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Examination of Some Variables in Relation to Perceived Locus of Control

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EXAMINATION OF SOME VARIABLES IN RELATION TO PERCEIVED LOCUS OF CONTROL

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This Thesis submitted by Jerome Irwin Weiss in partial fulfillment of the requirements for the Degree of Master of Science from the University of North Dakota is hereby approved by the Faculty Advisory Committee under whom the work has been done.

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ABSTRACT

Several studies indicate that the Internal Locus of Control Scale (Rotter, 1962) may also be an indicator of concern or anxiety.

The present study was designed to assess whether IE and task variable manipulation would be reflected in physiological and decision time measurements. The specific dependent variables chosen were blood pressure, pulse rate, respiration rate and decision time. Past evidence suggests that E's are more anxious than I's, and that anxiety is reflected by a decrease in blood pressure. Evidence also points to the possibility that the other dependent variables considered are affected by IE and task manipulation, although not necessarily in a manner correlated with blood pressure.

Each of sixty internal and external subjects served as their own controls by participating in both a skill and a chance task at the same sitting. All measurements were recorded by a commercial four channel polygraph. A 2x2x2 design was used, with two types of subjects (internal and external), two types of tasks (chance and skill), and two levels of order (skill first, chance first).

Analysis of the data indicated that the respiration rate of the internals was greater than that of the externals and the blood pressure of the internal group participating in a chance task was greater than that of the internal group participating in a skill task.

CHAPTER I

INTRODUCTION

In the past years many investigators have attempted to delineate the role played by expectation (or subjective probability) in the formation of behavior potential.

Tolman (1955) for example, argues that the performance of a rat in a food-reward situation will depend upon both positive and negative factors. Positive factors are those such as the need for food, the value of the anticipated food, and the expectancy that the food will be forthcoming. The negative values are those such as the work involved in making the proper response.

Edwards (1955) speculates that decisions must involve both utility and subjective probability. He considers that choices are made to maximize subjectively expected utility, through a function of both expectancy and utility.

Atkinson (1957) names six variables involved in the motivation of potential behavior. These are the subjective expectancies of: (1) success; (2) failure; (3) positive incentive value of success; (4) negative incentive value of failure; (5) the achievement motive; (6) the motive to avoid failure.

Rotter's (1954) theoretical framework surrounding his social learning theory stresses the functional attributes of reinforcement expectancy and perceived reinforcement value in the growth of

potential behavior.

His speculation is that potential behavior is dependent upon both an expectancy that behavior will be rewarded with a desired reinforcement, and upon the perceived value of that reinforcement. Rotter concludes that a reinforcement following behavior will not necessarily influence it in an automatic manner. Its effect will be contingent upon the perception of a causal relationship between reinforcement and behavior and the perceived value of that reinforcement.

The Personality Dimension

Rotter explains that the perception of a causal relationship between reinforcement and behavior varies in degree from one individual to another. For example, a person may perceive that all of his reinforcements are contingent upon his behavior. Rotter would describe him as one having a belief in internal control and place him at one end of a continuum describing the personality dimension of Internal-External (I-E) Control.

At the opposite end of the continuum is the individual who, although he may perceive reinforcements following his behavior, will perceive them as discrete rather than related events. This person perceives his reinforcements as contingent upon chance, luck, fate or more powerful others. Rotter describes this person as one having a belief in external control.

This personality dimension has the internal personality (I) at one end and the external personality (E) at the extreme opposite end. According to Rotter (1966) each of us can be placed somewhere on its continuum, with most of us containing both I and E

characteristics. Each person's point of placement on the continuum is dependent upon his experiential history of reinforcement. An individual's continuous interaction with the world from birth onward will result in an experiential history of reinforcement which determines the degree to which he is a believer in internal or external control.

The Task Dimension

Another aspect of Rotter's theory regarding Internal-External Control is that of the Task Dimension.

An individual may perceive a task as one in which reinforcement is response contingent. Rotter labels a task in which reinforcement is response contingent as a skill task (S).

A task in which reinforcement is not perceived as response contingent is labeled by Rotter as a chance task (C).

At one end of the task dimension are those tasks labeled S and at the other extreme are those labeled C. Although there are tasks considered S or C by different individuals, there are many usually agreed upon by many people as being either S or C. For example, some may attribute success at a card game to skill while others attribute their success at this task to luck; success at roulette is usually agreed to be a result of luck and not skill; success at golf is usually considered a result of skill and not luck.

Measurement of the Personality Dimension

Phares (1955) in his doctoral dissertation presented the first scale to measure the personality dimension of Internal-External Control. He designed his study to test his 13 item likert type scale which was to measure the degree to which an individual believed reinforcements

chance contingent.

He administered the scale to a population of college students and selected for his study those making scores indicating an extremely high or extremely low chance orientation.

The subjects were arranged into two groups of high chance orientation and two groups of low chance orientation. One high and one low group were administered a task requiring them to match light and dark values. Another high and another low group were administered a task requiring them to match lines of different lengths.

Half of the subjects were told that success at the tasks would be a result of their skill. The other subjects were told that the tasks were so difficult success would be a result of their luck.

Subjects were asked to bet poker chips on each up-coming trial. The number a subject would bet on his probability of success served as Phares' measure of expectancy. Reinforcement for each trial was (unknown to subjects) predetermined and identical for all subjects.

His results indicated that his scale was able to make some non-significant predictions of expectancy shifting and unusual expectancy shifting.

James (1957) made one of the earliest revisions of the Phares Scale. He kept the Likert format but increased the critical items to 26 and added filler items bringing the total to 60. This scale was revised, restandardized and retitled the Dekalb Survey Inventory, Form IE in 1963.

Rotter, Seeman and Liverant (1962) developed another version of the Phares Scale and entitled it the Internal-External Control Scale (I-E Scale). This is the scale used in the present study. It has a

forced choice format containing 23 critical items and six fillers. As with the Dekalb Survey Inventory, a score consists of the total numbers of E choices made by the subject.

Mirels(1970) factor analyzed the 23 critical items of the Rotter I-E Scale. His results indicate that it contains two key factors.

Factor one reflects a belief that becoming a success is a matter of hard work; luck has little or nothing to do with it. The factor loading here was .57.

Factor two reflects the belief that an average citizen can influence governmental decisions. This factor loading was .68.

Other scales purporting to measure the I-E variable in children have also been developed over the last ten years.

Bialer (1961) modified the James scale to a 23 item "yes-no" questionnaire which may be orally administered.

Crandall, Katovsky and Preston (1962) developed the Intellectual Achievement Responsibility Scale (IAR). This scale purports to reflect a child's belief in Internal or External Control in respect to intellectual achievement situations. Its format is that of multiple choice.

Battle and Rotter (1963) developed the Children's Picture Test of I-E Control. A child is shown a series of pictorial situations reflecting responsibility. He is asked what he would say if placed in each of them.

Predictions Along the Personality Dimension

Graves (1961) predicted the degree of external belief which would be found in three ethnic groups. Rotter's scale was adjusted

and administered to high school students in a tri-ethnic community. The results were consistent with the prediction that Indians were the most external, Spanish-American next and white's the least externally oriented.

Battle and Rotter (1963) found that lower class Negroes were significantly more external than lower class whites or middle class Negroes and whites.

Lefcourt and Ladwig (1965, 1966) predicted that racial segregation and discrimination would lead Negroes to believe that only luck would bring about reinforcements for them. They applied their prediction to Negro and white prison inmates and found that they successfully predicted higher external control among the Negroes.

In each of these ethnic studies the race or class who was in a social position of minimal power tended to score in an external direction. However, within racial groupings, class interacts so that "lower class" and "lower caste" produces those groups scoring highest in external control.

Lefcourt (1966) interpreted these studies to mean that external behavior in a skill oriented society is reflected by passivity and apathy.

Julian, Lichtman, and Ryckman (1968) investigated whether the personality dimension also determined a preference for conditions maximizing perceived control of a situation.

In the first of a series of studies they had the subject become aware of his dart throwing performance at various distances from a target. The subject was then given the choice of few darts and a position close to the target or many darts and a position far from

the target. The results indicated that significantly more I's than E's chose a position where they had previously exhibited their greatest control.

In a second study Julian, et al., speculated that an I is more concerned with a skill situation than is an E. It was predicted that interfering with an internal's dart throwing would cause him to behave in a more frustrating manner than would an external under the same conditions.

Again the method was a dart game. However, in this version darts were thrown by blindfolded subjects while "frustrated" by verbal harassment.

The results indicated the E's rather than the predicted I's displayed a significantly greater amount of "frustrated" behavior. To explain why the results ran counter to their prediction, Julian, Lichtman and Ryckman referred to an experiment by Rotter and Mulry in 1965.

In 1965 Rotter and Mulry hypothesized an interaction between the I-E personality variable and the I-E task variable. They stated that the internally oriented individual should have greater value (and thus concern) for a skill-perceived task. Inversely, the externally oriented individual should have greater value (and thus concern) for a chance-perceived task.

For the time being it will be sufficient to state that they found some non-significant support for their hypothesis in their results.

Julian, Lichtman and Ryckman (1968) use this study to interpret their second dart experiment. They presumed that a dart game will usually be interpreted as a game of skill, but that the condition of

a blindfold changed the interpretation of the situation to that of chance. They state that under the condition of a blindfold, the dart throwing task became one of greater concern and value to E's rather than I's. Therefore, their second experiment resulted in a significantly greater amount of "frustrated" behavior for E's than I's.

Rotter and Mulry (1965) had speculated that an I and an E might differ in the value they placed on the same reinforcement. The value would vary as a function of whether the reinforcement was perceived as contingent upon chance or skill. They speculated that an I would place greater value on the outcome of a skill-perceived (S) than a chance-perceived situation. Barker (1946), and Lotsof (1956, 1958) had indicated that if reinforcement expectancy were held constant, the time required by a subject to choose between a matched pair of possible reinforcements would increase with the importance of the reinforcements. Therefore, Rotter and Mulry hypothesized that given a discrimination task, an I's decision time would be significantly greater in an S-perceived rather than a C-perceived task. Inversely E's would have greater value for and take longer to make choices in a C-perceived rather than an S-perceived task.

An angle matching task was devised and one half the I's and one half of the E's instructed that success at the task was contingent upon skill. The rest of the subjects were instructed that the task was chance contingent.

Reinforcement consisted of feedback on whether each preceding trial was "right" or "wrong." As in Phares' experiment, unbeknown to the subjects, reinforcement was predetermined and identical for all individuals.

Decision time for each trial was defined as that time elapsing from the signal for the subject to make the match to his actual response.

As predicted, it was the interaction of personality and task variables that achieved significance. A significant difference was found between the Is and Ic groups ($F = 6.667$, $df = \frac{1}{116}$, $p < .025$).

The decision time of I's participating in an S-perceived task was longer than the decision time of I's participating in a C-perceived task.

A significant difference was also found between the I's participation in an S-perceived task and E's participating in an S-perceived task.

Although the difference between the two E groups did not reach the level required for significance, it was in the predicted direction.

Paulson (1970) attempted to replicate the results of Rotter and Mulry as well as to explore the relationship of the I-E variable to arousal and frustration.

He speculated that if I's were more concerned or "motivated" in an S-perceived task, they, rather than E's, would show greater arousal in the acquisition phase of the task.

Subjects were placed in I, IE, and E groups based on the basis of their scores on the Dekalb Survey Inventory (James, 1957; $r = .60$ between the James and Rotter Scales).

His independent variables were sex (M, F), IE (E, IE, E) and task instructions (skill, chance). His dependent variables were measurements of arousal (pulse rate), frustration (Zaks and Walters Aggression Scale), and trials to extinction. Two different tasks were

utilized. One, the "Skye" apparatus, was described to the subjects as a task in which success was S-contingent. The subject participated in this task by pulling a string raising a block of wood on which a metal ball rested. Before each trial the subject was required to estimate the height to which he could raise the block without having the ball roll off.

The other task required a subject to guess whether a card to be flashed upon a screen would be marked by an "X" or an "O." Success at this task was defined to the subject as chance contingent.

Unknown to the subjects reinforcement had been pre-determined and was identical for all individuals.

Arousal was measured by a finger plethysmograph which Paulson described to the subjects as an instrument used to measure "concentration."

After a subject had been hooked up, instructions read to him, and a resting phase of two minutes had gone by, the subject was allowed to begin the task. After ten acquisition trials he was put into an extinction phase.

Paulson analyzed his data by an Analysis of Variance with a Covariant Adjustment. The "covariant" was the average amount of arousal during the "resting phase." A Duncan Multiple Range Test was used to analyze his adjusted means.

The results of pertinence to the present study supported a hypothesis that E's showed more arousal during a C-perceived task than do I's. His data also indicated that I's showed a non-significant greater arousal during acquisition of an S-perceived task than do E's.

Other Studies of I-E, Anxiety and Arousal

Butterfield (1964) reported significant correlations between

Rotter's Scale and the Alpert-Haber (1960) Achievement Anxiety Test. The correlation for the Debilitating Anxiety Segment of the scale was .61 with $p < .01$. The facilitating anxiety segment resulted in a correlation of -.82 with $p < .01$.

Watson (1967) attempted to replicate and add to Butterfield's findings. He administered the Rotter Scale, the Achievement Anxiety Test and Taylor Manifest Anxiety Test to 648 subjects.

His results indicated that the more E one appeared on the Rotter Scale, the greater the amount of anxiety one reported on the TMA and AAT debilitating scales.

Watson hypothesized that the subjects actual or perceived lack of control produces anxiety. The more E one was the less control he would perceive himself to have. This perceived lack of control in turn would produce greater anxiety in him than if he perceives himself in control of the situation.

Lefcourt and Ladwig (1965, 1966) in a study of his taking in Negro and white adults successfully predicted higher external-control expectancies among Negro rather than white prison inmates.

Negroes scored significantly higher in externality in the Rotter I-E Scale (1962), Dean's Powerless and Normalessness Scale (1961) and indices derived from performance on the Level of Aspiration Board. (Powerlessness refers to the lack of power to cause goals and is similar to Rotter's construct. Normalessness refers to the belief that conventionality is not an effective method to to achieve desired goals).

Lefcourt speculated that the Negro (external) seemed more highly

motivated to avoid failure in skill situations and more motivated to achieve success in chance situations.

Platt and Eisenman (1968) administered both the IE Scale and the Cornell Index, Form $N_2(23)$. The Cornell Index is a paper and pencil forced choice scale which measures anxiety levels. The results supported Platt and Eisenman's predictions. Internal subjects showed better adjustment and lower anxiety than did E's.

The results of t-tests were significant beyond the .05 level.

Bowers (1968) attempted to relate the I-E variable to physiolgical measures such as GSR and basal skin resistance. He speculated that the lack of perceived control over a stressor was an antecedent to anxiety. Of importance to the present study are the following facts. Half of his subjects were informed that a shock would be administered to them, but was avoidable under certain conditions. The other subjects were told the shock would be randomly administered. Upon the subjects' completion of the experiment, Bower asked them to fill out I-E forms and the Fenz Anxiety Scale (1967).

Unfortunately, the physiological data presented no clarifying results. He did find that a .39 correlation ($p < .05$) resulted between degree of E as measured by the I-E Scale and degree of anxiety as measured by the Fenz Anxiety Scale. He, therefore, speculated that anxiety may be produced by an interaction between the perception of no control and personality factors.

Summary and Statement of Problem

Lefcourt (1965, 1966) has speculated that E's tend to be apathetic and passive in S-perceived situations, but motivated toward

success in C-perceived situations.

Rotter and Mulry (1965) have examined the function of the interacting personality and task variables on decision time. Their results cause them to speculate that there is an interaction between these variables. More specifically, they indicate that an I will be more ego involved in an S-perceived task than a C-perceived task. Because of this his decision time will be greater in the S-perceived task. They predict the reverse for an E.

Watson (1967) found a significantly positive trend between the Taylor Manifest Anxiety Scale, the AAT Deb. and the Rotter I-E Scale. He, therefore, speculated that a positive relationship exists between one's degree of externality and one's degree of reported anxiety.

Platt and Eisenman (1968) report that the results of a Cornell Index and Rotter I-E administration indicate that both poorer adjustment and greater anxiety among E's than I's.

Bowers (1968) indicates that a Fenz Anxiety Scale and Rotter I-E administration resulted in a significant correlation between one's degree of externality and the degree of anxiety one reports.

Paulson (1970) was the only investigator to present a physiological measurement as evidence. His data indicated that E's participating in a C-perceived task showed greater finger pulse arousal than did I's participating in a C-perceived task.

With the exception of Paulson, successful investigators have used paper and pencil tests to probe the parameters or explore the functioning of the I-E variable.

This study will attempt to examine the functioning of the I-E

variable as reflected by physiological measures.

The independent variables of the present study are the personality dimensions (I-E) and the task dimensions (S-C) of the Internal and External Control variable. The dependent variables are those of blood pressure, pulse rate, respiration rate and reaction time.

Formulation of Hypotheses

Mandler, Mandler, Kremen and Sholitan (1961) have explored the possibilities of a relationship between one's report of anxiety and various physiological measurements. A correlation was found between verbal indices such as the TMAS and physiological measures such as respiration and blood pressure.

Kelly and Walter (1968) indicate that anxiety produces a decrease in skin blood flow.

Watson (1967) reported that a positive correlation existed between externals and anxiety. Platt and Eisenman (1968) and Bowers (1968) and others report that E's experience greater anxiety than do I's. If so, this greater anxiety should be reflected in E's as a lower blood pressure than in I's.

Hypothesis I.--The base and task blood pressure values of I's will be greater than the blood pressure values of E's.

According to Lacey (1956) the relationship of pulse rate and respiration rate to blood pressure is a mechanical one. However, the direction of the relationship is dependent on many factors (one person may hold their breath when anxious, but another may breathe faster). In hopes of finding some consistency, a non-directional

hypothesis will be made.

Hypothesis II.--The pulse rate and respiration rates of internals will be different from that of externals.

Rotter and Mulry (1965) presented results which indicated an interaction between personality and task variables as measured by decision time.

Hypothesis III.--The decision time of an I participating in an S-perceived task will be greater than that of an I in a C-perceived task.

Hypothesis IV.--The decision time of an I participating in an S-perceived task will be greater than that of an E in an S-perceived task.

Paulson's (1970) results indicated that an E participating in a C-perceived task would have a higher blood pressure value than an I in a C-perceived task.

Hypothesis V.--The blood pressure value of an E participating in a C-perceived task will be greater than that of an I participating in a C-perceived task.

If, as Rotter, Mulry and Paulson suggest, the personality and task variables do interact they should be different from each other as measured by blood pressure, pulse rate, respiration and decision times.

Hypothesis VI.--The blood pressure, pulse rate and respiration rate of the I's participating in a S-perceived task will be different

from that of an I participating in a C-perceived task.

Hypothesis VII.--The blood pressure, pulse rate and respiration rate of an I participating in an S-perceived task will be different from that of an E participating in an S-perceived task.

Hypothesis VIII.--The pulse rate, respiration rate and decision time of an E participating in a C-perceived task will be different from that of an I participating in a C-perceived task.

Hypothesis IX.--The blood pressure, pulse rate, respiration rate and decision time of an internal in an S-perceived task will be different from that of an E in a C-perceived task.

Hypothesis X.--The blood pressure, pulse rate, respiration rate and decision time of an I in a C-perceived task will be different from that of an E in an S-perceived task.

Hypothesis XI.--The blood pressure, respiration rate and decision time of an I in a C-perceived task will be different from that of an E participating in a C-perceived task.

CHAPTER II

METHODOLOGY

Selection of Subjects

The subjects were 67 male students. They were volunteers from the Educational Psychology and Introduction to Psychology courses during the 1970-71 spring semester at the University of North Dakota. This experiment partially fulfilled a course requirement for them.

All subjects had taken the Rotter I-E test during one of their first class sessions. Their scores were used as a basis for pre-selection. The internal subjects were 32; those who scored at or below 4. The E's were those students who had scored at or above 12. As an appointment was made for each subject, he was randomly assigned to either a S/C or C/S set of conditions.

Due to machine malfunctions, the data for only 60 subjects was found to be usable.

Stimuli

Previous I-E studies have used one of two approaches in regard to stimuli. One approach is that used by Rotter and Mulry. One set of stimuli was used with all subjects and instructions attempted to manipulate whether the stimuli was S-perceived or C-perceived.

The second method is that used by Paulson. He used two completely different sets of stimuli. Different instructions aided his manipulating whether a subject perceived the situation as S or C

controlled.

In the present study one set of stimuli were used. They were adapted from the Phares (1957) line matching task. They consisted of ten 3" x 5" cards mounted at varying angles on a sheet of brown illustration board and a set of ten 2" x 2½" white cards.

On each 3" x 5" white card were ½" strips of black tape. The tape ranged in length from 1" to 2-1/8" in length. The difference in length between any two adjacent strips was 1/8". Ten strips of tape of a color other than black were mounted at varying angles on the 2" x 2½" cards to its mate on the illustration board.

During the S-perceived segment E held the taped side of each 2" x 2½" white card visible to subject.

During the C-perceived segment E held the blank side of each 2" x 2½" white card visible to subject.

The Physiological Measurements

Weinman (Venables, 1967) indicates that the functioning of the cardiovascular system is strongly influenced by "mental" processes. A part of the cardiovascular parameters most strongly influenced is the blood volume and volume pulse of the peripheral vascular vessels. Changes in these vessels lend themselves quite readily to observation due to the accessibility to the peripheral vascular bed.

Lindsley (1951) indicates that changes in blood pressure is one of the best indicators of changes which occur through the sympathetic nervous system in such states as rage, fear, pain or excitement.

The plethysmograph is an instrument that enables one to measure the blood volume variation in a limb. With the use of a

plethysmograph on the hand and forearm, Abrahamson and Ferris (1940) observed that "mental" arithmetic caused a marked vasoconstrictions of the blood vessels.

Burch (1948) presents some results of his use of a finger type of plethysmograph. They indicate that a marked variation in volume was observed in response to unpleasant thoughts.

Weinmann (1967) indicates that the most efficient plethysmograph is a photoplethysmograph; the type used in the present study. The transducer utilized consists of a light source and photodetector. They lie side by side facing the investigated tissue. The changing volume of blood causes a change in light intensity. The greater the volume of blood present the less light will be picked up by the photodetector. As the blood volume decreases, the greater the amount of light registered by the photodetector. Thus, the plethysmograph detects a cardiovascular pressure wave and indirectly monitors heart rate.

Lindsley (1951) and Guyton (1969) indicate that change in the respiratory cycle are prominent in "emotional" conditions such as startle, fright, attempts at deception and states of conflict and anxiety.

Respiration in this study was measured by the method of impedence change. This is the method of measuring alternation in the conducting path between a pair of electrodes placed on the chest. As air is drawn into the lungs, the conductivity to the passage of current is reduced. The transducers were an impedance pneumograph and its electrodes.

A Fels zinc sulfate electrode paste was used to facilitate

electrode contact along a mid-auxillary line about the level of the sixth pair of ribs. A low intensity 50 kilocycle per second current was passed through the subject and fluctuation reflected volume changes independent of electrode resistance over a large area. These fluctuations were processed and converted to a variable signal recorded by the physiograph.

The recording instrument used in this study was the E and M Physiograph "Four." This is a commercial electronic polygraph which allows a maximum of four channels to operate simultaneously. For the purpose of the present study three of its channels were used to measure blood pressure, respiration and time. Further information regarding the impedance pneumograph and pulse pickup can be found in Appendix.

Quantifying the Physiological Data

The graph paper on which the recordings were made was divided into segments at every tenth block. The pulse waves which fell upon these lines constituted a random sample for each subject. Diastolic and systolic measures were taken for rest and task periods then converted to ratios by means of the following expression (Campbell and Church, 1969):

$$\text{Blood Pressure} = \frac{\text{Systolic}}{\text{Diastolic} + \text{Systolic}}.$$

Pulse rates for each subject was the result of taking an average of wave peaks for each task and for each rest period.

Respiratory rates were established by taking an average of respiratory waves for each task and for each rest period.

Decision time latencies were summed per subject for each task.

A per subject per segment mean was then calculated.

Blood pressure, pulse rate and respiration values are adjusted scores. They have been adjusted to eliminate the biasing effect of events preceding a given task. These scores have been adjusted by subtracting the preceding rest score from a task score.

Procedure

All Psychology and Educational Psychology students were asked to fill out the Rotter I-E form at the beginning of the semester. About a month afterward, the chosen subjects were contacted by phone. They were informed that the experimenter (E) was doing a study. Only three of the subjects wanted to know the nature of the study. They were informed that it had to do with visual tasks. All subjects were told they had been chosen at random from a master list of psychology students.

If they were willing to participate, an arrangement was made regarding place and time of meeting.

All subjects were tested in about a ten week period. A typical day's schedule consisted of six I's and six E's under counterbalanced conditions.

Upon each subject's arrival, he was told that the study was investigating physiological correlates of operating under S and C conditions, shown how the polygraph operated and informed of its painless nature. The subject was then seated in front of the polygraph and the transducers attached. Within ten minutes after the subject had entered the room, a satisfactory base rate was achieved.

Because each subject participated in a skill and chance task

so as to be his own control, tasks were counterbalanced. It was also felt by the experimenter that if the speculated I-E task interaction existed, it would be accented by having the same subject participate in an S and C task at the same sitting.

The following instructions were read preceding the S-task.

Skill.--"This is a test of your discriminatory ability. On this board are ten lines: A, B, C, D, E, and so forth. In a moment you will be shown ten shuffled cards, one at a time. As I show you a card, I will call out, 'Now.' Your job will be to take as much time as you need to make a skillful decision as to which length of line the card matches and to call it out. You will be winning or losing under skill conditions. This may be a fairly difficult job, but some people do very well. So take as much time as you need to use all of your skill before each decision. Once we begin, we will not be able to answer any questions; so do you have any questions before we begin?"

The following instructions were read preceding the C-task.

Chance.--"This is a test of your luck or chance, much like playing a roulette game. On this board are ten lines: A, B, C, and so forth. In a moment, you will be shown ten shuffled cards, one at a time, but each will be hidden behind my hand. As I hold up my hand, I will call out, 'Now.' Your job will be to take as much time as you need to guess which length of line it matches and then call it out. You will be winning or losing under chance conditions. Past research has shown that some people do surprisingly well, so take as much time as you need on each card. Once we begin we will not be able to answer any questions, so do you have any questions before we begin?"

As E spoke, he shuffled the cards and indicated how they would

be held for subject to view them. If there were no questions, the first task was begun.

After the first task was completed, the subject was told to relax while a scond base line was taken. Upon completion of the second task, the subject was asked to relax while a third base line was taken.

Reinforcement was given after each trial by E saying, "Right" or "Wrong." Unknown to the subjects, reinforcement had been predetermined and was identical for all individuals.

The random arrangement of reinforcements were as follows:

1	2	3	4	5	6	7	8	9	10
-	+	-	-	+	+	+	-	-	+.

The time elapsed from the subjects response to the presentation of the next card was ten seconds. The time consumed by the S-task was about five minutes. The time consumed by the C-task was usually much less.

After completing the third rest phase, the subject was informed that the experiment was over. The transducers were removed and he was shown to another room.

Post-Experiment Questionnaire

After completing the experiment, the subject was taken into another room and asked to complete a post-experiment questionnaire (see Appendix). The subject was told that when done he could leave by a side door. The questionnaire items were designed to gather information pertaining to the following questions:

1. Does the attitude of the subject toward his completed task

behavior agree with the I-E category assigned him by his score on the Rotter Scale?

2. Are the tasks experimentally defined as skill and chance perceived as such by the subjects?
3. To what extent were the subjects aware of the actual purpose of the experiment?
4. To what extent would a self report of discomfort relate to any of the physiological measures?

The questionnaire was picked up before the arrival of the next subject.

CHAPTER III

RESULTS

Validation of Task Perception

As part of the post-experiment questionnaire all subjects were asked to indicate the per cent of skill one needed to be 100 per cent successful on the skill task and the per cent of luck needed for one to be 100 per cent successful on the chance task (see Appendix).

The mean per cent of skill indicated by subjects for one to be 100 per cent successful in the skill task was 76.7. The mean per cent of luck indicated as needed for 100 per cent success on the chance task was 72.3. This indicates that subjects perceived the skill task to require a great deal of skill for success and the chance task to require a great deal of chance for success. This would further indicate that the task labeled skill by E was perceived as a skill task by subjects and that the task labeled chance by E was perceived as a chance task by subjects.

Another questionnaire item asked each subject to indicate whether he felt he did best in the S or C task.

Thirty I's and 28 E's replied to this item. Of the thirty I's, twelve said they did best when participating in the C task. Eighteen of the thirty indicated that they did best under the S task.

Of the 28 E's that replied to this item, 23 indicated that they did best when participating in the C task and five indicated that they

did best when participating in the S task.

The result of a Chi-Square test of these frequencies was 8.729. This exceeds the 3.841 Chi-Square required for significance at the .01 level.

Reinforcement, as operationally defined in the method section, was identical for all subjects for all tasks. However, a significantly greater number of I's felt they "did best" under the skill situation than under the chance situation, while a significantly greater number of E's felt they "did best" under the chance situation rather than the skill situation.

These results indicate that a significant number of subjects belonged in the catagories assigned them by Rotter's I-E Scale.

Results of Variable Manipulation

The dependent variables in this study were measures of blood pressure, pulse rate, respiration rate and decision time. To eliminate any possible pre-task influence, physiological scores for each task were adjusted. Each score was adjusted by subtracting the immediately preceding rest measure. The resulting difference scores were used in analysis of variance computations and Duncan Multiple Range tests. Each subject participated in both a S-perceived and a C-perceived task. Data regarding order of presentation became available as supplementary information.

The General Design

A three-way analysis of variance (Winer, 1962) was used to test the group differences. Each of the three factors had two levels:

1. Subjects: Internal and External
2. Task: Skill and Chance
3. Order: Skill first and Chance first.

Preceding the analysis it was decided that the rejection of the null hypothesis would be based on the .05 level of significance.

This design was used to determine the effect of the Independent Variables of Personality (I-E), task (skill and chance) and order (S/C or C/S) upon the dependent variables of blood pressure, pulse rate, respiration rate and reaction time.

Blood Pressure Rest Phases

A one-way analysis of variance was run for each blood pressure rest phase. None of the tests result in a figure which reaches that required for the .05 level of significance.

Task Blood Pressure Results

Table 1 contains the means and standard deviations derived from task blood pressure score values adjusted as described earlier. The analysis of variance for subjects and tasks at all levels of order is also summarized in Table 1.

Table 1 reveals that:

1. A combination of personality variable, task variable and order variable produced an interaction significant at the .05 level. This interaction is pictorially described in Figures 1 and 2. Because a significant interaction requires interpretation across all levels a Duncan Multiple Range Test (Edwards, 1968) was run. The results of this test are presented in Table 2.

TABLE 1

MEANS AND STANDARD DEVIATION VALUES FOR BLOOD PRESSURE RATE DURING TWO TASKS AT ALL LEVELS OF ORDER

	Personality Orientation							
	Internal				External			
	TASK							
	Skill		Chance		Skill		Chance	
	ORDER							
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Mean	0.967	.992	1.003	1.189	1.017	.998	1.023	1.005
Standard Deviation	.108	.119	.156	.260	.076	.101	.083	.123

SUMMARY OF THE ANALYSIS OF VARIANCE

Analysis of Variance for Means of Blood Pressure Values During Two Tasks at all Levels of Order for I-E S's

	Sources of Variation	S. S.	df	MS	F
A	S's (I-E)	.023	1	.023	1.18
B	Task (S or C)	.109	1	.109	5.64*
C	Order (S/C or C/S)	.071	1	.071	3.67
AB	I-E x Task	.088	1	.088	4.52*
AC	I-E x Order	.027	1	.027	1.38
BC	Task x Order	.085	1	.085	4.38*
ABC	FE x Task x Order	.085	1	.085	4.36
Error (within)		2.181	112	.019	
Total		2.671	119	.022	

*$p < .05$

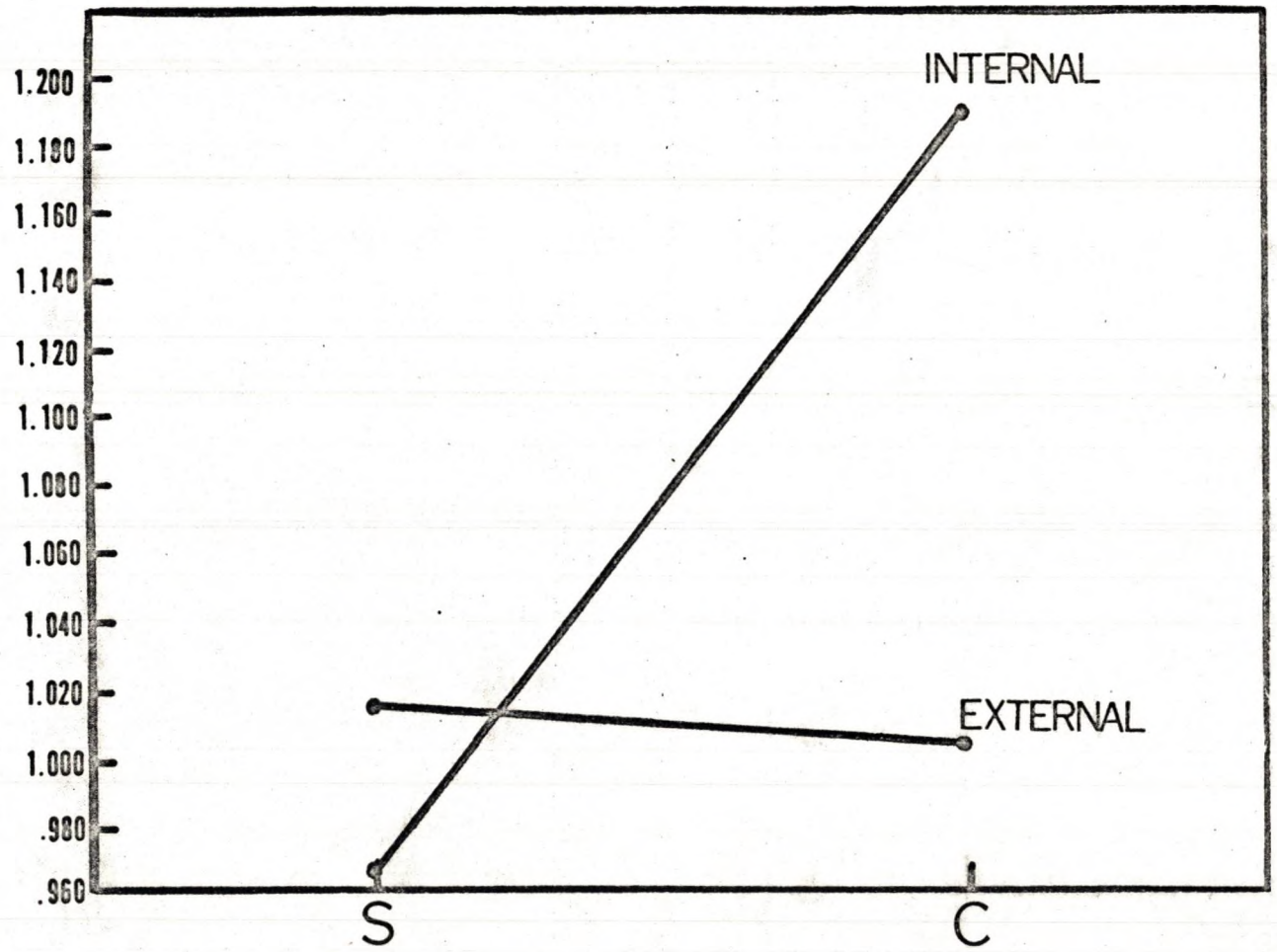


Fig. 1.--Interaction of I-E skill-chance under the skill-chance order of presentation for blood pressure

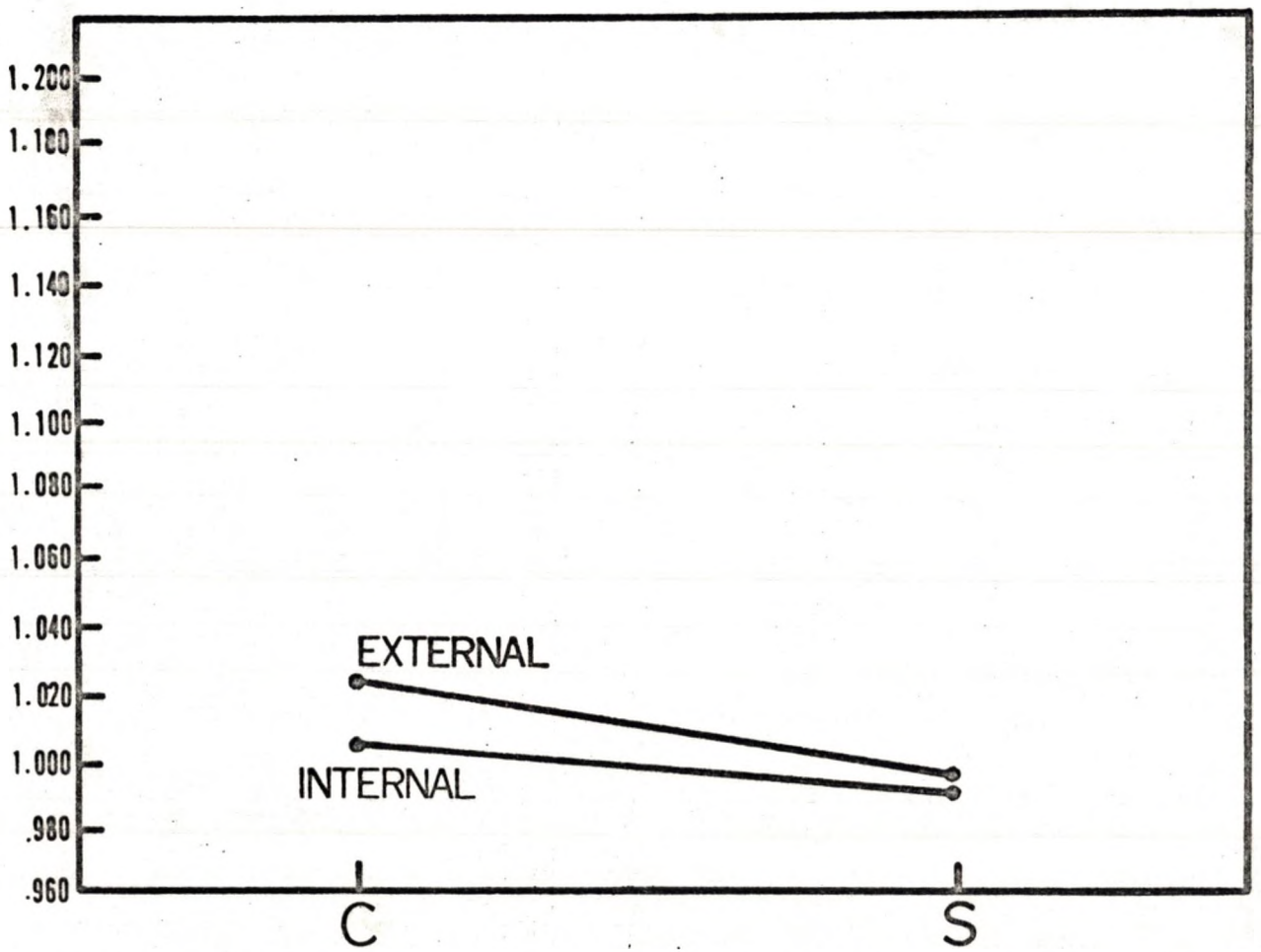


Fig. 2.--Interaction of I-E by skill-chance under the chance-skill order of presentation for blood pressure

TABLE 2

DUNCAN'S MULTIPLE RANGE TEST APPLIED TO THE DIFFERENCES BETWEEN k = 8 TREATMENT MEANS REPRESENTING PERSONALITY BY TASK BY ORDER FOR BLOOD PRESSURE RESULTS

Means		ISs/c .967	ISc/s .922	ESc/s .998	ICc/s 1.003	ECs/c 1.005	ESs/c 1.017	ECc/s 1.023	ICs/c 1.189	
ISs/c	.967	x	.025	.031	.036	.038	.050	.056	.222	R_2=.0944
ISc/s	.992		x	.006	.011	.013	.025	.031	.197	R_3=.1047
ESc/s	.998			x	.005	.007	.019	.025	.191	R_4=.1081
ICc/s	1.003				x	.002	.014	.020	.186	R_5=.1106
ECs/c	1.005					x	.012	.018	.184	R_6=.1126
ESs/c	1.017						x	.006	.172	R_7=.1142
ECc/s	1.023							x	.166	R_8=.1155
ICs/c	1.189								x	

ISs/c, ISc/s, ESc/s, ICc/s, ECs/c, ESs/c, ECc/s, ICs/c

Any two treatment means not underscored by the same line are significantly different.

Any two treatment means underscored by the same line are not significantly different.

The mean blood pressure value for I's participating in a C task during S/C order was 1.189. The obtained differences between this group and each of the other groups exceeds the difference required for the .05 level of significance by the Duncan. The results indicate that the significant three-way interaction is due to the IC C/S group.

2. A combination of task variable and order of presentation produced a two-way interaction significant at the .05 level. This significant interaction is pictured in Figure 3.
3. A combination of the personality variable and the task variable produced a two-way interaction significant at the .05 level. This is pictured in Figure 4.
4. As task varied, a difference in blood pressure occurred which is significant at the .05 level.
5. There was no significant interaction between the personality variable and the order variable.
6. As the personality variable varied, blood pressure did not vary significantly.
7. The various levels of order resulted in an F of 3.67. This does not reach the F of 3.94 required for the .05 level of significance.

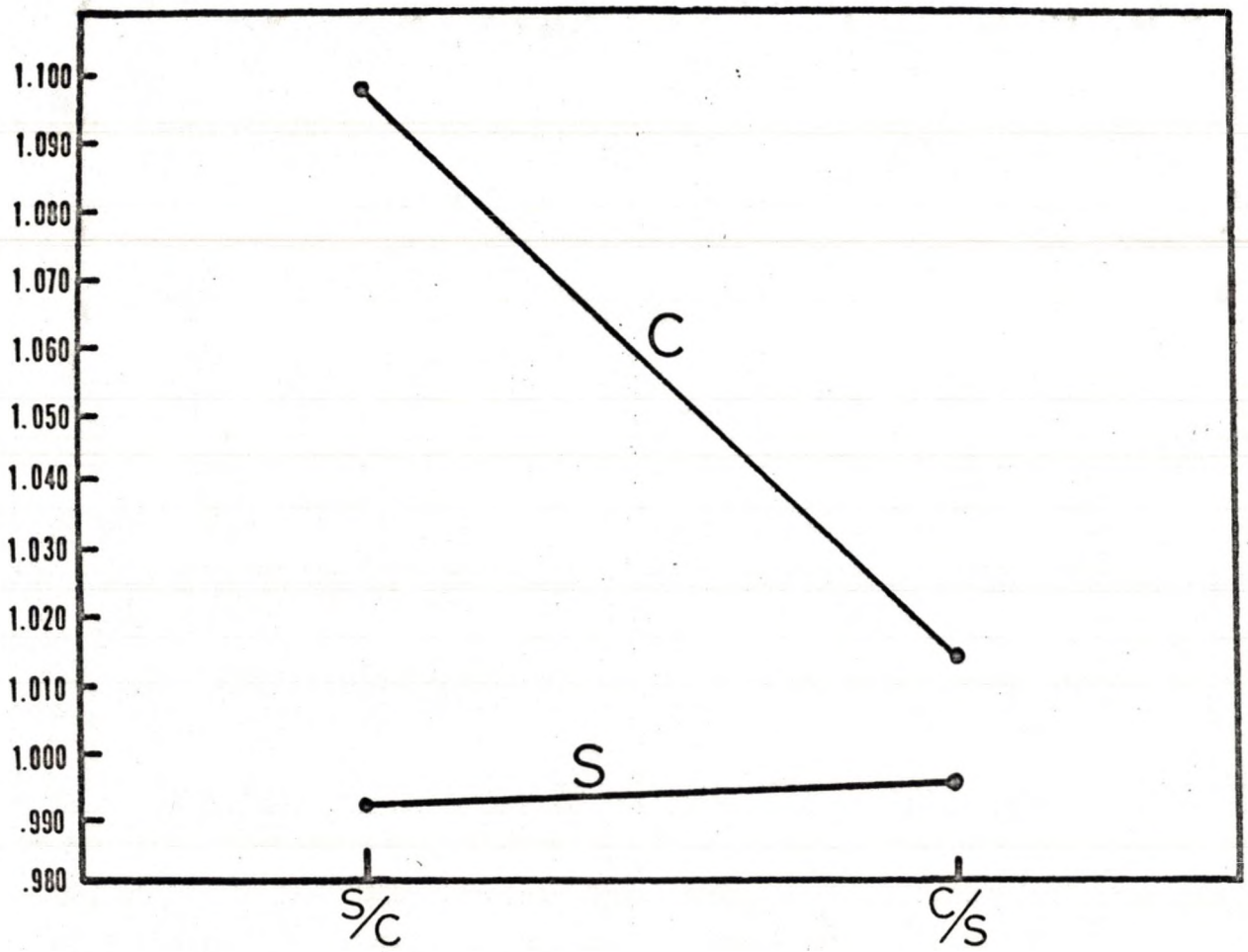


Fig. 3.--Interaction of task by order for blood pressure

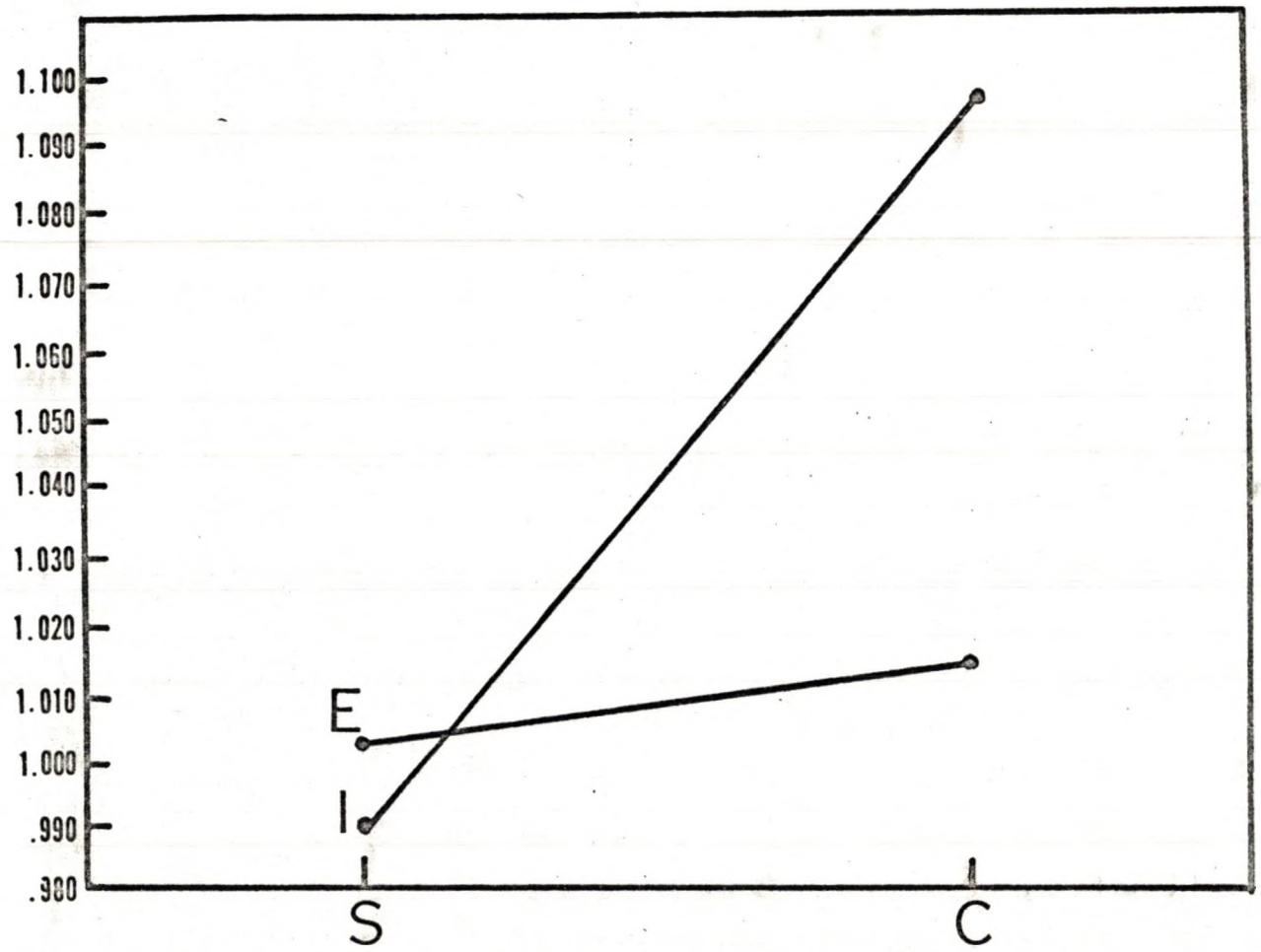


Fig. 4.--Interaction of personality variable by task for blood pressure

Outcome of Hypotheses in Relation to Blood Pressure Analysis

Hypothesis I.--The base and task blood pressure values of I's will be greater than the blood pressure values of E's.

None of the tests applied to the blood pressure rest phase values reached a figure significant at the .05 level. The analysis of variance applied to the task blood pressure values resulted in an F of 1.18 for the personality variable. An F of 3.94 is required for significance at the .05 level. Therefore, the null hypothesis cannot be rejected for this hypothesis.

Hypothesis V.--The blood pressure of the E participating in a C task will be greater than that of an I participating in a C task.

The interaction of the personality variable and task variable was examined by a Duncan Multiple Range Test. Table 3 shows the results.

The mean of the EC group was 1.014. The mean of the IC group was 1.096. The 0.082 difference between them does not reach the 0.1081 difference required by the Duncan Multiple Range Test for significance at the .05 level.

Hypothesis VI.-- Blood pressure of internal subjects participating in a skill task will be greater than blood pressure of internals participating in a chance task.

The interaction of the personality variable and task variable was examined by a Duncan Multiple Range Test (Table 3).

The mean of the internal group participating in a skill task was 9.79. The mean of the internal group participating in a chance task is 1.096. The 0.117 difference between these two means exceeds the 0.0994 difference required for significance at the .05 level by the Duncan.

TABLE 3

DUNCAN'S NEW MULTIPLE RANGE TEST APPLIED TO THE DIFFERENCES BETWEEN k = 8 TREATMENT MEANS REPRESENTING PERSONALITY BY TASK VARIABLES

	Is 9.79	Es 1.007	Ec 1.014	Ic 1.096	
IS 9.79	x	.028	.035	0.117	R_2 .0994
ES 1.007		x	.007	0.089	R_3 .1047
EC 1.014			x	0.082	R_4 .1081
IC 1.096				x	

Is, Es, Ec, Ic

Any two treatment means not underscored by the same line are significantly different.

Any two treatment means underscored by the same line are not significantly different.

Hypothesis VII.--The blood pressure, pulse rate and respiration rate of an I participating in an S-perceived task will be different from that of an E participating in an S-perceived task.

Hypothesis IX.--The blood pressure, pulse rate, respiration rate and decision time of an internal in an S-perceived task will be different from that of an E in a C-perceived task.

Hypothesis X.--The blood pressure, pulse rate, respiration rate and decision time of an I in a C-perceived task will be different from that of an E in an S-perceived task.

Hypothesis XI.--The blood pressure, respiration rate and decision time of an I in a C-perceived task will be different from that of an E participating in a C-perceived task.

Of the groups considered in Hypotheses VI through XI, Table 3 indicates that the greatest difference occurs between the EC and IC groups. However, the .089 difference does not exceed the 0.1047 difference required by the Duncan for significance at the .05 level.

Investigation of the Order of Presentation Factor

The internal chance groups were presented with both a skill-chance task order and a chance-skill task order.

The Duncan Multiple Range Test (Table 2) applied to all groups of the three-way Analysis of Variance. It requires a difference of 0.1106 between the ICs/c and ICc/s groups for significance at the .05 level.

The adjusted mean of the ICs/c group was 1.189. The adjusted mean of the ICc/s group was 1.003. The difference between the ICs/c

and ICc/s groups exceeds that needs for significance at the .05 level by the Duncan.

Table 2 also indicates that the difference between the ICs/c group and each of the other groups also exceeds that required for significance at the .05 level by the Duncan.

Pulse Rate Results

Pulse Rate Rest Phase.--A one-way analysis of variance was run for each base pulse rate rest phase score. None of these tests resulted in a figure which reaches that required for the .05 level of significance.

Task Pulse Rate Results.--Table 4 contains the means and standard deviations derived from the adjusted pulse rate values. The analysis of variance for subjects and tasks at all levels of order is also summarized in Table 4. This analysis of variance summary table reveals that the largest F ratio of .6413 was for order by task by personality variables. However, it did not meet the 3.94 F required to reach the .05 level of significance.

Outcome of Hypotheses in Relation to Pulse Rate.--The analysis of pulse rate data did not warrant rejection of the null hypothesis for any of the research hypotheses. On all measures of all hypotheses regarding the pulse rate variable, there were no results which were significant.

TABLE 4

MEANS AND STANDARD DEVIATION VALUES FOR PULSE RATE DURING TWO TASKS AT ALL LEVELS OF ORDER

	Personality Orientation							
	Internal				External			
	TASK							
	Skill		Chance		Skill		Chance	
	ORDER							
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Mean	.044	.059	.043	.074	.038	.036	.056	.021
Standard Deviation	.240	.085	.188	.132	.093	.097	.126	.097

SUMMARY OF ANALYSIS OF VARIANCE

Analysis of Variance for Mean Adjusted Pulse Rate Values During Two Tasks at all Levels of Order

	Sources of Variance	S. S.	df	MS	F
A	Order	.0005	1	.0005	.025
B	I-E	.0087	1	.0087	.436
C	Task	.0006	1	.0006	.030
AB	Order x I-E	.0046	1	.0046	.230
AC	Order x Task	.0001	1	.0001	.007
BC	I-E x Task	.0002	1	.0002	.012
ABC	Order x Task x I-E	.0128	1	.0128	.6413
Error within		2.2521	112	.0201	

Respiration Rate Results

Respiration Rate Rest Phases.--A one-way analysis of variance was run for each respiration rate rest phase score. None of these tests resulted in a figure which reaches that required for the .05 level of significance.

Task Respiration Rate.--Table 5 contains the means and standard deviations derived from adjusted respiration rate scores. The analysis of variance for subjects and tasks at all levels of order is also summarized in Table 5. The ANOVA summary table reveals that:

1. None of the interaction resulted in an F as high as that required for significance at the .05 level.
2. Of the individual factors, only the personality variable has resulted in an F which is as high as that required for the .05 level of significance. The analysis of the personality variable has resulted in an F of 5.214. This is above the 3.94 F required for the .05 level of significance.

Outcome of Hypotheses in Relation to Respiration Rate.--Hypothesis II states that the respiration rate of internals will be different than that of externals.

Table 5 reveals that an analysis of the personality variable results in an F of 5.214. This is above the 3.94 F required for the .05 level of significance.

Hypotheses VI, VII, VIII, IX, X, and XI deal with a speculated interaction of the personality and task variables. The combination of personality variable and task variable achieved an F of 0.609. This does not reach the 3.94 F required at the .05 level of significance.

TABLE 5

MEANS AND STANDARD DEVIATION VALUES FOR RESPIRATION RATE FOR I-E's DURING TWO TASKS AT ALL LEVELS OF ORDER

	Personality Orientation							
	Internal				External			
TASK	Skill		Chance		Skill		Chance	
ORDER	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Mean	.040	.017	.017	.032	.046	.038	.061	.043
Standard Deviation	.060	.040	.056	.048	.038	.065	.040	.047

SUMMARY OF ANALYSIS OF VARIANCE

Analysis of Variance for Mean Adjusted Respiration Rate Values for I-E's During Two Tasks at all Levels of Order

	Sources of Variance	S. S.	df	MS	F
A	Order of Presentation	.0014	1	.0014	.559
B	Personality Variable	.0131	1	.0131	5.214*
C	Task	.0002	1	.00023	.0923
AxB	Order x I-E	.0045	1	.0045	1.8080
AxC	Order x Task	.0022	1	.0022	.9055
BxC	I-E x Task	.0015	1	.00153	.6093
AxBxC	Order x I-E x Task	.0006	1	.00062	.2467
Error		.2819	112	.0025	

*$p < .05$

The analysis of respiration rate data does not warrant rejection of the null hypothesis for any of these research hypotheses. There were no significant results on any measures of the above hypotheses.

Decision Time

Table 6 contains the means and standard deviations derived from decision time scores. Table 6 also contains a summary of the analysis of variance of the decision time scores under the factors of personality, task and order. The table indicates the largest F ratio of 15.643 to be the result of the task factor. This F is larger than the 3.94 F required for significance at the .05 level. However, it may be an artifact of methodology.

The skill task consisted of matching a visible line to one of a number of other lines. One way of accomplishing this would be to compare a given line to each of the other lines. It would require an amount of time for a subject to look back at the standard each time as he compared it to another line.

The chance task required the subject to match a line hidden by E's hand to the same group of lines. Since there was no visible standard, a subject might rapidly glance over the visible lines while imagining the non-visible line.

Because of this possibility, the significant F ratio of the task factor must be discounted.

Outcome of Hypotheses in Relation to Decision Time.--Hypotheses III, IV, VIII, IX, X, AND XI deal with a speculated interaction of the personality and task variables. The significant findings in relation to these hypotheses indicate that those in certain skill

TABLE 6

MEAN AND STANDARD DEVIATION VALUES FOR DECISION TIMES FOR I-E's DURING TWO TASKS AT ALL LEVELS OF ORDER

	Personality Orientation							
	Internal				External			
	TASK							
	Skill		Chance		Skill		Chance	
	ORDER							
	1st	2nd	1st	2nd	1st	2nd	1st	2nd
Mean	8.66	12.07	4.20	4.05	9.97	10.97	6.21	4.79
Standard Deviation	5.28	14.69	2.23	4.43	5.85	9.99	8.28	3.23

SUMMARY OF ANALYSIS OF VARIANCE

Analysis of Variance for Mean Reaction Time Values During Two Tasks at all Levels of Order for I-E Subjects

	Source of Variance	S. S.	df	MS	F
A	Order	66.902	1	66.902	1.111
B	Personality Variable	16.574	1	16.574	.275
C	Task	941.918	1	941.918	15.643*
AxB	Order x I-E	2.414	1	2.414	0.040
AxC	Order x Task	15.121	1	15.121	0.251
BxC	I-E x Task	12.039	1	12.039	0.199
AxBxC	Order x I-E x Task	25.382	1	25.382	0.421
Error		6743.938	112	60.213	

*$p < .05$

groups took longer task times than those in certain chance groups. These significant findings should be discounted. They may be due to an artifact of methodology as described above.

CHAPTER IV

SUMMARY AND DISCUSSION

The present study was designed to assess whether I-E and task variable manipulation would be reflected in physiological and decision time measurements. The specific dependent variables chosen were blood pressure, pulse rate, respiration rate, and decision time.

Past evidence suggests that E's are more anxious than I's, and that anxiety is reflected by a decrease in blood pressure. Evidence also points to the possibility that measures of respiration, pulse rate and decision time are also affected by I-E and task manipulation although not necessarily in a manner correlated with blood pressure.

Table 7 summarizes the hypotheses and their outcomes.

The subjects were 60 male students at the University of North Dakota who were preselected by means of their scores on the Rotter I-E Control Scale. The I's were those who scored at or below four. The E's were those who scored at or above twelve. All subjects volunteered in order to gain needed experimental credit.

Each subject served as his own control by participating in both an S-perceived and C-perceived task. It was also felt that if the speculated I-E task interaction existed, it would be accented by having the same subject participate in both an S and C task at the

same sitting. The tasks were adapted from a line matching task used by Phares (1957). The S-perceived task required each subject to match a visible line to one on a group of lines. The C-perceived task repeated the procedure except that the standard line was now hidden by E's hand.

The dependent variables of blood pressure, pulse rate, respiration rate and decision time were recorded by an "E and M" polygraph.

The results shown in Table 7 indicate that only four of the hypotheses were substantiated. These results indicated that:

1. The respiration rate of I's was found to be greater than that of the E's.

   Watson (1967) and others have indicated that E's report greater anxiety on pencil and paper tests.

   Lindsley (1951), Guyton (1969) an others indicate that changes in the respiratory cycle are prominent in "emotional" conditions such as startle, fright, attempts at deception and states of conflict and anxiety. However, in no instance is evidence presented regarding a consistent directional prediction such as the result indicating the respiration rate of the I's as greater than the respiration rate of the E's.

   If it is accepted that the above conditions are correlated with an increase in respiration rate, then we may say that the increased difference of E's respiration rate may reflect one or more of the above conditions. However, it is felt that a great deal of further study should be made of the factors involved before any such conclusion can be made.

TABLE 7

HYPOTHESES AND RESULTS

Hypothesis		BP[1]	PR[2]	RR[3]	DT[4]	Base[5]
I	I > E	*				*
II	I ≠ E		*	*S(E>I)	*	*
III	IS > IC				*S	
IV	IS > ES				*	
V	EC > IC	*	*			
VI	IS ≠ IC	*S(IC>IS)	*	*		
VII	IS ≠ ES	*	*	*		
VIII	EC ≠ IC		*	*	*	
IX	IS ≠ EC	*	*	*	*	
X	IC ≠ ES	*	*	*	*S(ES>IC)	
XI	IC ≠ EC	*	*	*	*	

*This dependent variable is of concern to the accompanying hypothesis.

1. BP : Blood Pressure

2. PR : Pulse Rate

3. RR : Respiration Rate

4. DT : Decision Time

5. Base: Base Rest Phases

S: The results for this hypothesis has reached the level required for significance.

2. The blood pressure of the IC group was found to be greater than that of the IS group.

The second result indicates that the blood pressure of the IC group was found to be greater than that of the IS group.

Kelly and Walter (1968) reported results which indicated that anxiety produces a decrease in skin blood flow. Rotter, Mulry, Paulson and others have speculated an interaction between the task and personality variables which would have the I's more concerned in an S-perceived task than in a C-perceived task. The second result above indicates that the blood pressure of the IC group was found to be greater than that of the IS group. This is consistent with the speculations of Rotter, Mulry, Paulson and others combined with the findings of Kelly and Walter.

3. The decision time of the IS group was found to be longer than that of the IC group.
4. The decision time of the ES group was found to be longer than that of the IC group.

Outcomes 3 and 4 may be an artifact of methodology. The skill task consisted of matching a visible line to one of a number of other lines. A subject might look back to the standard as be compared it to each line of the group. If so, this would require more time than same subject in the chance task who rapidly glanced over the group while imagining the hidden line. Because of this possibility the significant outcomes numbered 3 and 4 must be discounted.

An analysis of the post-experimental questionnaire completed

by each subject indicated that the tasks labeled skill and chance by E were so perceived.

The results also indicated that most subjects categorized by the Rotter Scale as E's felt they had done better on the C-perceived task rather than the S-perceived task, and most subjects categorized by the Rotter Scale as I's felt they had done better on the S-perceived task than on the C-perceived task.

Unknown to any subjects reinforcement had been pre-determined and identical for all individuals under all conditions. This result suggests that an S-perceived situation is also perceived as the locus of greater probability for reinforcement by an I as opposed to a C-perceived situation. It also suggests that inversely, the C-perceived situation would be considered as the locus of greater probability of reinforcement by an E rather than an S-perceived situation.

This result is also consistent with the speculation of Rotter, Mulry and Paulson that there is an interaction between the task variable and personality variable.

Rotter, for example, speculates that I's would tend to select activities in which they can demonstrate skill, while E's tend to select those activities in which they can demonstrate luck. Perhaps the explanation for such choices is that the I perceives the probability of gaining greater reinforcement for him lies in the skill situation and the E perceives that the probability of his gaining greater reinforcement lies in the chance or luck situation.

The Physiological Hypotheses

Only two of the hypotheses pertaining to physiological measures

were significant. One reason may be due to the short length of time spent on a task. About five minutes may have been spent by each subject on the skill task and about one minute was spent by each subject on the chance task.

Malmo (1962) indicates that activation is a phenomenon of slow change. Although physiological measures can reflect this dimension, the time element may extend into minutes or hours. Perhaps this is why the most successful experimental studies regarding the I-E variable have been in regard to persistence time. In a persistence study the subject participates in a condition which lasts a minimum of many minutes.

A subjective observation made by E during the experiment was that most subjects utilized some sort of guessing strategy in the C-tasks. For example, a subject might initiate guesses of lines that were located at one extreme side of the board and work toward the center. Another subject might begin with lines located at all sides of the board and work inward. In effect, the task labeled luck was being attacked with a "skillful" approach. Perhaps this strategy disappears in a task of much greater length. Perhaps in a persistence task, a sufficient amount of time passes for both a change to a truly random strategy and a change in activation level to occur.

The negative results indicated may also have occurred because of the type of measures utilized. Mandler (1958) has indicated greater success at establishing "emotional" indices with measures of muscle tension.

Although few of the hypotheses have resulted in significant evidence, the importance of this study lies in its attempt to explore

various physiological measures in hopes of gaining further knowledge of the I-E parameters.

APPENDIX

Please print your name _____

Please answer the following questions. Use the back of the paper if additional space is needed.

1. I think I did best during the skill / chance segment (circle one).

2. Indicate with an X the amount of skill a person needs to be 100% successful on the skill task:

0% 25% 75% 100%

3. Indicate with an X the amount of luck a person needs to be 100% successful on the chance task:

0% 25% 75% 100%

4. Please explain in your own words what you believe to be the purpose of this experiment.

5. In what way do you feel the experiment was successful or unsuccessful?

6. Did you feel excited, anxious, upset or uncomfortable during the experiment? ( ) Yes ( )No

   If so, when: ( ) during the chance segment
   ( ) during the entire experiment
   ( ) during the skill part
   ( ) before the experiment

7. If you felt uncomfortable during the experiment, what might have made you feel this way?

Photoelectric Pulse Pick-up

(Produced by E & M Instrument Co., Inc. Division of National Aeronautical Corporation, 6030 England Street, P. O. Box 14013, Houston, Texas 77021)

Specifications:

Part No.: 91-500-70

Maximum Sensitivity: 0.75 volts per 1 per cent resistance change (at R = 75k)

Response Time: 50 milliseconds

Time Constant: .25 seconds

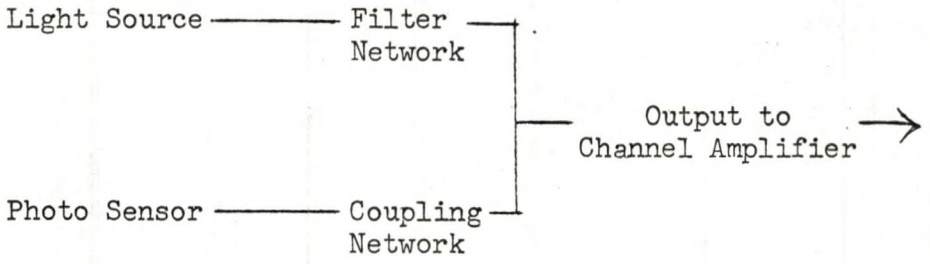
Photocell Spectral Sensivity: S-15 (RCA)

Bulb Voltage: 0.5 to 2.5 volts at 40 ma maximum

Dimensions: 1/2" x 9/32" x 25/32" (Detecting Head only)

Controls: None. Sensitivity and pen positions are controlled by the Amplitude and Position controls on the Physiograph D. C. Channel Amplifier or T-M-C Unit

Block Diagram:



Impedance Pneumograph

(Produced by E & M Instrument Co., Inc. Division of National Aeronautical Corporation, 6030 England Street, P. O. Box 14013, Houston, Texas 77021)

Specifications:

Part No.: 93-800-70

Maximum Sensitivity: 1 ohm impedance change per centimeter of physiograph pen deflection

Subject Impedance Range: 25-3000 ohms

Response Time: 50 milliseconds

Time Constant: A. C. coupled output--2.5 seconds. D. C. coupled output--infinite.

Excitation Frequency: 20,000-25,000 c. p. s.

Noise Level: Less than 0.03 per cent of subject impedance

Applied Current: 2 micro-amperes r. m. s. (constant)

Warm-up Time: 5 minutes for maximum D. C. stability

Controls:

Amplitude: A single-variable potentiometer for full range of sensitivity adjustment

Calibrate, +5 ohms: A push-button switch for superimposing a +5 ohm impedance change on the recording

Condenser-Coupled Output-Direct Coupled Output: A single turn variable potentiometer for balancing the direct coupled output for particular subject input impedance. This control, when turned fully counter-clockwise, switches to condenser coupled output, where input impedance balancing is not necessary.

ROTTER INTERNAL-EXTERNAL CONTROL SCALE

Choose 0 or 1.

1. 0 Children get into trouble because their parents punish them too much.

   1 The trouble with most children nowadays is that their parents are too easy with them.

2. 0 Many of the unhappy things in people's lives are partly due to bad luck.

   1 People's misfortunes result from the mistakes they make.

3. 0 One of the major reasons why we have wars is because people don't take enough interest in politics.

   1 There will always be wars, no matter how hard people try to prevent them.

4. 0 In the long run people get the respect they deserve in this world.

   1 Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.

5. 0 The idea that teachers are unfair to students is nonsense.

   1 Most students don't realize the extent to which their grades are influenced by accidental happenings.

6. 0 Without the right breaks one cannot be an effective leader.

   1 Capable people who fail to become leaders have not taken advantage of their opportunities.

7. 0 No matter how hard you try some people just don't like you.

   1 People who can't get others to like them don't understand how to get along with others.

8. 0 Heredity plays the major role in determining one's personality.

   1 It is one's experiences in life which determine what they are like.

9. 0 I have often found that what is going to happen will happen.

   1 Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.

10. 0 In the case of the well prepared student there is rarely if ever such a thing as an unfair test.

    1 Many times exam questions tend to be so unrelated to course work that studying is really useless.

11. 0 Becoming a success is a matter of hard work; luck has little or nothing to do with it.

    1 Getting a good job depends mainly on being in the right place at the right time.

12. 0 The average citizen can have an influence in government decisions.

    1 This world is run by the few people in power, and there is not much the little guy can do about it.

13. 0 When I make plans, I am almost certain that I can make them work.

    1 It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.

14. 0 There are certain people who are just no good.

    1 There is some good in everybody.

15. 0 In my case getting what I want has little or nothing to do with luck.

    1 Many times we might just as well decide what to do by flipping a coin.

16. 0 Who gets to be the boss often depends on who was lucky enough to be in the right place first.

    1 Getting people to do the right thing depends upon ability; luck has little or nothing to do with it.

17. 0 As far as world affairs are concerned, most of us are the victims of forces we can neither understand nor control.

    1 By taking an active part in political and social affairs the people can control world events.

18. 0 Most people don't realize the extent to which their lives are controlled by accidental happenings.

    1 There really is no such thing as "luck."

19. 0 One should always be willing to admit mistakes.

    1 It is usually best to cover up one's mistakes.

20. 0 It is hard to know whether or not a person really likes you.

    1 How many friends you have depends upon how nice a person you are.

21. 0 In the long run the bad things that happen to us are balanced by the good ones.

    1 Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.

22. 0 With enough effort we can wipe out political corruption.

    1 It is difficult for people to have much control over the things politicians do in office.

23. 0 Sometimes I can't understand how teachers arrive at the grades they give.

    1 There is a direct connection between how hard I study and the grades I get.

24. 0 A good leader expects people to decide for themselves what they should do.

    1 A good leader makes it clear to everybody what their jobs are.

25. 0 Many times I feel that I have little influence over the things that happen to me.

    1 It is impossible for me to believe that chance or luck plays an important role in my life.

26. 0 People are lonely because they don't try to be friendly.

    1 There's not much use in trying too hard to please people, if they like you, they like you.

27. 0 There is too much emphasis on athletics in high school.

    1 Team sports are an excellent way to build character.

28. 0 What happens to me is my own doing.

    1 Sometimes I feel that I don't have enough control over the direction my life is taking.

29. 0 Most of the time I can't understand why politicians behave the way they do.

1 In the long run the people are responsible for bad government on a national as well as on a local level.

TABLE 8

RAW DATA OF THE Is/c GROUP (n = 15)

Blood Pressure and Pulse Rate Values															
	Rest Phase One			Skill Task			Rest Phase Two			Chance Task			Rest Phase Three		
S	F	D	S	F	D	S	F	D	S	F	D	S	F	D	S
1	1. 300	3. 250	7. 250	1. 262	8. 461	7. 961	1. 250	15. 250	11. 500	1. 280	10. 277	10. 222	1. 300	11. 333	11. 333
2	1. 500	11. 666	16. 666	1. 590	4. 428	5. 914	1. 350	6. 666	7. 333	1. 468	5. 818	6. 4848	1. 350	10. 666	8. 000
3	1. 266	15. 750	16. 750	1. 550	10. 320	11. 720	1. 333	13. 400	15. 400	1. 446	10. 600	12. 266	1. 133	15. 250	14. 000
4	1. 500	9. 000	15. 333	1. 256	10. 421	11. 157	0. 900	0. 910	20. 666	0. 821	10. 000	11. 812	1. 400	3. 666	5. 666
5	1. 550	8. 333	4. 333	1. 644	4. 550	1. 200	1. 550	7. 666	2. 666	1. 400	5. 062	2. 250	1. 550	7. 333	1. 000
6	1. 650	3. 333	4. 000	1. 590	3. 846	2. 076	1. 550	3. 000	3. 333	1. 671	2. 882	2. 352	1. 550	5. 000	4. 666
7	1. 35	12. 33	15. 00	0. 714	8. 500	10. 458	1. 350	8. 666	11. 000	1. 500	3. 733	7. 533	1. 400	11. 666	13. 000
8	1. 45	20. 666	14. 333	1. 700	9. 812	5. 687	1. 500	21. 666	12. 333	1. 626	15. 000	9. 412	1. 500	19. 000	10. 666
9	1. 050	8. 333	9. 333	1. 226	10. 857	8. 428	1. 050	11. 333	12. 333	1. 193	6. 294	6. 058	1. 100	7. 666	7. 666
10	1. 150	13. 0	13. 353	1. 356	3. 692	9. 1153	1. 250	9. 666	11. 333	1. 666	4. 615	9. 846	1. 300	9. 333	9. 666
11	1. 400	7. 666	6. 333	1. 406	4. 611	3. 055	1. 450	4. 666	5. 000	1. 400	5. 125	4. 937	1. 300	6. 333	4. 000
12	1. 600	10. 666	7. 333	1. 921	6. 529	5. 352	1. 600	22. 666	15. 666	1. 638	12. 333	6. 333	1. 650	11. 000	12. 333
13	1. 466	16. 500	10. 250	1. 462	11. 736	6. 473	1. 300	13. 666	14. 666	1. 368	11. 000	6. 444	1. 350	18. 666	7. 000
14	1. 200	11. 666	9. 000	1. 271	12. 750	11. 500	1. 300	15. 000	12. 000	1. 253	14. 066	13. 866	1. 2500	17. 000	15. 333
15	1. 450	20. 666	13. 000	1. 612	10. 277	9. 388	1. 400	18. 333	15. 666	1. 516	11. 928	11. 357	1. 400	20. 333	16. 333

TABLE 9

RAW DATA OF THE Is/c GROUP (n = 15)

	Respiration Values					Decision Time		Questionnaire		
S	Rest 1	S	Rest 2	C	Rest 3	S	C	#1	#2s	#3c
1	.333	.291	.250	.293	.250	13.6	3.8	x	50	20
2	0.200	0.189	0.200	0.186	0.200	22.4	19.6	c	75	25
3	0.266	0.340	0.266	0.330	0.233	14.1	4.2	c	75	100
4	0.250	0.237	0.250	0.200	0.200	7.1	3.6	s	100	10
5	0.250	0.338	0.200	0.300	0.100	7.6	2.3	c	100	100
6	0.300	0.2909	0.250	0.294	0.250	3.54	1.30	s	75	100
7	0.150	0.233	0.150	0.214	0.200	10.6	3.3	s	80	75
8	0.250	0.333	0.300	0.366	0.300	3.9	2.9	s	100	100
9	0.200	0.268	0.200	0.260	0.200	8.3	4.6	s	75	100
10	0.300	0.391	0.400	0.341	0.350	13.6	1.7	c	100	75
11	0.300	0.275	0.250	0.254	0.200	5.3	1.1	c	25	100
12	0.250	0.428	0.200	0.253	0.200	4.0	2.7	c	100	25
13	0.200	0.375	0.200	0.287	0.200	5.7	4.0	s	75	100
14	0.350	0.364	0.350	0.361	0.350	4.6	3.5	c	70	80
15	0.300	0.350	0.300	0.300	0.300	5.6	2.2	s	75	45

TABLE 10

RAW DATA OF THE Ic/s GROUP (n = 15)

	Blood Pressure and Pulse Rate Values														
	Rest Phase One			Chance Task			Rest Phase Two			Skill Task			Rest Phase Three		
S	F	D	S	F	D	S	F	D	S	F	D	S	F	D	S
1	1. 450	2. 333	1. 333	1. 313	2. 894	2. 157	1. 050	5. 000	1. 666	1. 104	4. 000	2. 928	0. 950	6. 666	3. 333
2	1. 500	18. 667	11. 333	1. 581	15. 526	8. 158	1. 450	20. 667	8. 667	1. 552	15. 579	8. 684	1. 500	19. 000	10. 334
3	2. 050	4. 000	2. 334	1. 933	5. 000	1. 350	1. 850	5. 667	2. 500	1. 895	4. 320	1. 920	1. 800	5. 667	2. 667
4	1. 150	10. 333	14. 333	1. 063	5. 461	8. 692	1. 150	10. 667	7. 666	1. 106	7. 666	7. 111	1. 250	4. 750	9. 500
5	1. 350	2. 000	1. 00	1. 468	2. 894	2. 947	1. 350	4. 00	2. 000	1. 418	4. 555	2. 388	1. 200	6. 00	5. 000
6	1. 100	3. 500	5. 750	1. 510	4. 500	4. 583	1. 366	6. 750	6. 500	1. 628	5. 352	5. 235	1. 366	17. 00	8. 500
7	1. 30	21. 666	15. 666	1. 393	6. 294	4. 352	1. 350	17. 666	11. 666	1. 448	7. 352	1. 235	1. 300	16. 666	12. 333
8	1. 400	10. 000	7. 000	1. 591	8. 285	20. 750	1. 450	9. 000	6. 666	1. 600	6. 555	5. 277	1. 350	9. 333	5. 666
9	1. 800	13. 666	7. 666	1. 616	9. 947	4. 473	1. 700	9 000	6. 000	1. 646	9. 066	4. 533	1. 650	9. 666	5. 000
10	1. 400	5. 750	7. 750	1. 513	3. 941	4. 705	1. 350	8. 500	9. 500	1. 427	7. 952	8. 476	1. 350	10. 000	11. 666
11	1. 600	2. 666	5. 666	1. 550	5. 450	5. 250	1. 450	9. 666	16. 000	1. 561	16. 200	15. 028	1. 533	18. 000	22. 500
12	1. 050	10. 333	10. 000	1. 100	8. 083	6. 833	1. 100	14. 666	13. 000	1. 100	11. 142	8. 857	1. 000	15. 750	12. 000
13	1. 350	2. 333	2. 666	1. 346	8. 285	7. 571	1. 350	12. 333	12. 333	1. 300	8. 437	8. 000	1. 350	11. 000	10. 666
14	1. 500	16. 333	12. 333	1. 514	10. 812	21. 000	1. 550	15. 00	13. 666	1. 533	9. 411	13. 470	0. 933	12. 333	15. 666
15	0. 933	8. 333	8. 000	1. 268	4. 235	5. 647	1. 250	6. 666	11. 333	1. 326	5. 125	5. 250	1. 200	5. 000	15. 333

TABLE 11

RAW DATA OF THE Ic/s GROUP (n = 15)

	Respiration Values					Decision Time		Questionnaire		
S	Rest 1	C	Rest 2	S	Rest 3	C	S	#1	#2s	#3c
1	0.350	0.287	0.250	0.280	0.200	4.2	14.1	x	75	100
2	0.200	0.250	0.250	0.253	0.200	5.3	6.4	c	100	100
3	0.200	0.227	0.200	0.200	0.150	7.9	11.7	s	25	25
4	0.250	0.300	0.300	0.280	0.250	1.6	4.8	s	90	100
5	0.250	0.281	0.250	0.281	0.200	4.2	5.4	s	75	100
6	0.166	0.290	0.233	0.307	0.233	1.4	5.9	c	70	80
7	0.300	0.360	0.300	0.316	0.300	2.6	14.5	s	50	100
8	0.350	0.358	0.350	0.381	0.350	2.7	7.5	s	75	100
9	7.350	0.272	0.250	0.342	0.300	7.6	15.8	s	80	100
10	0.300	0.313	0.300	0.300	0.250	3.5	6.8	s	80	100
11	0.350	0.450	0.350	0.268	0.333	8.6	63.2	s	70	85
12	0.250	0.218	0.250	0.263	0.233	2.9	10.9	c	100	100
13	0.300	0.307	0.300	0.300	0.300	3.8	3.5	s	50	100
14	0.400	0.364	0.350	0.360	0.300	3.8	6.4	c	50	50
15	0.300	0.287	0.200	0.253	0.250	2.9	4.1	c	100	100

TABLE 12

RAW DATA OF THE Ec/s GROUP (n = 15)

	Blood Pressure and Pulse Rate Values														
	Rest Phase One			Chance Task			Rest Phase Two			Skill Task			Rest Phase Three		
S	F	D	S	F	D	S	F	D	S	F	D	S	F	D	S
1	1. 500	11. 000	4. 500	1. 500	1. 608	2. 478	1. 450	7. 666	7. 666	1. 500	1. 935	2. 387	1. 450	7. 333	6. 000
2	1. 500	19. 000	15. 666	1. 444	20. 150	16. 800	1. 450	24. 666	19. 000	3. 353	20. 947	17. 736	1. 500	5. 230	17. 333
3	1. 700	9. 666	10. 000	1. 692	8. 466	4. 933	1. 500	13. 000	10. 000	1. 592	8. 200	6. 933	1. 600	9. 333	10. 000
4	1. 500	16. 000	11. 333	1. 614	11. 687	7. 062	1. 500	13. 333	8. 333	1. 488	10. 300	4. 750	1. 500	12. 000	6. 333
5	1. 400	9. 00	4. 666	1. 315	4. 866	4. 000	1. 300	5. 666	5. 666	1. 295	4. 478	4. 043	1. 250	4. 333	3. 333
6	1. 550	12. 333	6. 333	1. 525	8. 571	4. 285	1. 500	12. 333	6. 333	1. 543	13. 444	5. 944	1. 600	9. 666	5. 333
7	1. 233	15. 500	11. 750	1. 223	13. 750	10. 187	1. 233	23. 250	13. 750	1. 254	13. 185	10. 111	1. 200	20. 00	12. 500
8	1. 550	8. 666	7. 333	1. 425	5. 944	5. 555	1. 500	11. 000	15. 000	1. 377	8. 600	9. 000	1. 400	8. 333	9. 333
9	1. 050	7. 333	4. 666	1. 300	5. 562	2. 750	1. 050	11. 333	3. 666	1. 320	9. 187	5. 750	1. 350	13. 666	9. 000
10	1. 300	11. 666	6. 00	1. 275	5. 333	2. 366	1. 250	10. 666	6. 333	1. 281	8. 575	2. 757	1. 250	9. 333	1. 666
11	1. 500	10. 333	2. 333	1. 685	6. 062	3. 000	1. 550	5. 333	4. 666	1. 592	6. 370	2. 740	1. 500	5. 330	4. 333
12	1. 500	6. 000	6. 000	1. 816	4. 214	3. 285	1. 450	6. 333	6. 000	1. 631	4. 222	2. 166	1. 500	6. 666	4. 333
13	1. 250	3. 333	3. 333	1. 391	2. 500	3. 071	1. 300	5. 000	4. 333	1. 300	3. 571	3. 714	1. 250	3. 000	5. 333
14	1. 100	1. 250	1. 750	1. 180	2. 058	1. 117	1. 200	3. 666	1. 666	1. 180	2. 913	2. 608	1. 033	7. 750	7. 000
15	0. 950	11. 666	18. 666	1. 040	7. 882	12. 588	0. 950	18. 000	16. 000	1. 017	8. 550	11. 450	0. 950	17. 000	16. 333

TABLE 13

RAW DATA OF THE Ec/s GROUP (n = 15)

	Respiration Values						Decision Time		Questionnaire		
S	Rest 1	C	Rest 2	S	Rest, 3	C	S	#1	#2s	#3c
1	0.300	0.404	0.300	0.387	0.300	31.5	41.9	c	50	50
2	0.150	0.264	0.150	0.206	0.250	7.8	9.6	c	75	50
3	0.300	0.376	0.300	0.323	0.350	1.8	3.6	c	75	90
4	0.300	0.392	0.3000	0.364	0.300	3.1	5.3	c	60	50
5	0.200	0.284	0.250	0.245	0.250	2.1	7.8	x	50	100
6	0.250	0.258	0.250	0.281	0.250	2.6	5.7	c	40	65
7	0.266	0.261	0.266	0.275	0.300	2.5	13.6	s	100	75
8	0.250	0.300	0.300	0.300	0.2500	6.1	7.1	c	100	100
9	0.350	0.342	0.350	0.293	0.300	2.4	7.0	c	75	100
10	0.250	0.282	0.250	0.309	0.250	18.6	22.7	c	75	30
11	0.400	0.442	0.350	0.392	0.350	2.7	14.6	c	100	75
12	0.3000	0.400	0.150	0.368	0.300	0.5	5.7	s	90	100
13	0.3000	0.383	0.300	0.350	0.300	0.7	2.3	c	70	40
14	0.266	0.326	0.300	0.366	0.233	5.8	11.5	c	75	25
15	0.250	0.340	0.250	0.300	0.300	5.0	6.2	c	100	75

TABLE 14

RAW DATA OF THE Es/c GROUP (n = 15)

	Blood Pressure and Pulse Rate Data														
	Rest Phase One			Skill Task			Rest Phase Two			Chance Task			Rest Phase Three		
S	F	D	S	F	D	S	F	D	S	F	D	S	F	D	S
1	1. 200	12. 333	11. 000	1. 372	3. 321	3. 785	1. 300	8. 666	9. 666	1. 316	4. 350	5. 555	1. 300	8. 666	8. 000
2	1. 600	15. 666	13. 333	1. 637	10. 777	8. 666	1. 600	11. 333	10. 000	1. 721	9. 937	6. 750	1. 450	15. 666	11. 666
3	1. 300	2. 666	2. 00	1. 400	3. 176	2. 117	1. 250	3. 000	1. 666	1. 328	3. 150	1. 400	1. 266	2. 750	1. 500
4	1. 150	7. 666	5. 666	1. 194	7. 761	7. 142	1. 100	7. 666	7. 666	1. 100	6. 125	5. 625	1. 050	7. 666	6. 333
5	1. 450	3. 666	3. 333	1. 485	3. 500	2. 583	1. 350	8. 666	6. 000	1. 440	5. 117	3. 352	1. 450	7. 333	5. 000
6	1. 333	10. 000	10. 750	1. 393	7. 000	9. 000	1. 200	9. 75	9. 000	1. 414	7. 705	9. 529	1. 150	14. 000	10. 750
7	1. 400	7. 00	4. 333	1. 475	4. 777	2. 407	1. 350	7. 000	4. 000	1. 394	7. 333	3. 714	1. 300	13. 333	6. 333
8	1. 100	12. 333	5. 000	1. 113	7. 941	5. 117	1. 100	11. 666	6. 000	1. 100	9. 500	5. 428	1. 150	11. 333	5. 000
9	1. 000	10. 333	10. 000	1. 142	6. 647	8. 000	1. 100	23. 000	18. 333	1. 140	3. 083	6. 833	0. 950	27. 666	20. 666
10	1. 250	10. 25	6. 00	1. 147	9. 681	4. 545	1. 200	11. 666	6. 333	1. 158	7. 000	4. 428	1. 150	8. 000	4. 666
11	1. 600	10. 666	8. 00	1. 647	6. 083	2. 708	1. 600	13. 666	11. 000	1. 400	7. 333	6. 095	1. 700	12. 750	8. 000
12	1. 550	3. 000	1. 666	1. 700	3. 062	1. 562	1. 600	2. 333	2. 000	1. 488	3. 105	1. 894	1. 450	4. 666	3. 333
13	1. 250	17. 666	13. 0	1. 432	11. 710	8. 894	1. 300	20. 333	10. 333	1. 375	9. 640	8. 400	1. 250	13. 666	12. 000
14	1. 200	10. 333	6. 666	1. 200	5. 238	4. 047	1. 200	9. 333	5. 000	1. 200	6. 470	3. 941	1. 150	8. 000	4. 666
15	1. 666	11. 666	15. 459	1. 960	4. 000	9. 000	1. 400	11. 000	13. 666	1. 394	6. 400	10. 500	1. 400	6. 000	13. 000

TABLE 15

RAW DATA OF THE Es/c GROUP (n=15)

	Respiration Values						Decision Time		Questionnaire		
S	Rest 1	S	Rest 2	C	Rest 3		S	C	#1	#2s	#3c
1	0.200	0.180	0.250	0.250	0.250		17.2	9.6	c	85	100
2	0.250	0.356	0.300	0.321	0.250		6.6	4.0	c	75	75
3	0.300	0.320	0.300	0.328	0.300		4.9	1.6	x	75	25
4	0.250	0.352	0.200	0.353	0.250		8.7	1.6	x	40	15
5	0.300	0.361	0.250	0.320	0.350		10.1	3.7	c	100	25
6	0.266	0.373	0.300	0.378	0.250		6.3	4.7	s	75	25
7	0.300	0.341	0.250	0.311	0.300		14.	7.0	c	100	100
8	0.300	0.360	0.300	0.338	0.300		4.9	2.3	c	80	80
9	0.350	0.378	0.350	0.420	0.300		5.1	1.4	c	100	75
10	0.250	0.278	0.200	0.283	0.300		12.7	1.2	s	75	100
11	0.250	0.304	0.250	0.236	0.200		9.4	7.6	c	75	10
12	0.300	0.321	0.300	0.358	0.300		2.8	5.3	s	75	25
13	0.300	0.322	0.350	0.313	0.200		25.6	12.1	c	70	100
14	0.350	0.352	0.350	0.357	0.350		9.0	3.5	c	100	100
15	0.250	0.309	0.250	0.300	0.250		12.3	6.3	c	85	65

TABLE 16

ADJUSTED BLOOD PRESSURE VALUES (n = 60)

	Ec/s					Ic/s					Es/c					Is/c				
	Rest 1	C	Rest 2	S	Rest 3	Rest 1	C	Rest 2	S	Rest 3	Rest 1	S	Rest 2	C	Rest 3	Rest 1	S	Rest 2	C	Rest 3
1	.300	.606	.500	.552	.450	.363	.427	.249	.422	.333	.471	.532	.527	.560	.480	.690	.484	.429	.498	.499
2	.451	.454	.435	.458	.768	.377	.344	.295	.357	.534	.459	.445	.468	.404	.426	.588	.562	.523	.527	.428
3	.508	.368	.434	.459	.517	.368	.212	.118	.307	.320	.428	.399	.357	.307	.352	.515	.531	.534	.536	.478
4	.414	.376	.384	.315	.345	.581	.614	.418	.481	.666	.424	.479	.500	.478	.452	.630	.517	.957	.541	.607
5	.341	.451	.500	.474	.434	.333	.504	.333	.343	.454	.476	.424	.409	.395	.405	.342	.208	.258	.284	.120
6	.339	.333	.339	.306	.355	.621	.504	.490	.494	.333	.518	.562	.480	.552	.434	.545	.350	.526	.449	.482
7	.430	.425	.371	.434	.384	.419	.408	.397	.143	.425	.382	.335	.363	.336	.322	.548	.551	.559	.713	.527
8	.458	.483	.576	.511	.528	.411	.714	.425	.445	.377	.182	.391	.339	.363	.306	.409	.366	.362	.802	.359
9	.388	.330	.244	.384	.397	.359	.310	.400	.333	.340	.491	.546	.443	.689	.427	.528	.437	.521	.840	.500
10	.339	.307	.372	.243	.151	.574	.549	.527	.515	.538	.369	.319	.351	.387	.368	.506	.711	.539	.734	.508
11	.184	.331	.466	.300	.929	.680	.490	.623	.481	.555	.428	.308	.445	.453	.385	.452	.398	.517	.785	.387
12	.500	.438	.486	.339	.393	.491	.458	.469	.442	.432	.357	.378	.461	.378	.416	.407	.450	.408	.882	.528
13	.500	.551	.464	.509	.639	.533	.477	.500	.486	.492	.423	.431	.336	.465	.467	.383	.355	.517	.889	.272
14	.583	.351	.312	.472	.474	.430	.660	.476	.588	.559	.392	.435	.348	.345	.368	.435	.474	.444	.918	.474
15	.615	.614	.470	.572	.489	.488	.571	.629	.506	.754	.573	.644	.554	.621	.684	.386	.477	.460	.887	.445

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