects for High and Low PRS Groups by EA Conditions

	High PRS	Low PRS
High EA	9	6
Low EA	8	6