

THE EFFECTS OF REWARD-PUNISHMENT,
INTROVERSION-EXTRAVERSION AND
SEX TYPE ON DAYDREAMING

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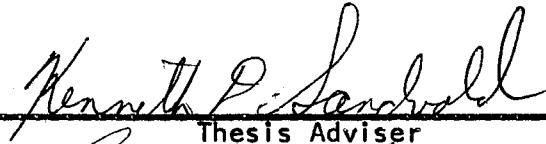
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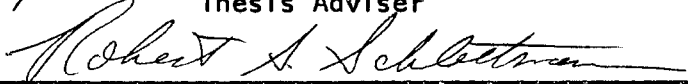
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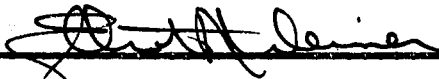
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CHAPTER I

INTRODUCTION AND REVIEW OF THE LITERATURE

This dissertation is an attempt to study the effects of reward and punishment as types of reinforcement on the amount of daydreaming shown by male and female introverts and extraverts. Eight experimental groups were utilized. Four of the groups received positive reinforcement in the form of monetary and verbal reward and the other four groups received negative reinforcement in the form of monetary and verbal punishment. It was expected that differences in the amount of daydreaming would be seen between introverts and extraverts depending on the type of reinforcement received. This study was stimulated as a result of research supporting two theories dealing with the above mentioned variables. One of the theories deals with introversion-extraversion and the other with a proposed model of daydreaming.

It is, of course, impossible to discuss the psychological and physiological nature of introversion and extraversion without taking as one's starting point the extensive and important contributions to this field of study by Eysenck (1957, 1967) and his collaborators. Unfortunately, the sheer volume of this work precludes any but the simplest summary of it. In order to provide a better understanding of the importance of this study the author has chosen to include a more thorough account of Eysenck's theory of introversion-extraversion in Appendix A.

Briefly stated, Eysenck contends that a key difference between introverts and extraverts is the degree of socialization which is typical of each. Socialization, or the establishment of social controls over egoistic impulses, is mediated by conditioning. Eysenck further contends that because of their rapid strong development of excitation and their weak tendency toward the development of reactive inhibition introverts condition well, and hence tend to become oversocialized. Conversely, the slow development of weak excitatory potentials and the rapid and strong development of inhibitory potentials makes extraverts condition poorly. As a consequence extraverts tend to be undersocialized. Below is given a brief account of the "typical" extravert and of the "typical" introvert; these may be regarded as idealized endpoints of a continuum to which real people may approach to a greater or lesser degree.

The typical extravert is socialable, likes parties, has many friends, needs to have people to talk to, and does not like reading or studying by himself. He craves excitement, takes chances, often sticks his neck out, acts on the spur of the moment and is generally an impulsive individual. He is fond of practical jokes, always has a ready answer, and generally likes change. He is carefree, easygoing, optimistic, and likes to laugh and be merry. He prefers to keep moving and doing things, tends to be aggressive and to lose his temper quickly. His feelings are not kept under tight control, and he is not always a reliable person.

The typical introvert is a quiet, retiring sort of person, introspective, fond of books rather than people; he is reserved and distant except to intimate friends. He tends to plan ahead, looks before he leaps, and distrusts the impulse of the moment. He does not like excitement, and likes a well-ordered mode of life. He keeps his feelings under close control, seldom behaves in an aggressive manner, and does not lose his temper easily. He is reliable, somewhat pessimistic, and places great value on ethical standards (Eysenck and Eysenck, 1963).

Gray's Theory

Recently Gray (1970) has advanced a new view in regard to the nature of the psychological variables underlying the personality dimensions of introversion and extraversion. Briefly he feels that the hypothesis in Eysenck's theory of introversion-extraversion attributing greater conditionability to the introvert should be replaced by the hypothesis that the introvert is relatively more sensitive to punishment and to frustrative nonreward.

Gray has contended that, if indeed, we do accept Eysenck's description of introvert behavior as over-socialized and of extravert behavior as under-socialized; and if we accept his view that the process of socialization consists in the formation of a cluster of conditioned fear reactions, then we should agree that Eysenck has asked the right question. That is, why do introverts form conditioned fear reactions more strongly than extraverts? Gray rejects the answer that it is because they are more susceptible to fear or punishment. Support for this hypothesis can be found in experiments by Spence (1964) and Kimble (1969). They found that high anxious introverts form conditioned eyeblink responses better than low anxious introverts if the environment in which they are investigated contains some element of threat, that is shock. In reviewing the literature one may also notice that all the data favoring the hypothesis that introverts are in general more conditionable than extraverts (Eysenck, 1965, 1967) also favor Gray's hypothesis, in that they have all been obtained in aversive conditioning situations, primarily that of eyeblink conditioning.

Gray's hypothesis that introversion involves a heightened susceptibility to fear (or to express the same point in another way, a heightened sensitivity to punishment and warnings of punishment) has a good

deal of face validity. Psychopathic behavior in the extraverted neurotic is easily regarded as a tendency to take a reward (by, say, stealing, lying, or sexual gratification) without thought for the consequences, i.e. with no fear of punishment. The recidivism which is such a feature of psychopathic behavior (Eysenck, 1964) is also regarded precisely as a relative insensitivity to punishment. Conversely, the symptoms of the dysthymic neuroses (See Appendix A), are in many cases perfectly clear expressions of fear, as for example in the phobias and the anxiety state. In other cases it requires very little skill to discern the fear which lies less obviously behind the neurotic symptoms. An example of this is the obsessional ritual or rumination. This may be performed in a state of apparent calmness, but it is usually sufficient to prevent the patient from complying with the urge to perform the ritual for overt signs of fear, often intense, to become evident. Thus, it can be seen that the obsessive-compulsive symptoms bear all the marks of an active avoidance response (Gray, 1970).

Gray's hypothesis also predicts the same socialization differences as are postulated by Eysenck. The introverted neurotic child should socialize better than the extraverted neurotic because his greater sensitivity to punishment should lead to a firmer development of the conscience to the extent that punishment or withdrawal of reward are used as parental techniques of control of undesirable behavior.

In further considering Gray's hypothesis, it should be considered that the extraversion factor is made up of two correlated (+.47) sub-factors (Eysenck and Eysenck, 1963), one of "impulsiveness" and one of "sociability" or "social extraversion." Thus, it may be proposed that the extravert acts on the spur of the moment because his behavior,

when compared with the introvert, is more determined by potential rewards in his environment. He is also less likely to avoid potential punishment. His greater interaction with people can be understood if we recall that people are the most important dispensers of both rewards and punishments for other people. Therefore, those who are less sensitive to punishment by other people are more likely to seek them out.

Arousability and Sensitivity to Punishment

Eysenck has attributed the greater conditionability of the introvert to either the relatively lower susceptibility to processes of inhibition or to a relatively higher level of arousability or to both. Eysenck (1957, 1967) and Gray (1967) both offered good evidence in support of the view that introverts and extraverts do differ in their level of arousability. It would appear to be in the interest of parsimony if the differences could be related to differences in arousability in the same way that Eysenck relates conditionability to arousability.

A method of doing this would be to start from the fact that any stimulus, if it is made intense enough, may act as a form of punishment, then to note that differences in arousability may be regarded as differences in the degree to which individuals amplify or dampen stimulation. Introverts amplify stimulation and extraverts tend to dampen stimulation. Therefore, it should follow that, as any physical stimulus is increased in intensity, the point at which the stimulus becomes punishing should be reached sooner for the introvert than for the extravert. The more introverted the person is the greater should be his tendency to avoid intense stimulation when compared with the extravert.

Schalling and Levender (1964) have provided direct evidence for the introvert's tendency to avoid intense stimulation. They worked with nine introverts and ten extraverts. Electric pain stimulation was used and sensation thresholds, pain thresholds, and tolerance thresholds were established. Differences between groups were found to show greater pain tolerance and higher pain thresholds for the extraverts. The majority of these comparisons were statistically significant. Other evidence for the introvert's tendency to avoid intense stimulation is reviewed by Eysenck (1967).

Gray's (1970) view that the introvert's greater susceptibility to punishment, relative to the extravert, may be derived from the same fundamental substrate of introversion-extraversion postulated by Eysenck's theory. The introvert has a higher level of arousability than the extravert and is therefore more susceptible to punishment.

Comparison Between Gray and Eysenck's Theories

Although Gray's and Eysenck's theories appear to be somewhat similar there are two major differences that are worth mentioning and apply to the context of this particular study. They are:

1. Eysenck proposes that introverts form conditioned responses with greater ease than do extraverts because they are more highly conditionable. The greater conditionability of the introvert is in turn attributed by Eysenck either to a relatively lower susceptibility to processes of inhibition than the extravert or to a relatively higher level of general arousability or to both (Eysenck, 1957, 1967).

On the other hand Gray feels that introverts condition faster than extraverts in some situations because they are more susceptible to

punishment and frustrative nonreward. However, he continues to derive susceptibility to punishment from the more basic factor of general level of arousability (Gray, 1970).

2. Eysenck further states that introverts condition better than extraverts in all situations. Extraverts rarely ever condition better than introverts.

Gray proposes that introverts condition better than extraverts only in situations involving punishment as a reinforcer and introverts condition better in situations involving reward as a reinforcer. It should be noted that adequate testing of the differences in the theoretical orientations is somewhat lacking. A test between Eysenck's and Gray's hypotheses would be an investigation of the conditioning of introverts and extraverts, (as measured by the Eysenck Personality Inventory), using both reward and punishment as reinforcement.

Daydreaming

Since daydreaming is one of the variables included in the present study the following information is provided to give the reader some idea as to why the author has chosen to include it as part of this study.

The phenomenon of daydreaming, long of interest to poets and novelists, and more recently a source of data to the psychoanalyst, has as yet been little studied through the systematic methods of psychology. Recognized as a fairly widespread human characteristic, linked in common-sense experience with childhood and adolescence and, at least in America, with neuroticism, daydreaming is part of a class of internally-produced cognitive processes which have been neglected by psychologists

since Watson's attacks on introspection almost fifty years ago.

To the extent that daydreaming is one manifestation of an ongoing stream of relatively self-activated cognitive responses which characterize consciousness, further knowledge of its dimensions and functional implications for the personality seems desirable. It remains to be determined, for example, whether the phenomenon of daydreaming is best viewed as competing for attention with external stimulation or whether it may represent a useful means, more available to particular individuals, for dealing effectively with a monotonous or frustrating external situation. Moreover, it seems necessary at the outset to determine whether daydreaming is related to already identified personality types.

The Antrobus, Singer and Greenberg Model of Daydreaming

Antrobus, Singer and Greenberg (1966) have proposed a model of some of the operations involved in generating fantasy, imagery and other sequences of mentation which are not strongly "directed," that is, subject to constraints by the individual. This preliminary form of their model is intended to formalize some of the generally held, and perhaps intuitively obvious beliefs about fantasy and its relation to other classes of mentation, particularly response to environmental stimuli.

The model includes two major channels of stimulation or information available to the human being, the external environment and the inner dimension which includes short-term memories, elaborations of recently-perceived events, and events in long-term memory storage. They contend that under most conditions of moderate activation and wakefulness we may

postulate that the external stimuli have a somewhat greater priority for processing internal stimulations.

The model further maintains that if a cognitive system processes information from internal (memory) as well as external sources, then the upper limit for this operation equals the sum of the information rates from both sources. If the system obtains a higher payoff for processing information from an external source, then as the rate of receiving information from an external source increases, the processing mechanism should reduce input from memory with the consequence that the rate of producing spontaneous cognitive events should decrease. It is assumed that both simple sensory encoding and more complex short-term storage and comparison operations may be performed by a common cognitive system.

The significance to the person, or payoff, for responding to a stimulus may vary from one task or stimulus class to another. If indifferent to the stimuli in his environment, a person might give full reign to his fantasy; but if the payoff for responding to a certain stimulus class is high, he may hold irrelevant thoughts to a minimum. The authors of this model hypothesized that the greater the payoff for detecting a signal, the smaller the probability that a subject will report the occurrence of task-irrelevant thoughts.

The model further states that individual differences in perceptual versus imaginal and thinking activity may be assigned to individual differences in payoff for responding to external and internal stimulus sources. Studies of ocular motility and thought suppression (Antrobus, Antrobus, and Singer, 1964; Singer and Antrobus, 1965), suggest the hypothesis that those persons who for defensive or stylistic reasons

place excessive priority on external channels may also prove to be blocked in recall, imaginative, or verbal fluency situations (Levine and Spivak, 1964). A recent report by Luborsky, Blinder, and Schimek (1965) suggests that persons who show rapid scanning and avoidant eye movements, presumably allowing little time for coding or rehearsing the threatening material, show corresponding failures both in recall and in ideational fluency.

A defensive act in this situation is presumably one which permits a person to avoid or escape negative affect elicited by internal events stored in memory. The favored defensive mode should be the one with the highest payoff, that is, the response with the lowest probability of being followed by negative affect.

Research Evidence

Before discussing the methodology of this study, a review of some of the studies that have been performed to test Gray's hypotheses concerning introversion-extraversion and the Antrobus, Singer, and Greenberg model of daydreaming will be presented.

In that Gray's hypotheses concerning the psychological variables underlying the dimensions of introversion-extraversion and neuroticism are relatively (1970) new, there is not much research available which directly supports his position. The following three studies offer direct support for Gray's hypotheses.

In an eyelid conditioning situation in which subjects were given the Taylor Manifest Anxiety Scale and the Maudsley Personality Inventory (MPI), Piers and Kierchner (1969) found that the subjects who conditioned the best were more likely to be high on anxiety, neuroticism and extraversion. The authors report that this study was not designed to be

either emotional arousing or inhibition producing. Because of this, this study differs from other eyelid conditioning studies. The results of this study support Gray's predictions. It also leads to an interesting point. It can be seen that almost all the data favoring the hypothesis that introverts are in general more conditionable than extraverts (Eysenck, 1965, 1967) also favor Gray's hypothesis, since they have all been obtained in aversive conditioning situations, mainly that of eye-blink conditioning. That is, the results support Gray's hypothesis that introverts condition better than extraverts because introverts are more sensitive to punishment.

Mohan and Claire (1968), using the MPI, divided 80 subjects into four personality groups based on extraversion and neuroticism. All subjects were tested in verbal conditioning situations. The results reveal that extraverted subjects condition better than introverted subjects, high neuroticism subjects condition better than low neuroticism subjects, and girls condition better than boys. The results of this study are just the opposite of Eysenck's predictions, but agree with Gray's. Reward was used as reinforcement in this study. Therefore, Gray would have hypothesized that extraverts would condition better in this situation.

Fontenelle (1972) used a verbal conditioning situation with 80 subjects to test Gray's hypothesis concerning extraversion, introversion and neuroticism. Using both verbal and monetary reward and punishment as a means of reinforcement, he found punished introverts to condition more rapidly than punished extraverts ($p < .005$), and rewarded extraverts to condition more rapidly than rewarded introverts ($p < .25$).

To date there has been almost no research relating daydreaming to introversion-extraversion. Actually there appears to be only one study that has attempted to show the relationship between these two variables and that was a factor-analytic study made by Singer and Antrobus (1963). This study provided a summarization of the factorial composition of a series of measures of the structure and content of daydreaming behavior. The relationships of fantasy to measures of divergent thought productivity, attention, curiosity, and personality measures were examined. Questionnaire scales of daydream content and structure were developed, as well as a structured clinical interview procedure from which the actual daydreams reported by subjects could be rated along a variety of dimensions approximately paralleling those scored from the questionnaire data. Some of the Guilford-Zimmerman factored scales were employed as well as the Maudsley Extraversion and Neuroticism scales. A battery of attention and curiosity scales, as well as interpersonal fluency ability scales, were especially developed for inclusion, and various measures of intelligence, social approval, and falsification or careless-deviancy were also scored. One hundred college freshmen underwent a battery of tests and hour-long clinical interview. Analysis of the specially prepared questionnaires followed item-analysis of the scales. A principal-axis Varimax factor analysis was carried out on the data. Of twelve factors emerging from the data, one was a very well defined social extraversion factor with no indications of daydreaming (Singer and Antrobus, 1963).

In testing their proposed model for relating production of spontaneous cognitive events such as daydreams to the organism's continuous response to external stimuli, Antrobus, Singer and Greenberg (1966)

employed a simple signal-detection task under conditions of partial sensory deprivation in a series of experiments. An account of these experiments follow.

As previously stated in the model predicts that if a common cognitive system processes information from internal (memory) as well as external sources, then the upper limit for the operation equals the sum of the information rates from both sources. If the system obtains a higher payoff for processing information from an external source, then as the rate of receiving information from an external source increases, the executive should reduce input from memory with the consequence that the rate of producing spontaneous cognitive events should decrease. They employed as the dependent variable variation in the rate of generating spontaneous cognitive events as inferred from subject's rating of the frequency of spontaneous task-irrelevant cognitive events that occur within each trial and as the independent variable presentation of a regular train of 0.1 second auditory pulses of 281 and 349 CPS at the rate of 1 per second on one channel and 1/3 second on another channel. On each trial the subject was required to encode each signal according to one of two possible operations. The first required a simple discrimination of high or low (non-memory); the second required the comparison of each signal with the immediately preceding signal, that is, same or different (memory).

The experiment provided strong evidence that increasing the rate of responding to information from an external source and responding to information scored in short term memory interferes with the production of spontaneous cognitive events. However, the magnitude of spontaneous cognitive thoughts reported in a free report portion following each

trial far exceeded the expectation of the experimenters' (Antrobus, Singer, and Greenberg, 1966).

Everyone learns fairly early in life not only that performing one task may interfere with the performance of a second, but that merely thinking or daydreaming about something else may interfere with one's performance of a task. The significance to the person, or payoff, for responding to a stimulus may vary greatly from one task or stimulus task to another. If indifferent to the stimuli in his environment, a person might give full reign to his fantasy, but if payoff for responding to a certain stimulus class is high, he may hold irrelevant thoughts to a minimum. Antrobus, Singer and Greenberg have hypothesized in their model that the greater the payoff for detecting a signal, the smaller the probability that a subject will report the occurrence of a task-irrelevant thought.

To test this hypothesis the authors employed 80 college students as subjects. Each subject was presented with a series of randomly ordered high and low tones (440 - 880 CPS, respectively) while seated in a light-proof, sound attenuated booth. Signals were presented at the rate of one per second, 15 signals per trial, for a total of 100 trials. A subject was instructed to detect the low tones and indicate his discrimination by pressing a telegraph key. After each trial the subject operated a two-position switch to indicate whether he had any task-irrelevant thoughts during the just completed trial. The 80 subjects were randomly assigned to four payoff groups with the restriction that the groups be matched for sex. There were 11 males and 9 females in each group. Following a series of training trials, each subject was informed that he would receive either no penalty for

detection errors or a penalty of $1/5\text{¢}$, $2/5\text{¢}$, or $4/5\text{¢}$ per error. The experimental hypotheses were tested by means of an analysis of variance linear regression model. The statistical results were significant at the .05 level. A post-hoc comparison of the 11 male and 9 female subjects showed that the payoff effect is exclusively and strongly characteristic of the male subjects (Antrobus, Singer and Greenberg, 1966).

CHAPTER II

STATEMENT OF THE PROBLEM

Purpose of the Investigation

As seen in the above account, Antrobus, Singer and Greenberg (1966) speak in terms of payoff while Gray speaks in terms of susceptibility to punishment or reward. It is the purpose of this study to test both the Antrobus, Singer and Greenberg and Gray proposals with the intentions that the concept "payoff" is essentially the same as susceptibility to punishment and reward. That is, the fact that the introvert conditions more rapidly under conditions of punishment should provide a definite indication that he is paying attention or reacting to those stimuli he perceives as having greater payoff value. In this particular case it is hypothesized that the introvert will perceive avoidance of stimuli presented in the form of punishment as warranting greater payoff value, whereas the extravert will perceive stimuli presented in the form of reward as warranting greater payoff value.

More specifically this study is an attempt to determine if Gray's hypothesis concerning introversion-extraversion is true in the mental process of daydreaming. Gray (1970) has pointed out that reward and punishment may be a prime consideration in relating personality types to conditioning. Specifically he contends that introverts condition better under conditions of punishment, whereas extraverts are more sensitive to conditions of reward. At the same time Antrobus, Singer

and Greenberg (1966) propose a theoretical model of daydreaming which states that whether one attends to internal stimuli or external stimuli is a matter of the perceived "payoff" value each holds.

The researcher contends that if indeed, Gray and Antrobus, Singer and Greenberg are correct then it should be expected that an individual scoring low on the extraversion scale of the Eysenck Personality Inventory, (i.e., introvert) will show fewer accounts of daydreaming when presented with a somewhat boring task under conditions of punishment as a type of reinforcement than a person scoring high on the extraversion scale, (i.e., extravert).

On the other hand, it may be expected that an individual scoring high on the extraversion scale of the Eysenck Personality Inventory, (extravert) would show fewer accounts of daydreaming under conditions of reward as a type of reinforcement than the person scoring low on the extraversion scale.

The theoretical and empirical evidence reviewed in the foregoing pages has led the experimenter to postulate the following hypotheses:

Hypothesis 1.

When incorrect responses are punished and correct responses are ignored, introverts will have significantly fewer task-irrelevant thoughts than extraverts.

Hypothesis 2.

When incorrect responses are punished and correct responses are ignored, introverts will have significantly fewer stimulus detection errors than extraverts.

Hypothesis 3.

When correct responses are rewarded and incorrect responses are ignored, extraverts will have significantly fewer task-irrelevant thoughts than introverts.

Hypothesis 4.

When correct responses are rewarded and incorrect responses are ignored, extraverts will have significantly fewer stimulus detection errors than introverts.

Hypothesis 5.

Males will show fewer task-irrelevant thoughts than females.

Hypothesis 6.

Females will show fewer stimulus detection errors than males.

CHAPTER III

METHOD

Subjects

Forty male and forty female undergraduate students enrolled in Oklahoma State University Introductory Psychology classes were used as subjects. The following statement was read to approximately 500 students in the classes involved:

My name is Ron Seaborn. I am affiliated with the Oklahoma State University Psychology Department and the Veteran's Administration Hospital of Oklahoma City. My reason for being here today is to ask for volunteers to participate in some research which we are conducting. The research deals with personality variables. It will involve some very simple tasks which I think you will find interesting. To avoid influencing the results of this study, I would prefer not to comment further on the purpose or nature of it. However, I would like to repeat that participation in the study should prove interesting.

The experiment will take place in two parts. The first part will be conducted in class today. You will be asked to fill out a questionnaire concerning the way you feel and behave toward people. Those of you who make a certain score on the questionnaire will be asked to sign up for another session to be held later. The second session will require about 20 minutes of your time. Those of you who participate in the second session will have an opportunity to earn up to \$2.

I will now circulate the questionnaire. Please note the directions on the first page indicate that you are not to ponder over the questions as we want your first impression.

At this time the Eysenck Personality Inventory was administered.

Those subjects scoring at least one standard deviation above or below the mean on the extraversion scale of this inventory were assigned to one of two personality populations: (1) Introvert; extraversion scale < 9.6 ,

(2) extravert; extraversion scale >17.8. (See Appendix D for a more comprehensive view of the Eysenck Personality Inventory.) Twenty male subjects and twenty female subjects were then randomly selected from each of these samples (i.e., introversion, extraversion) to participate in the study, making a total of 80 subjects. Next, 10 male and 10 female subjects from each of these samples were randomly selected to receive reward or punishment (i.e., rewarded male introverts, rewarded male extraverts, rewarded female introverts, rewarded female extraverts, punished male introverts, punished male extraverts, punished female introverts, and punished female extraverts). The mean extraversion scores for each group are presented in Table I.

TABLE I
MEANS OF SUBJECTS' SCORES ON THE EYSENCK
PERSONALITY INVENTORY

	MALES		FEMALES	
	Introverts	Extraverts	Introverts	Extraverts
Reward	5.5	20.1	6.1	19.7
Punishment	5.7	19.4	5.9	19.1

Apparatus and Materials

An experimental room in the Dairy Building at Oklahoma State University provided the experimental setting for all subjects. The room was furnished with two tables and two chairs. One table held two EICO

audio-generators, models WA44C and 377, a Lafayette 11 watt P.A. amplifier, a Marretta transformer, a Lehigh Valley electronics counter and two switches connected to the audio generators and controlled by the experimenter. The second table was used by the subjects and held one switch which was connected to the electronic counter and operated by the subjects. The two tables were placed together, one in front of the other with the subject sitting at one table and the experimenter sitting behind the equipment at the other table. The subject and experimenter faced each other.

A set of earphones was placed over the ears of the subject and a blindfold made of black felt covered the subject's eyes. In addition to serving as a blindfold the cloth also served the purpose of holding the earphones tight against the subject's ears, thus assisting in eliminating any external noise that might have filtered into the experimental room. A microphone and the amplifying system were hooked up to both the earphones and the speaker (See Figure 1).

Task

The experimental task for the subjects was to monitor auditory signals of two pure tones differing only in frequency, one being pitched slightly higher than the other (250 CPS, 280 CPS). The signals were presented in a randomized, although prerecorded sequence. Each signal had a duration of 1/10 second (See Table II for order of signal presentation).

External stimulation was kept at a minimum by the use of a blindfold and a set of earphones covering the eyes and ears. In addition to minimizing the external noise the earphones were the source of receiving

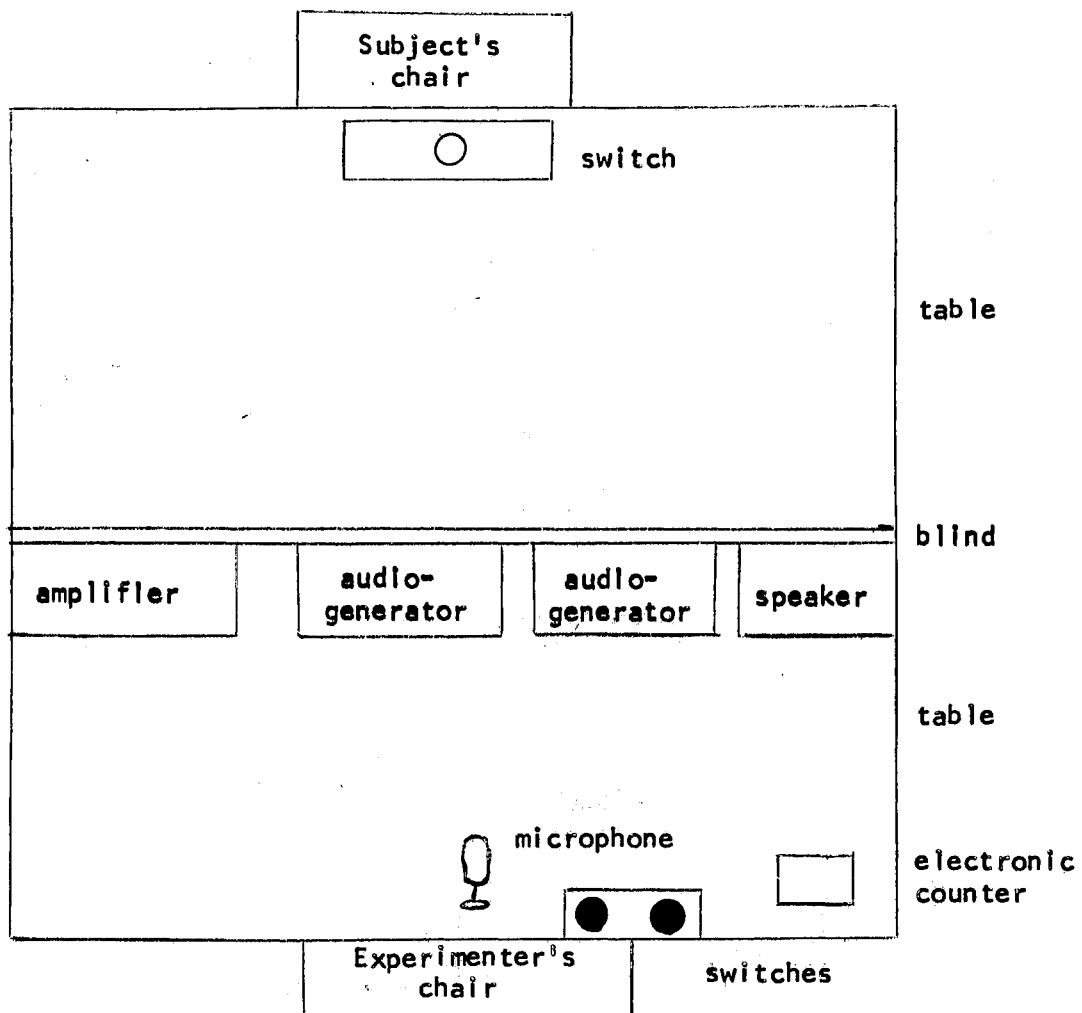


Figure 1. Diagram of Experimental Area

both auditory signals and verbal reward or punishment. Each subject was given 20 trials with a single trial consisting of 20 signal presentations making a total of 400 signal presentations. Each signal was presented at one second intervals. A practice trial where no reinforcement was administered was given to each subject as a form of warm-up to acquaint him with the task. Prior to this trial the following instructions were given to each subject.

I am going to place these earphones and blindfold over your ears and eyes. You will then be presented with a random series of 20 tones. One of the tones will have a slightly lower frequency than the other. You are to press the switch before you when you believe you hear the tone with the lowest frequency. This is a practice trial. You will be given further instructions at the end of this trial. The tones will only be one second apart, therefore, you will have to respond quickly.

Following the warm-up trial the subjects receiving punishment (punishment group) were read the following instructions.

You will now be presented with a random series of 400 tones just like the ones you just heard. One of the tones will have a slightly lower frequency than the other. You are to press the switch before you when you believe you hear the tone with the lowest frequency. However, this time at the end of every 20 tones I will ask you if you had any task-irrelevant thoughts since the last interruption. By task-irrelevant thoughts I mean any thought making reference to an event occurring outside the given trial in time and space. That is, you may think of what you were doing last night, or you may think of something you should do on your way home or something to do with your schoolwork. You notice all these things share in common the property of being unrelated or irrelevant to the actual task of detecting the tones. You are to answer yes or no depending on whether or not you experienced any of these types of thoughts. Remember before, I told you that you would have an opportunity to earn some money by participating in this experiment. Right now you have \$2. However, each time you incorrectly identify a tone I will subtract 1/2¢ from your account. You will know if you have incorrectly identified a tone by hearing a verbal command through your earphones. You will receive the money you have earned after completing the task.

Those subjects that received reward (reward group) were read the following instructions.

You will now be presented with a random series of 400 tones just like the ones you just heard. One of these tones will have a slightly lower frequency than the other. You are to press the switch before you when you believe you hear the tone with the lowest frequency. However, this time, at the end of every 20 tones I will ask you if you had any task-irrelevant thoughts since the last interruption. By task-irrelevant thoughts I mean any thought making reference to an event occurring outside the given trial in time and space. That is, you may think of something to do with your homework, or something you should do on your way home. You notice all these things share in common the property of being unrelated or irrelevant to the task of detecting the tones. You are to answer yes or no depending on whether or not you experienced any of these types of thoughts. Remember before, I told you that you would have an opportunity to earn some money by participating in this experiment. You will receive 1/2¢ for each correct detection you make. If you correctly identify all the tones you will earn a total of \$2. You will know if you have correctly identified the tone by hearing a verbal command through the earphones. You will receive the money after the completion of the task.

Each time a subject in the punishment group made an incorrect response the experimenter would say "wrong" in a volume above the conversational level. The amplifier was also set at a loud volume (3.5, an arbitrary unit on the volume control of a Lafayette 11 watt P.A. amplifier). No comment was made to a correct response. Each time a subject in the reward group made a correct response the experimenter said "right" in an approving tone. The amplifier was set on a mild volume (2.5, an arbitrary unit on the volume control of a Lafayette 11 watt, P.A. amplifier). No comment was made to an incorrect response.

Following the practice trial the subject was asked if he was aware of any hearing difficulty. Those subjects who answered in the affirmative were discontinued from further participation in the experiment. Four subjects fell into this category and were replaced by four subjects without hearing difficulty.

Experimental Design

The statistical treatment of the data was guided by the six hypotheses. A three-factor (2 X 2 X 2) analysis of variance (Winer, 1971) was employed. The independent variables were: reward-punishment, introversion-extraversion, and male-female. There were ten subjects in each of the eight experimental groups (N = 80). The dependent variables were: (1) the reported number of task-irrelevant thoughts, and (2) the number of errors made by each subject on the stimulus detection task. Task-irrelevant thoughts were defined as any thought-making reference to an event occurring outside the given task in time and space. That is, any thought that made reference to any event that was not directly connected to differentiating between a high and low tone was considered a task-irrelevant thought. A stimulus detection error was defined as misidentifying a high tone as a low tone or misidentifying a low tone as a high tone.

In addition to an overall analysis of variance of main effects Hartley's F max test for homogeneity of variance and Newman Keul's post-hoc comparisons (Winer, 1971) were computed. Tests for homogeneous variance showed equal variance throughout all the groups on both dependent variables. The comparisons that were made are as follows: (a) punished introverts versus punished extraverts, (b) punished introverts versus rewarded extraverts, (c) punished introverts versus rewarded introverts, (d) rewarded extraverts versus punished extraverts, (e) rewarded extraverts versus rewarded introverts, and (f) rewarded introverts versus punished extraverts.

CHAPTER IV

RESULTS

Task-Irrelevant Thoughts

Appendix B gives a summary of the total number of task-irrelevant thoughts for each subject within each of the eight experimental groups. The data were analyzed to evaluate the general hypothesis of differences in task-irrelevant thinking among the eight groups. The results for the analysis of variance of task-irrelevant thoughts shown in Table III indicate that there was a significant effect of reward-punishment ($F = 4.21, p < .05$), and that this effect was due primarily to the interaction of reward-punishment with introversion-extraversion ($F = 8.25, p < .01$). Figure 2 presents a graphic representation of this interaction.

No highly significant results were found for the remaining variables. To discover where the real effects of the significant interaction between reward-punishment X introversion-extraversion lay the Newman Keuls method of post-hoc comparisons (Winer, 1971) was employed. These comparisons showed that punished introverts had significantly fewer task-irrelevant thoughts than punished extraverts ($p < .01$); punished introverts had significantly fewer task-irrelevant thoughts than rewarded extraverts ($p < .10$); and punished introverts had significantly fewer task-irrelevant thoughts than rewarded introverts ($p < .01$). They also showed that rewarded extraverts reported fewer task-irrelevant thoughts than punished extraverts ($p < .30$) and that rewarded

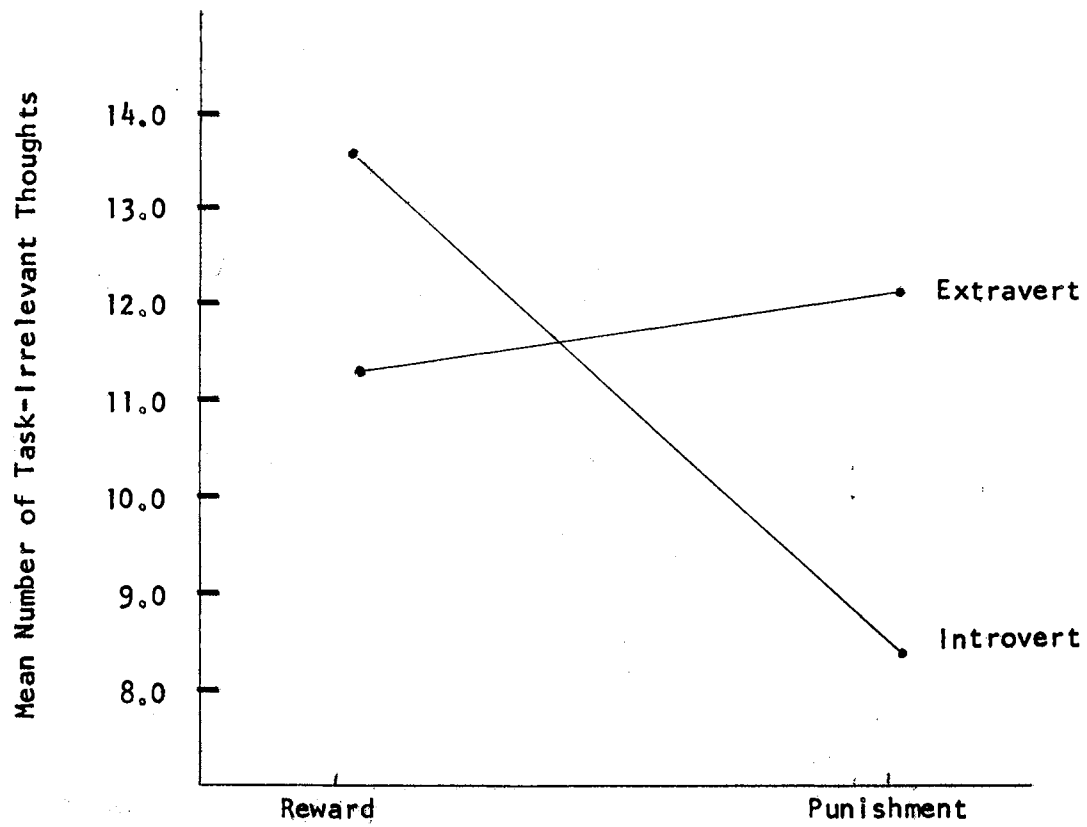


Figure 2. Mean Number of Task-Irrelevant Thoughts for Introversion-Extraversion X Reward-Punishment Groups

extraverts reported fewer task-irrelevant thoughts than rewarded introverts ($p < .30$).

TABLE III
SUMMARY OF ANALYSIS OF VARIANCE
FOR TASK-IRRELEVANT THOUGHTS

Source	df	SS	MS	F	p
RP	1	20.00	20.00	4.21	<.05
IE	1	3.20	3.20	.67	<.50
MF	1	6.05	6.05	1.27	<.30
RP X IE	1	39.20	39.20	8.25	<.01
RP X MF	1	.05	.05	.01	<.90
IE X MF	1	.05	.05	.01	>.90
RP X IE X MF	1	.05	.05	.01	>.90
Error	72	342.20	4.75		

RP = Reward - Punishment
IE = Introversion - Extraversion
MF = Male - Female

Errors

Appendix C gives a summary of the total errors made on the stimulus detection task for each subject. The data were analyzed to evaluate the general hypothesis of differences in stimulus detection errors among the eight hypothesized groups. The results of the analysis of variance shown in Table IV indicate that the interaction effect of reward-punishment X introversion-extraversion was highly significant ($F = 12.08, p < .005$). Figure 3 presents a graphical representation of this interaction. Table IV also shows that the remaining main and interaction effects did not reach a high level of significance.

TABLE IV

SUMMARY OF ANALYSIS OF VARIANCE
FOR ERRORS

Source	df	SS	MS	F	P
RP	1	57.80	57.80	1.10	p<.30
IE	1	11.20	11.20	.21	p<.70
MF	1	.20	.20	.004	p>.90
RP X IE	1	616.00	616.00	12.08	p<.005
RP X MF	1	9.80	9.80	.19	p<.70
IE X MF	1	18.00	18.00	.35	p<.60
RP X IE X MF	1	8.40	8.40	.16	p<.70
Error	72	3718.00	51.60		

RP = Reward - Punishment
 IE = Introversion - Extraversion
 MF = Male - Female

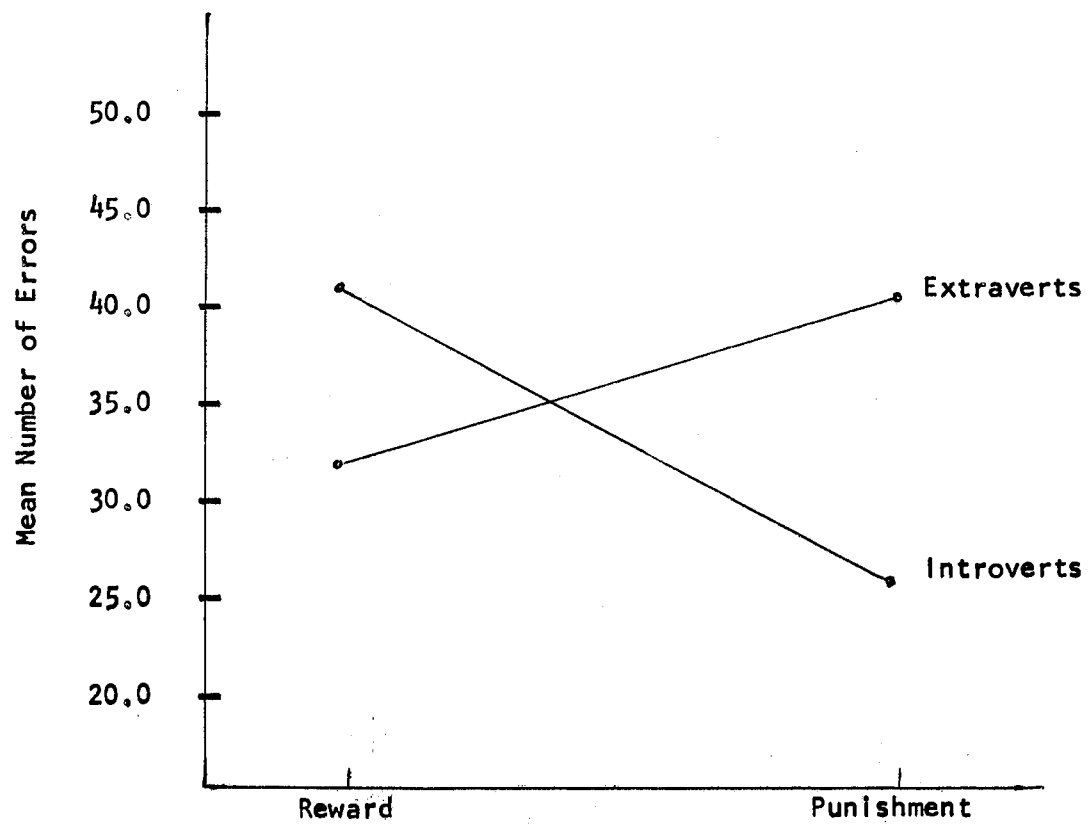


Figure 3. Mean Number of Errors for Introversion-Extraversion X Reward-Punishment Groups

In further analyzing the significant interaction effect of reward-punishment X introversion-extraversion, the Newman Keuls method of post-hoc comparisons was again used to test for major differences.

These comparisons showed that punished introverts had significantly fewer stimulus detection errors than punished extraverts ($p < .01$); and that rewarded extraverts had significantly fewer stimulus detection errors than punished extraverts ($p < .10$). Significant differences were also found between punished introverts and rewarded introverts ($p < .01$), with the former showing fewer errors; and rewarded extraverts and rewarded introverts ($p < .01$), the former showing fewer errors. Although punished introverts had fewer errors than rewarded extraverts ($p < .40$) and punished extraverts had fewer errors than rewarded introverts ($p > .50$), the differences were not very significant.

CHAPTER V

DISCUSSION

The results of this study revealed significant differences in task-irrelevant thoughts and stimulus detection errors among some of the groups. The following hypotheses were strongly supported.

Hypothesis 1.

When incorrect responses are punished and correct responses are ignored, introverts have significantly fewer task-irrelevant thoughts than extraverts.

Hypothesis 2.

When incorrect responses are punished and correct responses are ignored, introverts have significantly fewer stimulus detection errors than extraverts.

Hypothesis 4.

When correct responses are rewarded and incorrect responses are ignored, extraverts have significantly fewer stimulus detection errors than introverts.

The following hypotheses were rejected.

Hypothesis 3.

When correct responses are rewarded and incorrect responses are ignored, extraverts have fewer task-irrelevant thoughts than introverts.

Hypothesis 5.

Males show fewer task-irrelevant thoughts than females.

Hypothesis 6.

Females show significantly fewer stimulus detection errors than males.

This study also produced some other interesting findings.

- A. Introverts receiving punishment as a type of reinforcement have significantly fewer task-irrelevant thoughts than introverts receiving reward.
- B. Introverts receiving punishment as a type of reinforcement have significantly fewer stimulus detection errors than introverts receiving reward.
- C. Extraverts receiving reward have significantly fewer errors ($p < .10$) than extraverts receiving punishment.

The hypotheses that were supported and the trends that were found appear to give ample support to Gray's theoretical formulations that introverts are more sensitive to conditions of punishment and extraverts are more sensitive to reward. They also seem to support Antrobus, Singer and Greenberg's proposed model that daydreaming is a function of perceived payoff value.

The finding that introverts who receive punishment as a type of reinforcement have significantly fewer task-irrelevant thoughts and do better on the assigned task than introverts who receive reward as a reinforcer requires further consideration. Historically, there have been two fundamental assumptions used to explain the phenomenon of punishment suppression. The first of these assumptions was the strong version of the negative law of Effect proposed by Thorndike (1913). Thorndike assumed that any painful or unpleasant event would weaken the response which preceded that event. Thorndike (1932) subsequently rejected this notion and it has not received much attention since. The second fundamental assumption suggested to account for the punishment suppression phenomenon has been referred to as the alternative-response assumption (Azrin and Holtz, 1966). In its simplest form, the assumption states that the decrement in a punished response is caused by an increment in some alternative behavior. All contemporary explanations of

punishment suppression are specific elaborations of this alternative-response assumption.

In considering the effects of punishment on the suppression of daydreams and errors in this study one may conclude that when a subject makes an error in stimulus detection and this response is followed by punishment as a type of reinforcement the subject will attend to providing an alternative response that will avoid the punishment. That response in this instance would be correctly identifying the non-punishing tone. It would also mean the subject is required to pay closer attention to the task at hand, therefore, the very act of having internally produced cognitions that were not pertaining to the task of identifying the stimuli should have a tendency to interfere with the subject's ability to pay close attention to the task. Thus, the act of daydreaming itself will tend to produce a greater number of punished responses, therefore, is more likely to be avoided by the subject.

A very important and possibly crucial aspect of this experiment, and one that was not considered prior to setting up and running the experiment, was that in the long run the rewarded groups were to receive approximately 80 percent verbal reinforcement, whereas the punished groups were to receive approximately 20 percent verbal reinforcement. At first glance this may appear to add further confusion to the results that punished subjects performed better than rewarded subjects, especially after considering that most of the experiments done with reward and punishment have demonstrated superior connection-strengthening of reward relative to punishment (Nutten and Greenwald, 1968).

In reviewing the literature pertaining to the finding that reward

produces greater connection-strengthening than punishment, Nutten and Greenwald (1968) have declared that the majority of these experiments have used tasks in which only 25 percent or fewer of subjects responses were rewarded, with the remainder being punished. This is the opposite of the reinforcement ratio used in the present study. Nutten and Greenwalk (1968) conducted several studies to determine if the isolation effect of reinforcement might be responsible for the differences found between the effects of reward and punishment. Two of the experiments they used to test the isolation effect follow.

Twenty subjects were presented with 40 stimulus photographs for which the subject was to estimate the number, to the nearest five, of objects depicted. In the first experiment responses to a preselected twenty (50 percent) of the forty stimuli were called right, while in the second experiment only ten (25 percent) of the forty responses were called right. All other responses were called wrong. The results showed that the 25 percent rewarded group did significantly better than the group receiving 50 percent reward. In a subsequent experiment the same experimenters found that when reward and punishment were administered with equal frequencies there was no difference in the effect of reward and punishment.

Consistent with these findings were the same effects demonstrating superiority of performance of punished responses when punishment was a relatively infrequent outcome. Thus, the ratio of reward to punishment in a series of tasks may be expected to effect learning or performance (a) directly by virtue of an isolation effect in which the sheer infrequency of one type of outcome draws attention to the response that produced it, and (b) also indirectly in that the subject may find it more

profitable, in regard to accomplishment of some persisting task, to focus attention on responses that receive the more infrequently occurring outcome (Nutten and Greenwald, 1968). Further research in this area should attempt to control for this isolation effect, possibly by using an equal percentage of reward and punishment. Considering the possibility of the isolation effect in regard to the present study interpretation of the results should be approached with caution.

Another interesting finding provided by this study is the effect reward and punishment had on extraverts in regard to the two dependent variables. The fact that extraverts receiving reward showed significantly fewer errors in the stimulus detection task than extraverts receiving punishment, and the fact that there were no significant differences with the same groups in regard to the number of task-irrelevant thoughts is somewhat perplexing. In a study done by Antrobus, Singer and Greenberg (1966) using normal subjects that were not screened on the introversion-extraversion variable, the cognitive effect was found to be much stronger than the error effect. The authors' explanation of this was that had the penalty values been increased to be stronger than the moderate penalty values that were employed then there would have been a reversal in the effects; such as was generated in this study. It should also be mentioned that pilot studies have shown that when given the alternative of detecting signals or doing nothing while sitting in a soundproof, lightproof booth, subjects always choose the task (Singer, 1966).

The male-female variable was used in this study primarily as a control factor in that previous studies have found that the pay-off effect mentioned in the daydreaming model was primarily an effect of

males, whereas the error effect was characteristic of females. This study showed no differences between the two sexes.

Suggestions for Further Research

Extension of the theoretical model and its experimental outgrowths may open the way for further significant research. The work described above was done with students, who probably have a greater priority for inner responsiveness as a group. The use of adolescents in whom fantasy activity is in itself at a peak (Singer and McCraven, 1961) may influence these findings. It should also be of interest to determine to what extent the findings about auditory detection apply to visual detection situations. It may well be that given a visual task of some difficulty the demands upon visual imagery, which, as was shown by Antrobus and Singer (1964), as well as this study comprises a good share of the task-irrelevant thinking variance. At the same time one might also examine the relative priorities of various modalities, both as external sources or as imagery patterns.

Another research possibility includes the quest on "fantasy deprivation." Dement (1960), in a very provocative study found some indications that persons awakened systematically during state 1 EEG and REM periods suffered from restlessness and excessive daydreaming. He suggested that some basic physiological restorative function was served by dreaming. One might set up an experimental situation using introverts and extraverts and effectively minimize activity by increasing the complexity of rate of the external task, providing a reward for increased external channel attention and introducing considerable external distraction for an extended period. It may be found that such

"daydream" or "general thinking deprivation" would have some unpleasant effects, particularly on frequent daydreamers. To provide a greater test of the concept of "payoff" it may be worthwhile to vary the amount of reward and punishment. It is also suggested that the percentage of reward and punishment be equalized to control for the isolation effect.

CHAPTER VI

SUMMARY

An attempt was made to determine the relationship of introversion-extraversion, reward-punishment, and sex-type to the number of correct responses and task-irrelevant thoughts in a stimulus detection task. In formulating the hypotheses and interpreting the results, the primary concern was testing Gray's theoretical formulations concerning introversion-extraversion and Antrobus, Singer and Greenberg's theoretical formulations concerning daydreaming.

Eighty subjects (20 male introverts, 20 female introverts, 20 male extraverts, and 20 female extraverts) were selected on the basis of their introversion-extraversion scores on the Eysenck Personality Inventory. Next, 10 subjects from each of these samples were randomly selected to receive reward or punishment. A stimulus detection task was used in which the subject was required to press a button when he thought he heard the lowest of two tones (250 CPS and 280 CPS). Each time a subject in the punished group made an incorrect response, the experimenter said "wrong" in a tone above normal conversational level and 1/2¢ was subtracted from a total given to the subject at the start of the experiment. Each time a subject in the rewarded group made a correct response the experimenter would say "right" in an approving tone and the subject would be awarded 1/2¢. At the end of each trial which consisted of 20 presentations of the tones the subject was asked

If he experienced any task-irrelevant thoughts.

A three-factor (2 X 2 X 2) analysis of variance was employed. Post-hoc comparisons were also computed. The dependent variables in this study were the number of errors in the stimulus detection task and the number of task-irrelevant thoughts reported at the end of each trial. The results are summarized below.

The following hypotheses were strongly supported.

Hypothesis 1.

When incorrect responses are punished and correct responses are ignored, introverts have significantly fewer task-irrelevant thoughts than extraverts.

Hypothesis 2.

When incorrect responses are punished and correct responses are ignored, introverts have significantly fewer stimulus detection errors than extraverts.

Hypothesis 4.

When correct responses are rewarded and incorrect responses are ignored, extraverts have significantly fewer stimulus detection errors than introverts.

The following hypotheses were rejected.

Hypothesis 3.

When correct responses are rewarded and incorrect responses are ignored, extraverts have fewer task-irrelevant thoughts than introverts.

Hypothesis 5.

Males show fewer task-irrelevant thoughts than females.

Hypothesis 6.

Females show significantly fewer stimulus detection errors than males.

This study also produced some other interesting findings.

- A. Introverts receiving punishment as a type of reinforcement have significantly fewer task-irrelevant thoughts than introverts receiving reward.

- B. Introverts receiving punishment as a type of reinforcement have significantly fewer stimulus detection errors than introverts receiving reward.
- C. Extraverts receiving reward have significantly fewer errors ($p < .10$) than extraverts receiving punishment.

Although the obtained results may be interpreted as lending support to Gray's statement that introverts are more sensitive to conditions of punishment as a type of reinforcement whereas, extraverts are more sensitive to conditions of reward as a type of reinforcement, it is suggested that further research be done controlling for the possibility of an isolation effect due to unequal reinforcement ratio. The results also seem to lend support to Antrobus, Singer and Greenberg's theoretical model of daydreaming. That is, whether one pays more attention to internal or external stimuli is a matter of perceived payoff value. However, here also, it is suggested that the isolation effect may have had a decided effect. Areas for further research were also suggested.

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APPENDIX A

EYSENCK'S THEORY OF INTROVERSION-EXTRAVERSION

In the development of his theory, Eysenck began with a study of the problems of classification. His major concern was "What are the major dimensions of personality with respect to which persons vary?" The answer, proposed on the basis of previous findings and original research, was that most of the variance in personality functioning can be accounted for in terms of the three orthogonal dimensions of psychoticism, neuroticism, and introversion-extraversion. Psychoticism is defined as a predisposition to develop such symptoms of mental disorder as delusions, hallucinations, mood disturbances, motor retardation, and the like. Neuroticism is identified with emotionality or lability of the autonomic nervous system, which is considered to act as a predisposition to neurotic disorders. The introversion-extraversion dimension is defined in terms of a wide range of behaviors. The behavior of introverts is characterized by a relative lack of sociability, high persistence, high level of aspiration, an emphasis on accuracy rather than speed, reliance on inner standards of conduct, and a stress on moral scruples. Extraverts, on the other hand, are sociable, impulsive, dependent on the social valuations of others, low in level of aspiration, and tough minded in their attitudes. Eysenck further proposed that hysteria is the syndrome to be found in the extraverted neurotic, while dysthymia (syndrome characterized by anxiety, reactive depression, and/or

obsessive-compulsive features) is typically found in the introverted neurotic (Eysenck, 1957, 1967, Lovibond, 1964).

In offering an explanation of the likely neurophysiological mechanisms of the personality differences between extraverts and introverts, Eysenck followed Pavlov's excitation-inhibition theory and Hull's inhibition theory, thus formulating his individual difference and typological postulates in terms of excitation-inhibition balance.

The general relationship between personality and excitation-inhibition was put forward by Eysenck in two postulates (Eysenck, 1957). The first of these was called the postulate of individual differences; human beings differ with respect to the speed with which excitation and inhibition are produced, the strength of the excitation and inhibition produced, and the speed with which inhibition is dissipated. These differences are considered properties of the physical structures involved in making stimulus-response connections. Eysenck referred to the second postulate as the typological postulate; it is as follows:

Individuals in whom excitatory potential is generated slowly and in whom excitatory potentials so generated are relatively weak, are thereby predisposed to develop extraverted patterns of behavior and to develop hysterical-psychopathic disorders in cases of neurotic breakdown. Whereas, individuals in whom excitatory potentials so generated are strong, are thereby predisposed to develop introverted patterns of behavior and to develop dysthymic disorders in case of neurotic breakdown. Similarly, individuals in whom reactive inhibitions are generated, and in whom reactive inhibition is dissipated slowly, are thereby predisposed to develop extraverted patterns of behavior and to develop hysterical-psychopathic disorders in case of neurotic breakdown. Conversely, individuals in whom reactive inhibition is developed slowly, in whom weak reactive inhibitions are generated, and in whom reactive inhibition is dissipated quickly, are thereby predisposed to develop introverted patterns of behavior and to develop dysthymic disorders in case of neurotic breakdown (Eysenck, 1957).

APPENDIX B

TABLE V

TOTAL TASK-IRRELEVANT THOUGHTS FOR
THE EIGHT HYPOTHESIZED GROUPS

S	PFI	PMI	PFE	RMI	RFE	RME	PME	RFI
1	3	3	6	5	3	9	10	4
2	5	5	3	9	7	3	8	7
3	2	7	8	9	9	7	6	4
4	6	4	8	6	3	5	3	8
5	4	2	6	7	4	5	7	11
6	1	5	7	6	7	4	5	6
7	7	8	7	8	5	6	4	5
8	5	6	5	9	4	6	6	8
9	3	3	6	4	6	7	5	7
10	4	3	4	6	5	8	10	5
	40	46	58	69	54	60	64	65

APPENDIX C

TABLE VI

TOTAL STIMULUS DETECTION ERRORS FOR
THE EIGHT HYPOTHESIZED GROUPS

S	PMI	PFI	PME	PFE	RMI	RFI	RME	RFE
1	12	10	22	13	17	31	11	13
2	7	11	12	10	26	16	16	19
3	14	18	31	41	31	25	14	12
4	20	19	14	16	33	28	31	26
5	10	9	26	25	15	14	9	8
6	15	13	35	21	20	9	7	33
7	9	7	14	11	10	18	18	18
8	22	21	22	20	17	27	15	15
9	15	11	9	19	26	16	13	11
10	18	14	17	23	19	22	16	19
	142	133	202	199	214	206	150	174

APPENDIX D

THE EYSENCK PERSONALITY INVENTORY

The Eysenck Personality Inventory is a self-report inventory which is designed to measure two dimensions of personality; extraversion-Introversion and neuroticism. It consists of 57 items, of which 24 are keyed to extraversion, 24 to neuroticism, and 9 to a lie (L) scale. Mean scores on the extraversion and neuroticism scales are 13.7 (SD = 4.1) and 10.9 (SD = 4.7), respectively (Eysenck and Eysenck, 1963).

The Eysenck Personality Inventory, which is the revised version of the Maudsley Personality Inventory (Eysenck, 1962), was developed out of many years of intensive research on the quantitative and experimental analysis of personality. Operating on the assumption that measurement in the field of personality is impossible until the dimensions along which such measurement can take place are known, a large factorial study was carried out on a variety of personality traits whose presence or absence in 700 male neurotic soldiers was recorded by the psychiatrist in charge of the case (Eysenck, 1947). This study resulted in the isolation of the neuroticism and extraversion factors. Having isolated these factors, which appeared to indicate two dimensions of personality along which measurement might fruitfully be undertaken, an effort was made to discover objective tests which would make possible such measurement. A comparatively large number of tests were found to be discriminative in this connection. They are described in great detail elsewhere (Eysenck, 1947).

For the purpose of constructing the Eysenck Personality Inventory, a number of factor analytic studies were carried out, one of which resulted in a matrix of 108 entries which included all the items in Forms A and B, as well as a set of substitute items. Subjects of these investigations were more widely representative than is customary in such studies. Apart from university students, use was made of various middle-class and working-class groups, varying in age and sex, as well as of representative samples of the whole population, interviewed by experienced representatives of a leading firm of market research consultants. Essentially, item selection, followed by factor analysis, was sure as to minimize the correlation between the scales. The scales are thus considered to be independent, or orthogonal (Eysenck and Eysenck, 1963).

The reliabilities of the extraversion and neuroticism scales of the inventory are about as promising as could be expected of a personality test. They run between .84 and .94 when the test-retest method is used, and between .74 and .91, when the split-half method is employed. The only validity data cited by the authors involved the use of method of nominated groups. Using this method, S.B.G. Eysenck (1962) and Eysenck (1963) have several times shown that when independent judges are asked to nominate extraverted or introverted, stable or unstable subjects, and when these nominees are then asked to fill in the Eysenck Personality Inventory, there are clear and predictable differences between the scores of the respective groups. With regard to the validity of the inventory, Eysenck and Eysenck (1963) suggest that by virtue of the close similarity of the Eysenck Personality Inventory, it is reasonable to argue that the validity data collected on the

Maudsley Personality Inventory (Eysenck, 1962) would also apply to the Eysenck Personality Inventory.

Form A of the Eysenck Personality Inventory, which was used in the present study appears on the following pages.

1. Do you often long for excitement? Yes No
2. Do you often need understanding friends to cheer you up? . Yes No
3. Are you usually carefree? Yes No
4. Do you find it very hard to take no for an answer? . . . Yes No
5. Do you stop and think things over before doing anything? . Yes No
6. If you say you will do something do you always keep your promise, no matter how inconvenient it might be to do so? Yes No
7. Do you generally do and say things quickly without stopping to think? Yes No
8. Does your mood often go up and down? Yes No
9. Do you ever feel "just miserable" for no reason? Yes No
10. Would you do almost anything for a dare? Yes No
11. Do you suddenly feel shy when you want to talk to an attractive stanger? Yes No
12. Once in a while do you lose your temper and get angry? Yes No
13. Do you often do things on the spur of the moment? Yes No
14. Do you often worry about things you should not have done or said? Yes No
15. Generally do you prefer reading to meeting people? Yes No
16. Are your feelings rather easily hurt? Yes No
17. Do you like going out a lot? Yes No
18. Do you occasionally have thoughts and ideas that you would not like other people to know about? Yes No
19. Are you sometimes bubbling over with energy and sometimes very sluggish? Yes No
20. Do you prefer to have few but special friends? Yes No
21. Do you daydream a lot? Yes No
22. When people shout at you, do you shout back? Yes No
23. Are you often troubled about feelings of guilt? Yes No

24. Are all your habits good and desirable ones? Yes No
25. Can you usually let yourself go and enjoy yourself
a lot at a gay party? Yes No
26. Would you call yourself tense or "highly-strung?" . . . Yes No
27. Do other people think of you as being very lively? . . Yes No
28. After you have done something important, do you
often come away feeling you could have done better? . . Yes No
29. Are you mostly quiet when you are with other people? . . Yes No
30. Do you sometimes gossip? Yes No
31. Do ideas run through your head so that you cannot
sleep? Yes No
32. If there is something you want to know about,
would you rather look it up in a book than talk
to someone about it? Yes No
33. Do you get palpitations or thumping in your heart? . . . Yes No
34. Do you like the kind of work that you need to pay
close attention to? Yes No
35. Do you get attacks of shaking or trembling? Yes No
36. Would you always declare everything at the customs,
even if you knew that you could never be found out? . . Yes No
37. Do you hate being with a crowd who play jokes on
one another? Yes No
38. Are you an irritable person? Yes No
39. Do you like doing things in which you have to
act quickly? Yes No
40. Do you worry about awful things that might happen? . . . Yes No
41. Are you slow and unhurried in the way you move? Yes No
42. Have you ever been late for an appointment or work? . . Yes No
43. Do you have nightmares? Yes No
44. Do you like talking to people so much that you would
never miss a chance of talking to a stranger? Yes No
45. Are you troubled by aches and pains? Yes No

46. Would you be very unhappy if you could not see
lots of people most of the time? Yes No
47. Would you call yourself a nervous person? Yes No
48. Of all the people you know are there some whom
you definitely do not like? Yes No
49. Would you say you were fairly self-confident? Yes No
50. Are you easily hurt when people find fault with
you or your work? Yes No
51. Do you find it hard to really enjoy yourself
at a lively party? Yes No
52. Are you troubled with feelings of inferiority? Yes No
53. Can you easily get some life into a rather
dull party? Yes No
54. Do you sometimes talk about things you know
nothing about? Yes No
55. Do you worry about your health? Yes No
56. Do you like playing pranks on others? Yes No
57. Do you suffer from sleeplessness? Yes No

PLEASE CHECK TO SEE THAT YOU HAVE ANSWERED ALL THE QUESTIONS.

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VITA

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