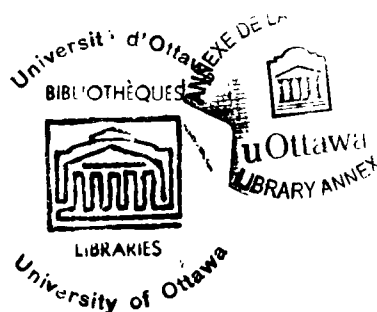


EXTRAVERSION-INTROVERSION AND THE  
EXPERIMENTER BIAS EFFECT

by David M. Nozick

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of Graduate Studies of the  
University of Ottawa as partial  
fulfilment of the requirements  
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## CURRICULUM STUDIORUM

David M. Nozick was born December 5, 1945, in Winnipeg, Manitoba. He received the Bachelor of Science degree from the University of Manitoba, Winnipeg, Manitoba, in 1966. He received the Master of Arts degree in psychology from the University of Manitoba, Winnipeg, Manitoba, in 1968. The title of his thesis was Experimenter Bias as a Function of Ambiguity of Stimulus.

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## INTRODUCTION

The realization that man can influence another man, or animal, without the use of overt communication was made by Pfungst in 1911. Pfungst was investigating the now famous horse Clever Hans, who was believed to be able to spell, read and solve problems. A series of experiments conducted by Pfungst revealed that Hans was unintentionally cued by his questioners. The questioners reflected their expectations by unintentional signals which the horse could perceive. Pfungst summarized his findings by declaring his investigators had been misled by "looking for, in the horse, what should have been sought in the man." Thus Pfungst pointed out the basis of the problem which has been more recently brought into the laboratory. The problem of the experimenter contaminating his results by transmitting unintentional cues to his subjects so as to influence their behavior has become a major concern for the social psychologist.

Robert Rosenthal and his associates have initiated the preliminary research in this area. In particular they have devoted considerable energy to investigating the E-bias effect. This effect refers to the influence that the experimenter's hypothesis regarding the nature or magnitude of the data to be obtained from his subject has

on the subsequent collection of such data. Rosenthal and colleagues have investigated a multitude of variables related to the E-bias effect including such factors as experimenter's experience, status, and sex.

However, a survey of the literature revealed few studies which have explored the relationship between personality and the E-bias effect. In the studies which have explored this relationship there has been a great variety of methods utilized in measuring the personality constructs. This has led to considerable confusion and a lack of consensus as to which personality construct is the most salient in the mediation of the E-bias effect. The present study is a further attempt to explore the relationship between personality and the E-bias effect by examining Eysenck's theory of the extraversion-introversion personality dimension and utilizing the Eysenck Personality Inventory as the measure of personality. As well, there is an absence of information on the reliability of the E-bias effect with an ambiguous stimulus. It is also the aim of this study to provide information on this latter question.

The first chapter of the thesis presents the review of the literature. The hypotheses of this experiment are stated at the end of the first chapter. Chapter two consists of a description of the procedures and methods used to test the hypotheses. Chapter three presents the results

of the investigation, a discussion of these results, and some suggestions for future research.

## CHAPTER I

### REVIEW OF THE LITERATURE

This chapter, which presents a discussion of studies relating to the Experimenter Bias Effect and Eysenck's extraversion-introversion dimension, begins with the historical development of the experimenter-subject interaction. Research cited in the following two sections will deal with variables that affect the E-bias effect and the manner in which it is mediated. In addition, the studies which have investigated the relationship between personality and the E-bias effect will be discussed. This chapter will also describe Eysenck's theory of the extraversion-introversion personality dimension. Consideration will be given to studies relating extraversion-introversion and subject or experimenter's performance in a psychological experiment. The final section of this chapter presents a synthesis of the studies discussed and a statement of the problem formulated in the present study.

#### 1. Historical Perspective of the Social Psychology of the Experiment.

During the past decade there has developed an increasing interest in the "social psychology of the experiment." The social situation which exists when an experimenter

encounters his subject has provided the basis for much information regarding interpersonal relations. In view of the importance of this information, investigators in the last decade have studied such factors as perception, motivation, and personality which may influence the experimenter-subject interaction.

In considering the experimental situation as a psychological problem, Rosenzweig anticipated the current interest in the experimenter's unwitting influence on his subjects.

Because one is obliged to study psychological phenomena in an intact conscious organism that is part and parcel of a social environment, the isolation of factors is difficult from the standpoint of experimental procedure. [...] In psychological experimentation the social environment can never be neglected and the experimenter is usually a part of the social environment of the experiment.<sup>1</sup>

McGuigan,<sup>2</sup> several decades later acknowledging that the characteristics of an experimenter may indeed influence behavior, proposed that behavioral scientists devise techniques of controlling the experimenter variable and accumulate knowledge about the effects of experimenters on their

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1 Saul Rosenzweig, "The Experimental Situation as a Psychological Problem," Psychological Review, Vol. 40, 1963, 1933, p. 337-339.

2 F. J. McGuigan, "The Experimenter: A Neglected Stimulus Object," Psychological Bulletin, Vol. 60, 1963, p. 421-428.

subjects. However, it was not until several years later that Rosenthal<sup>3</sup> and his associates began their systematic study of the experimenter.

Meanwhile, during this time period, Masling,<sup>4</sup> using projective instruments, was exploring the relationship between experimenter and subject. In his studies, Masling assessed the effect of the examiner's physical characteristics, and "warm-cold" behavior upon his subject response. Based on his findings, Masling drew the following conclusion:

The subject in the projective test setting will not only use those cues furnished by the ink blot or picture, but also those supplied by his feelings about the examiner, [...] those involved in the instructions, [...] and those cues supplied consciously or unconsciously by E.<sup>5</sup>

This observation by Masling was to foreshadow a great deal of research dealing with the experimenter-subject interaction.

One of the most thorough and systematic analyses of the interpersonal nature of the psychological experiment was that by Riecken.<sup>6</sup> Riecken noted three aims of the

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<sup>3</sup> Robert Rosenthal, Experimenter Effects in Behavioral Research, New York, Appleton-Century-Crofts, 1966, vii-464 p.

<sup>4</sup> Joseph Masling, "The Influence of Situational and Interpersonal Variations in Projective Testing," Psychological Bulletin, Vol. 57, 1960, p. 65-85.

<sup>5</sup> Ibid., p. 81.

<sup>6</sup> H. W. Riecken, "A Program for Research on Experiments in Social Psychology," in N.F. Washburne (ed.), Decisions, Values and Groups, Vol. 2, New York, Pergamon Press, 1962, p. 25-41.

subject. The first of these is the attainment of those rewards the subject feels are due him from having accepted the invitation to participate. A second objective of the subject is to discover the rationale of the experiment. Finally, the subject is motivated to be as good a subject as possible. Riecken pointed out that the subject wants to be evaluated favorably by the experimenter so therefore he tries to make his performance an appropriate one.

Orne,<sup>7</sup> on the other hand, contended that the subject would attempt to identify and confirm the experimental hypothesis because of his desire to contribute to the development of science. While in agreement with Orne's contention that subjects attempted to identify and confirm the experimental hypothesis, Rosenberg suggested that the subject's behavior was a function of his "evaluative apprehension"; that is, "an active anxiety-toned concern that he win a positive evaluation from the experimenter or at least that he provide no ground for a negative one."<sup>8</sup>

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7 Martin T. Orne, "On the Social Psychology of the Psychological Experiment: With Particular Reference to Demand Characteristics and Their Implications," American Psychologist, Vol. 17, 1962, p. 776-783.

8 Milton J. Rosenberg, "When Dissonance Fails: On Eliminating Evaluation Apprehension from Attitude Measurement," Journal of Personality and Social Psychology, Vol. 1, 1965, p. 28-42.

The question of subject's motivation was to be an important factor in the experimenter-subject interaction. Indeed, recent studies<sup>9,10</sup> have suggested that the probability of hypothesis-confirming behavior on the part of the subject would be directly related to the experimenter's ability to exert influence upon the subject's future.

Of those who explored the subject's behavior in a psychological experiment, Orne<sup>11</sup> has been the most articulate. Orne suggested that the subject's response in an experiment is a function not only of the independent variable being investigated, but also of the "demand characteristics" of the situation. The demand characteristics include such variables as the setting of the laboratory, the personal attributes of the experimenter, as well as implicit communication during the experiment proper. These variables serve as cues to the subject which enable him to identify and confirm the experimental hypothesis.

While most investigators have acknowledged the importance of the experimenter's influence during a

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9 Theodore Jacob, "Experimenter Bias Effect as a Function of Demand Characteristics and Experimenter Investment," Psychological Reports, Vol. 28, 1971, p. 1003-1010.

10 M. W. Minor, "Experimenter-Expectancy Effect as a Function of Evaluation Apprehension," Journal of Personality and Social Psychology, Vol. 15, 1970, p. 333-337.

11 Orne, op. cit., p. 779.



psychological experiment, until recently few studies have investigated this variable. Rosenthal<sup>12</sup> and his associates have studied the experimenter's influence most extensively.

## 2. Variables Affecting the Experimenter Bias Effect.

The early studies of Rosenthal and his associates have been concerned with two major types of effects which the experimenter can have upon the results of his research. These are the "experimenter effect" and the "experimenter bias effect."<sup>13</sup> The experimenter effect is the term used by Rosenthal to describe the influence of the experimenter's psychosocial and biosocial attributes on the subject's response. The experimenter bias effect is the term used by Rosenthal to describe the influence that the experimenter's hypothesis regarding the nature or magnitude of the data to be obtained from his subject has on the subsequent collection of such data.

One of the variables which Rosenthal and his associates have studied is the biosocial attributes of

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12 Rosenthal, op. cit., vii-464 p.

13 Ibid., p. 310-311.

both S and E. More specifically, Rosenthal<sup>14,15,16</sup> and his coworkers have found that the sex of both S and E is important in laboratory studies. Although in general the studies found that the conditions which maximize the E-effect occurred when Es were male and Ss were female, the sex of the experimenter did not always affect the performance of his subject. Glixman<sup>17</sup> presents partial support for the proposition that the sex of the experimenter may interact with the type of task required to determine the subject's response. Other biosocial attributes investigated and found to influence data include experimenter's age and race. Wenk,<sup>18</sup> for example, found that Negro subjects scored appreciably higher on nonlanguage

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<sup>14</sup> Robert Rosenthal, "Experimenter Attributes and Determinants of Subjects' Responses," Journal of Projective Techniques and Personality Assessment, Vol. 27, 1963, p. 324-331.

<sup>15</sup> R. Rosenthal, G. W. Persinger, R. C. Mulry, Linda Vikan-Kline and M. Grothe, "Changes in Experimental Hypothesis as Determinants of Experimental Results," Journal of Projective Techniques and Personality Assessment, Vol. 28, 1964, p. 465-469.

<sup>16</sup> Ibid., p. 470-473.

<sup>17</sup> A. F. Glixman, "Psychology of the Scientist. XXII: Effects of Examiner, Examinee-sex, and Subject-sex upon Categorizing Behavior," Perceptual Motor Skills, Vol. 24, 1967, p. 107-117.

<sup>18</sup> E. A. Wenk, "Notes on Some Motivational Aspects of Test Performance of White and Negro CYA Inmates," in R. Rosenthal and R. L. Rosnow (eds.), Artifact in Behavioral Research, New York, Academic Press, 1969, p. 188.

tests of intellectual functioning when the examiner was Negro rather than white. Rosenthal summarizes:

The general conclusion to be drawn from much of the research reviewed here seems to be that Ss tend to respond in the way they feel to be most proper in the light of the investigator's attributes.<sup>19</sup>

Another variable which appears to influence the collection of data is the psychosocial attributes of E. In particular, Rosenthal has emphasized the experimenter's anxiety, need for social approval, relative status, and warmth. In a number of studies concerned with the E's anxiety, Rosenthal and his associates<sup>20,21</sup> found no consistent relationship between S's response and E's anxiety level. Similarly, Rosenthal<sup>22</sup> and others found E's need for social approval to be related to S's responses in an unpredictable manner. Experimenter's status, on the other hand, has proven to have a fairly consistent effect on S's response. In one verbal conditioning experiment, Rosenthal

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19 Rosenthal, op. cit., 1966, p. 61.

20 R. Rosenthal, G. W. Persinger, Linda Vikan-Kline and R. C. Mulry, "The Role of the Research Assistant in the Mediation of Experimenter Bias," Journal of Personality, Vol. 31, 1963, p. 313-335.

21 R. Rosenthal, P. Kohn, P. M. Greenfield, and N. Carota, "Experimenters' Hypothesis Confirmation and Mood as Determinants of Experimental Results," Perceptual Motor Skills, Vol. 20, 1965, p. 1237-1252.

22 Ibid.

et al.<sup>23</sup> found higher status Es were significantly more effective in influencing their S's response. It was also noted by these authors that higher status Es were perceived by their subjects as being more professional, businesslike, and consistent than low status experimenters. Similarly, Barber and Calverley,<sup>24</sup> in an experiment using hypnosis, found that experimenters who influence their subject's responses behaved in a more professional way. In a recent publication, Rosenthal,<sup>25</sup> summarizing a number of studies employing low and high status experimenters, noted that high status experimenters had four times the probability of influencing their subject's responses.

Although concerned with the E-effect, the vast amount of research by Rosenthal and his associates has dealt with the more specific E-bias effect.<sup>26</sup> Rosenthal has

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23 R. Rosenthal, P. Kohn, P. M. Greenfield and N. Carota, "Data Desirability, Experimenter Expectancy, and the Results of Psychological Research," Perceptual Motor Skills, Vol. 3, 1966, p. 20-27.

24 T. X. Barber and D. S. Calverley, "Effect of E's Tone of Voice on Hypnotic-like Suggestibility," Psychological Reports, Vol. 15, 1964, p. 139-144.

25 R. Rosenthal, "Interpersonal Expectations: Effects of the Experimenter's Hypothesis," in Rosenthal and Rosnow (eds.), op. cit., p. 228.

26 Experimenter bias has been operationally defined in most studies as the significant difference between the results obtained by E's expecting one result and by E's expecting the opposite result.

demonstrated the E-bias effect with both human and animal Ss. Rosenthal and Fode,<sup>27</sup> using rats as Ss, tested the hypothesis that Es are able to obtain from their animal Ss the data they want or expect to obtain. Two groups of Es and two groups of randomly assigned animals were used. One group of Es was instructed that its group of rats was "maze-dull," and a second group of Es was instructed that its group of rats was "maze-bright." In a simple T maze the "maze-bright" rats performed significantly better than the "maze-dull" rats.

Rosenthal and Fode<sup>28</sup> were also the first to demonstrate the E-bias effect with human subjects, using a person perception task. The experimental paradigm of this investigation has been utilized in the majority of studies concerned with the E-bias effect. The experimental procedure was for the experimenter to show a series of ten photographs of people's faces to each of his subjects individually. The subject was to rate the degree of success or failure shown in the face of each person pictured in the photos. Each face could be rated as any value between -10

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27 R. Rosenthal and K. L. Fode, "The Effect of Experimenter Bias on the Performance of the Albino Rat," Behavioral Science, Vol. 8, 1963, p. 183-189.

28 -----, "The Problem of Experimenter Outcome-bias," in Rosenthal, op. cit., 1966, p. 145.

to +10, with -10 meaning extreme failure and +10 meaning extreme success. The ten photos had been selected so that on the average they were rated as neither successful nor unsuccessful, but rather as neutral with an average numerical score of zero. Half the experimenters were told that the "well-established" finding was such that their subjects should rate the photos as being of successful people (ratings of +5) and half the experimenters were told that their subjects should rate the photos as being of unsuccessful people (ratings of -5). Results of the experiment showed that experimenters expecting higher photo ratings obtained higher photo ratings than did experimenters expecting lower photo ratings.

This study and its replications have served as the foundation for much subsequent research. Shames and Adair<sup>29</sup> prior to testing the generality of the experimenter bias phenomenon replicated Rosenthal's original study. The positive and negative bias groups were instructionally induced as in the original Rosenthal experiment. A significant difference between the high and low bias subject's mean ratings was observed. Bootzin<sup>30</sup> similarly obtained

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29 M. L. Shames and J.G. Adair, "Experimenter Bias as a Function of Type and Structure of the Task," Canadian Psychologist, Vol. 8, 1967, p. 1176.

30 R. R. Bootzin, "The Experimenter: A Credibility Gap in Psychology," Dissertation Abstracts, Vol. 30, 1969, p. 1882.

significant differences between the mean ratings of high and low bias subjects. On the other hand, Barber et al.<sup>31</sup> in five independent investigations failed to demonstrate the E-bias effect using essentially the same experimental paradigm as Rosenthal did in his original experiment. Jacob,<sup>32</sup> following Rosenthal as closely as possible with respect to development of the experimental task, selection of Ss and Es, and instructions administered to Ss and Es, similarly was not able to obtain a significant difference between the positive and negative bias groups. In a recent critical review, Barber and Silver have questioned the reliability of the E-bias phenomenon, stating "to the best of our knowledge, the reliability of the instrument used in the great majority of studies in this area (person-perception task) has not been determined."<sup>33</sup> However, Friedman,<sup>34</sup> in the only published study to date to measure the reliability of the E-bias effect, found a test-retest

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31 T. X. Barber, A. Forgione, S. F. Cheves, D. S. Calverley, J. D. McPeake, and Barbara Bowen, "Five Attempts to Replicate the Experimenter Bias Effect," Journal of Consulting and Clinical Psychology, Vol. 33, 1969, p. 1-6.

32 T. Jacob, "The Experimenter Bias Effect: A Failure to Replicate," Psychonomic Science, Vol. 13, 1968, p. 239-240.

33 T. X. Barber and M. J. Silver, "Fact, Fiction, and the Experimenter Bias Effect," Psychological Bulletin, Monograph Supplement, Vol. 70, 1968, p. 24.

34 N. Friedman, The Social Nature of Psychological Research, New York, Basic Books, 1967, p. 42.

coefficient of correlation of .60 between Ss mean ratings on the Rosenthal person-perception task. Nevertheless, the empirical evidence for the reliability of the E-bias effect remains somewhat limited. Therefore, one of the purposes of the present study will be to investigate the reliability of the E-bias effect.

Recent attempts have been made to extend the generality of the E-bias effect to tasks other than the person perception task. These attempts have led to inconclusive results. Masling,<sup>35</sup> using the Rorschach ink blot test, found that S's responses were significantly altered by the expectancy of the experimenter. Similarly, Marwit and Marcia<sup>36</sup> with the Holtzman ink blot test and Silverman<sup>37</sup> with a word association test demonstrated the bias effect. On the other hand, Wessler,<sup>38</sup> using reaction time, and Shames and Adair,<sup>39</sup> using a dot counting task, failed to demonstrate the bias phenomenon.

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<sup>35</sup> J. Masling, "Differential Indoctrination of Examiners and Rorschach Responses," Journal of Consulting Psychology, Vol. 29, 1965, p. 198-201.

<sup>36</sup> S. J. Marwit and S. R. Marcia, "Tester Bias and Response to Projective Instruments," Journal of Consulting Psychology, Vol. 31, 1967, p. 253-258.

<sup>37</sup> I. Silverman, "The Effects of Experimenter Outcome Expectancy on Latency of Word Association," Journal of Clinical Psychology, Vol. 24, 1968, p. 60-63.

<sup>38</sup> R. L. Wessler, "The Experimenter Effect on a Task-ability Problem Experiment," Dissertation Abstracts, Vol. 27, 1966, p. 2173.

<sup>39</sup> Shames and Adair, op. cit., p. 1176.



In an effort to explain the inconclusive results cited above, Masling<sup>40</sup> proposed that the bias would occur only with an ambiguous task since under ambiguous conditions the subject is dependent upon the experimenter for cues how to solve the problem. Masling tested his hypothesis by varying the time exposure of dots presented tachistoscopically. His results showed that the shorter the time exposure, the more ambiguous the stimulus and the more likelihood of demonstrating the E-bias effect.

Thus the evidence strongly suggests that the stimulus must be ambiguous to allow the S to be influenced by E. Barko<sup>41</sup> and Felton,<sup>42</sup> independently studying the relationship between the E-bias effect and ambiguity of stimulus, both demonstrated the bias effect with an ambiguous stimulus but failed to do so with a structured one.

The studies reviewed in this section of the chapter illustrate the complexity of the E-bias effect and the

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<sup>40</sup> J. Masling, "Role related Behavior of the Subject and the Psychologist and Its Effect upon Psychological Data," Nebraska Symposium on Motivation, Vol. 14, 1966, p. 67-103.

<sup>41</sup> G. D. Barko, "Experimenter Bias Effect as a Function of Ambiguity," Dissertation Abstracts, Vol. 31, 1971, p. 7619.

<sup>42</sup> G. S. Felton, "Experimenter Expectancy Effect Examined as a Function of Task Ambiguity and Internal versus External Control of Reinforcement," Dissertation Abstracts, Vol. 31, 1970, p. 2277-2278.

difficulties in demonstrating the bias phenomenon. In the next section the manner in which the bias is mediated will be examined.

### 3. Mediation of the Experimenter Bias Effect.

In addition to studying the variables which influence the E-bias effect, current research has been concerned with how the bias is mediated. Barber and Silver,<sup>43</sup> in a critical review of some thirty-one studies concerned with the E-bias effect, suggest that at times experimenters appear to bring the outcome of their experiments in line with their biases by intentionally or unintentionally misjudging, misrecording, or misreporting their results. Rosenthal<sup>44</sup> examined this possibility by reviewing a number of experiments which have explored the operation of cheating and observer errors as factors operating in studies of experimenter bias. Rosenthal noted these experiments took elaborate precautions such as automatic recording of subjects' responses, monitoring of experimenter-subject interaction without their knowledge, and still obtained a very large effect of experimenter expectancy. Also, analyses of films of several experiments<sup>45</sup> in which experimenters did not know they were

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<sup>43</sup> Barber and Silver, op. cit., p. 25.

<sup>44</sup> Rosenthal, op. cit., 1969, p. 246-247.

<sup>45</sup> Ibid., 1966, p. 259-262.

being filmed gave no evidence to suggest any attempts to cheat on the part of the experimenters. Therefore, although it is possible cheating may occur in isolated experiments, it seems fairly conclusive that the majority of studies demonstrating the E-bias effect were not due to cheating or observer errors.

In view of the unlikelihood of intentional or unintentional recording errors explaining the results of studies of E-bias effect, alternative explanations were explored. The hypothesis of an operant conditioning process being responsible for the mediation of the bias was proposed by Rosenthal and his associates.<sup>46</sup> It was thought that perhaps every time the subject gave a response consistent with the experimenter's expectancy, the experimenter might look more pleasant, or smile, or glance at the subject approvingly, even without the experimenter's being aware of his own reinforcing responses. Thus the experimenter might unwittingly have taught the subject what responses were the desired ones. If, in fact, the hypothesis of operant conditioning was correct, one would expect to find that the very first response of a given subject would not be affected by the experimenter's expectancy, whereas later responses would be affected. That is, there would be a learning curve for

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<sup>46</sup> Ibid., p. 289.

subjects. However, Rosenthal and his associates<sup>47</sup> completed three studies which indicated, on the average, expectancy effects are greater for the subject's very first response than for his later responses. Since the very first response cannot follow any reinforcement by the experimenter it seems highly unlikely that operant conditioning is the mechanism of the E-bias effect. This conclusion received additional support from Masling<sup>48</sup> who also was unable to show that it was a pattern of examiner reinforcement that accounted for subject's biased responses. Thus, the author must conclude that since the E-bias effect occurs in the absence of operant conditioning, operant conditioning cannot explain the results of studies of experimenter bias.

The fact that the very first response of an experimental subject can be affected by the expectancy of the experimenter suggests that the mediation of this bias might occur, at least partially, during that phase of the data-collection situation in which the experimenter greets, seats, and instructs his subject. What the experimenter does unintentionally during this phase of the experiment

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<sup>47</sup> R. Rosenthal, K. L. Fode, Linda Vikan-Kline, and G. W. Persinger, "Verbal Conditioning: Mediation of Experimenter Expectancy Effect," Psychological Reports, Vol. 14, 1964, p. 71-74.

<sup>48</sup> Masling, op. cit., 1965, p. 198-201.

to inform his subject of the expected response has been the focus of much research.

Numerous experiments have studied the possibility that the experimenter may unwittingly transmit his bias by paralinguistic cues. Barber and Calverley<sup>49</sup> in their experiment in hypnosis found subjects accepted more suggestions when the experimenter adopted a forceful, authoritative tone of voice than a lackadaisical, bored tone of voice. Troffer and Tart<sup>50</sup> found similar results using experienced hypnotists. Experimenters expecting a low degree of suggestibility in their subjects related in a less convincing way than experimenters expecting a high degree of suggestibility. Duncan and Rosenthal,<sup>51</sup> analyzing experimenters' vocal emphasis via sound motion pictures, found subjects who heard relatively greater vocal emphasis on the response alternatives associated with high photo ratings subsequently assigned higher photo ratings than did any of the subjects who heard relatively greater vocal emphasis on the response alternatives associated with low photo ratings.

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<sup>49</sup> Barber and Calverley, op. cit., p. 139-144.

<sup>50</sup> S. A. Troffer and C. T. Tart, "Experimenter Bias in Hypnotic Performance," Science, Vol. 145, 1964, p. 1330-1331.

<sup>51</sup> S. Duncan and R. Rosenthal, "Vocal Emphasis in Experimenter's Instruction Reading as Unintended Determinant of Subjects' Responses," Language and Speech, Vol. 11, 1968, p. 20-26.

Adair and Epstein,<sup>52</sup> in a widely quoted study, showed that auditory cues alone may be sufficient to mediate expectancy effects. They demonstrated the E-bias effect with subjects who heard only the instructions tape-recorded earlier by experimenters given different expectancies. However, Carlson and Hergenhahn<sup>53</sup> failed to obtain expectancy effects when their subjects were not permitted visual access to the experimenter. Nevertheless, most of the available data support the importance of the auditory channel of communication in the mediation of the bias effect although the exact mode and type of paralinguistic cue has not been clarified at the present time.

The possibility that the experimenter may transmit his bias by bodily or facial movements, as well as other kinesthetic cues, has also been explored. The importance of visual cues in the mediation of the bias was seen by Zoble.<sup>54</sup> Zoble demonstrated the bias effect with subjects

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<sup>52</sup> J. G. Adair and Joyce Epstein, "Verbal Cues in the Mediation of Experimenter Bias," Psychological Reports, Vol. 22, 1968, p. 1045-1053.

<sup>53</sup> J. A. Carlson and B. R. Hergenhahn, "Use of Tape Recorded Instructions and a Visual Screen to Reduce Experimenter Bias," in Rosenthal and Rosnow (eds.), op. cit., p. 253.

<sup>54</sup> E. J. Zoble, "Interaction of Subject and Experimenter Expectancy Effect in a Tone Length Discrimination Task," in Rosenthal and Rosnow (eds.), op. cit., p. 253.

who had access only to visual cues. On the other hand, Rosenthal and Fode<sup>55</sup> found mute but visible experimenters to exert no expectancy effect. Although the evidence for visual cues mediating the bias does not appear as conclusive as that for the auditory cues, it seems likely that both channels of communication are used. Thus when subjects are deprived of either visual or auditory information, they appear to focus more attention on the channel that is available to them.

Recently it has been proposed by Rosenthal<sup>56</sup> that the E-bias effect may be a learned phenomenon as a result of an experimenter interacting with a series of research subjects. This hypothesis contends that the E is emitting a myriad of unprogrammed and unintended cues in the visual and auditory channels, and if whatever pattern of cues he is emitting happens to affect the subject's response so that the experimenter obtains the response he expects to obtain, that pattern of cues may be more likely to recur with the next subject. That is, obtaining an expected response may be the reinforcement required to shape the experimenter's pattern of unintentional cueing. This

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<sup>55</sup> R. Rosenthal and K. L. Fode, "The Effect of Experimenter Bias," Psychological Reports, Vol. 12, 1963, p. 491-571.

<sup>56</sup> Rosenthal, op. cit., 1969, p. 254-256.

hypothesis has received some support by several studies<sup>57</sup> which found that later contacted subjects showed significantly greater expectancy effect than did earlier contacted subjects. Although the foregoing experiment offers some support, the hypothesis is still largely untested. Indeed, it might be emphasized the exact nature of the unintended communication behavior is still largely unknown at the present time.

The complexities of the mediation of the experimenter bias effect was noted earlier by McGuire.<sup>58</sup> McGuire noted an eight-step transmission process was involved.

(a) The experimenter attended to the expectancy communication from the principal investigation. (b) The experimenter comprehended the expectancy communicated. (c) The experimenter retained the communication. (d) The experimenter (intentionally or unintentionally) attempted to transmit the expectancy to the subject. (e) The subject (consciously or unconsciously) attended to the expectancy communication from the experimenter. (f) The subject (consciously or

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<sup>57</sup> R. Rosenthal, G. W. Persinger, Linda Vikan-Kline, and K. L. Fode, "The Effect of Early Data Returns on Data Subsequently Obtained by Outcome-biased Experimenters," Sociometry, Vol. 26, 1963, p. 487-498.

<sup>58</sup> W. J. McGuire, "Personality and Susceptibility to Social Influence," in E.F. Borgatta and W. W. Lambert (eds.), Handbook of Personality Theory and Research, Chicago, Rand McNally, 1968, p. 1130-1187.



unconsciously) comprehended the experimenter's expectancy. (g) The subject (consciously or unconsciously) retained the experimenter's expectancy. (h) The subject (wittingly or unwittingly) acted upon (gave responses in harmony with) the experimenter's expectancy. Failure in any one of the eight links apparently would be sufficient to interfere with the mediation of the bias. The apparent complexity of the mediation of the bias appears to be an important factor in the failure of many studies to demonstrate the bias effect.

In the next section studies which have examined the influence of personality upon the E-bias effect will be reviewed.

#### 4. The Relationship of Personality Variables to the Experimenter Bias Effect.

The evidence<sup>59,60,61</sup> strongly suggests that the transmission of the E-bias effect is more likely with an ambiguous stimulus than a structured stimulus. It appears that with an ambiguous stimulus the S has a need to attend to E for cues how to solve the problem. Consequently, any

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59 Masling, op. cit., 1966, p. 67-103.

60 Barko, op. cit., p. 7619.

61 Felton, op. cit., p. 2277-2278.

variable which influences S's attention to E should also influence the E-bias effect. Two such variables which have been largely ignored in the mediation of the E-bias effect are the personality of both S and E.

For the most part researchers have concentrated their efforts on investigating the personality variables of E which serve to maximize the bias effect. Friedman et al.<sup>62</sup> found that the most successful biasers (experimenters) were seen as being more professional and more dominant than less successful biasers. Similarly, Engram,<sup>63</sup> using the California Personality Inventory, found seventy-seven significant ( $p < .05$ ) personality correlates on the E-bias effect. In particular, experimenters who obtained high scores on psychological mindedness and responsibility were unusually effective in producing a bias effect.

Research attempting to relate personality variables and the E-bias effect has encountered similar problems that research on the generality of personality disposition has encountered. The observations of Campbell and Fiske

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62 N. Friedman, D. Kurland, and R. Rosenthal, "Experimenter Behavior as an Unintended Determinant of Experimental Results," Journal of Projective Techniques and Personality Assessment, Vol. 29, 1965, p. 479-490.

63 W. C. Engram, "One Aspect of the Social Psychology of Experimentation: The E-effect and Related Personality Characteristics in the Experimenter," Dissertation Abstracts, Vol. 28, 1968, p. 3260-3261.

regarding methodological problems with research concerned with personality variables appear extremely relevant to research attempting to relate personality variables and the E-bias effect.

That is personality variables typically account for only a small percentage of the total variance and measures of different constructs using the same method tend to be more highly correlated with one another than measures of the same construct using different methods.<sup>64</sup>

This has led to considerable confusion and a lack of consensus as to which personality construct is the most salient in the mediation of the E-bias effect.

An additional source of the confusion and inconsistency found in studies investigating the personality variables in the E-bias effect may have been the failure to consider the dyadic character of the experimenter-subject interaction. Barber and Silver<sup>65</sup> have offered a model of the expectancy process which is connected with this stress on the dyadic interaction. In essence, Barber and Silver have argued that the experimenter bias effect is governed by the same behavioral principles that govern communication processes in general. Rather than viewing expectancy effect as a phenomenon unique to the experimental situation,

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<sup>64</sup> D. T. Campbell and D. W. Fiske, "Convergent and Discrimination Validation by the Multitrait-multimethod Matrix," Psychological Bulletin, Vol. 56, 1959, p. 81-105.

<sup>65</sup> Barber and Silver, op. cit., p. 1-29.

they view the effect as a type of unintended communication. According to the Barber and Silver model, the occurrence and magnitude depend in part upon the subject's perception and acceptance of the experimenter's subtle performance cues. McGuire,<sup>66</sup> in his eight-step transmission process, also emphasized the importance of the subject attending to and comprehending the expectancy communication from the experimenter.

In one of the only studies to utilize this dyadic interaction model, Bootzin<sup>67</sup> attempted to study the personality variables of both E and S. However, his preliminary results indicated that neither S's nor E's personality measures were related to the E-bias effect. However, in a second experiment he noted that Ss who gave positive biased ratings described themselves as easier to influence than most of their peers. Also Es who were confident of their ability to influence others and Es who obtained high dominant scores were more likely to elicit ratings in agreement with their expectation than other Es. Although Bootzin's results are inconclusive, his use of the dyadic interaction model appears to be promising for future studies relating personality and the E-bias effect.

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66 McGuire, op. cit., p. 1130-1187.

67 R. R. Bootzin, "Expectancy and Individual Differences in Experimenter Bias," Journal of General Psychology, Vol. 84, 1971, p. 303-312.

Thus it appears that the failure of previous studies to clarify the relationship between personality and the E-bias effect was due in part to not implementing the dyadic interaction model and in part to the great variety of methods utilized in measuring the personality constructs. The present study is a further attempt to explore the relationship between personality and the E-bias effect by utilizing the dyadic interaction model and the Eysenck Personality Inventory as the measure of personality.

In the next section Eysenck's Biological Theory of Extraversion and Neuroticism will be presented.

#### 5. The Eysenckian Theory of Extraversion and Neuroticism.

H. J. Eysenck, Professor of Psychology at London University and Chief Psychologist at the Maudsley Hospital, is one of the most productive writers in the field of personality theory. Eysenck<sup>68</sup> has put forward a personality theory of wide scope and considerable explanatory power. The theory may be considered as having three levels: (1) a descriptive level at which the main dimensions are measured and described; (2) an experimental level at which experimental tasks are given to subjects varying on the

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<sup>68</sup> H. J. Eysenck, The Biological Basis of Personality, Springfield, Ill., Charles C. Thomas, 1967, xvii-399 p.

main personality dimensions; and (3) a theoretical level at which a theory is suggested as to the biological basis of these personality dimensions.

The initial research from which Eysenck formulated his theory of personality was undertaken during the war years while Eysenck was working in the rehabilitation of military personnel who had succumbed to various psychiatric disorders. A factor analysis of a large number of psychological tests administered to these patients as well as to a control group of normals resulted in the extraction of two independent factors or dimensions of personality which were designated Introversion-Extraversion and Neuroticism-Stability.<sup>69</sup> Following the initial research, several investigators holding divergent points of view and making use of a great variety of test procedures have confirmed the existence of Eysenck's two independent dimensions of personality.<sup>70</sup>

At level two, Eysenck<sup>71</sup> has shown that subjects varying on these dimensions perform in differing ways on a wide variety of laboratory tasks. Section six will present

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69 H. J. Eysenck, Dimensions of Personality, London, Routledge and Kegan Paul, 1947, xi-308 p.

70 -----, The Structure of Human Personality, New York, John Wiley & Sons, 1953, xix-348 p.

71 Eysenck, op. cit., 1967, p. 75-186.

in detail the accumulated evidence which shows that under certain conditions introverts show better performance, whereas under other conditions extraverts show better performance. In particular, studies concerned with verbal conditioning, persuasion, suggestibility, and social desirability will be examined.

Initially utilizing the concept of inhibition as formulated by Pavlov<sup>72</sup> and the concept of reactive inhibition by Hull,<sup>73</sup> Eysenck conceived of the excitation-inhibition balance as a hypothetical construct to explain the observed differences between the performance of introverts and extraverts on various tasks. In the extravert, inhibitory processes dominated, and thus extraverts were said to be cortically inhibited, while in introverts excitatory processes dominated. The general relationship between personality and excitation-inhibition as conceived by Eysenck was formalized in his two postulates.<sup>74</sup> The first of these was called the postulate of individual differences:

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<sup>72</sup> I. P. Pavlov, Conditioned Reflexes, An Investigation of the Physiological Activity of the Cerebral Cortex, London, Oxford University Press, 1927, xv-430 p.

<sup>73</sup> C. L. Hull, Principles of Behavior, an Introduction to Behavior Therapy, New York, Appleton-Century-Crofts, 1966, xxii-422 p.

<sup>74</sup> H. J. Eysenck, The Dynamics of Anxiety and Hysteria, London, Routledge and Kegan Paul, 1967, p. 114.

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 properties of the physical structures involved in making stimulus-response connections.<sup>75</sup>

The second postulate was called the typological postulate:

Individuals in whom excitatory potential is generated slowly and in whom excitatory potential 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; individuals in whom excitatory potential is generated quickly and in whom excitatory potential so generated are strong, are thereby predisposed to develop introverted patterns of behavior and to develop dysthymic disorders in case of neurotic breakdown.<sup>76</sup>

Recently Eysenck<sup>77</sup> has argued that there is genetic evidence suggestive of a biological basis for variation along these personality dimensions. Eysenck<sup>78</sup> has sought to explain the observed difference between the behavior of introverts and extraverts on the basis of different thresholds in the various parts of the ascending reticular activating system which produces higher cortical arousal in introverts than in extraverts. Similarly, Eysenck contends

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75 Ibid.

76 Ibid.

77 Eysenck, The Biological Basis of Personality, p. 226-262.

78 Ibid., p. 230.



that differences in behavior associated with Neuroticism, the other factor in Eysenck's dimensional theory of personality, are related to differential thresholds of arousal in the visceral brain which are responsible for activating the autonomic nervous system.

Eysenck's theory has generated much needed research in the area of personality. In particular, the dimension of Extraversion-Introversion has been the focus of much research. In the following section studies concerning this dimension and verbal conditioning, social desirability, suggestibility and perception will be reviewed.

6. The Relationship between Extraversion-Introversion  
and Subject's Response.

Eysenck<sup>79</sup> has proposed that individuals measuring low on extraversion would build up reactive inhibition slowly and dissipate it quickly and therefore he argued introverts would condition better than extraverts. This hypothesis was originally confirmed using classical conditioning.<sup>80</sup> On the basis of this and several other studies, Eysenck concluded that when the conditions laid down for

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79 Eysenck, The Dynamics of Anxiety and Hysteria, xiv-311 p.

80 C. M. Franks, "Conditioning and Personality," Journal of Abnormal and Social Psychology, Vol. 52, 1956, p. 143-150.

the accumulation of inhibitory potential are fulfilled, significant differences between introverts and extraverts appear.<sup>81</sup>

Eysenck<sup>82</sup> later tested this hypothesis using verbal conditioning. He reinforced the emission of verbs referring to muscular activity verbs, using "hmm-mm" as a reinforcer. The results confirmed his initial prediction of greater conditionability of introverts. Similarly, Jawanda,<sup>83</sup> using a sentence completion type of verbal conditioning task, found subjects scoring low on extraversion develop verbal conditioning better than their counterparts, scoring high on extraversion. Additional support for Eysenck's prediction was found by Hekmat<sup>84</sup> on a task involving verbalization of affective self disclosures. Hekmat also found that introverted subjects are significantly more resistant to extinction than extraverted ones.

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<sup>81</sup> Eysenck, The Biological Basis of Personality, p. 120.

<sup>82</sup> -----, "Personality and Verbal Conditioning," Psychological Reports, Vol. 5, 1959, p. 570.

<sup>83</sup> J. S. Jawanda, Age, Sex, and Personality Variables in Verbal Conditioning and Its Modification by Drugs, unpublished doctoral thesis presented to Punjab University, 1966.

<sup>84</sup> H. Hekmat, "Extraversion, Neuroticism, and Verbal Conditioning of Affective Self-Disclosures," Journal of Counselling Psychology, Vol. 18, 1971, p. 64-69.

Although the above evidence strongly supports Eysenck's prediction, there are several studies in the literature which either failed to demonstrate a relation between the Extraversion-Introversion dimension and conditioning or obtained the opposite result, i.e., extraverts condition better than introverts.

Studies by McDonell and Inglis<sup>85</sup> and Goodstein<sup>86</sup> failed to find a relationship between verbal conditioning and introversion-extraversion in either the acquisition or the extinction phase. Laungani,<sup>87</sup> on the other hand, utilizing a verbal conditioning procedure, found a trend for those high on extraversion to show a more pronounced conditioning effect than those low on extraversion. Similarly, Mohan and Claire<sup>88</sup> found extraverted Ss condition better than introverted Ss on a verbal conditioning task.

It is the writer's conviction that the majority of studies reviewed in the preceding section of the chapter

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<sup>85</sup> C. R. McDonell and J. Inglis, "Verbal Conditioning and Personality," Psychological Reports, Vol. 10, 1962, p. 374.

<sup>86</sup> M. Goodstein, "Relationship between Verbal Operant Conditioning and Extraversion-Introversion," Psychological Reports, Vol. 20, 1967, p. 1036.

<sup>87</sup> D. Laungani, "Personality and Verbal Conditioning," Psychological Reports, Vol. 23, 1968, p. 1134.

<sup>88</sup> J. Mohan and C. Claire, "Personality and Verbal Conditioning," Manas: A Journal of Scientific Psychology, Vol. 15, 1968, p. 87-93.

offer evidence to support the relationship of introversion to rate of verbal conditioning. Nevertheless, the existence of a negative relationship between introversion and rate of verbal conditioning cannot be excluded.

Assuming that introverts condition better than extraverts, one might expect introverts to have a high need for social approval and therefore to respond in a more conforming, approval-seeking manner than extraverts. Farley,<sup>89</sup> in line with this expectation, found the level of extraversion was negatively associated with social desirability responding. That is, introverts endorsed significantly more socially desirable responses than extraverts. Lemaine,<sup>90</sup> on the other hand, attempted to test the hypothesis that extraverts exhibit more sociability because of their strong desire for contact with other people. However, because of methodological problems he was unable to evaluate his original hypothesis. Nevertheless, his results suggested introverts, when compared with extraverts, experience more ambiguity and less cognitive constraint when they have to judge the desirability of certain behavioral characteristics

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89 F. H. Farley, "Social Desirability, Extraversion and Neuroticism: A Learning Analysis," Journal of Psychology, Vol. 64, 1966, p. 113-118.

90 J. M. Lemaine, "Extraversion and Judgments of Social Desirability," Bulletin de Psychologie, Vol. 19, 1965, p. 419-426.

irrespective of experimental conditions. To the extent that one can assume introverts condition better than extraverts, the evidence indicates introverts appear to have a higher need for social approval than do extraverts.

On the other hand, Eysenck,<sup>91</sup> in a later publication while describing the personality variable extraversion-introversion, pointed out that the introvert is over-socialized, is less dependent on external circumstances, and thus less susceptible to group pressure than the extravert who does not have these internal controls, is not so independent of the social situation and therefore would become unduly responsive to group pressure. Thus on the basis of this statement one might predict introverts would be less persuasible, and less suggestible than extraverts.

Sinha and Ojha<sup>92,93</sup> both offer empirical evidence to support this hypothesis. They found extraverts were more liable to change their judgments under the influence of prestige suggestion than were introverts. Similarly,

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<sup>91</sup> Eysenck, The Dynamics of Anxiety and Hysteria, p. 213-214.

<sup>92</sup> A. K. D. Sinha and H. Ojha, "An Experimental Study of the Operation of Prestige Suggestion in Extraverts and Introverts," Journal of Social Psychology, Vol. 61, 1963, p. 29-34.

<sup>93</sup> H. Ojha, "An Experimental Study of Prestige Suggestion in Female Extraverts and Introverts," Manas: A Journal of Scientific Psychology, Vol. 17, 1970, p. 1-5.

Srivastana,<sup>94</sup> using the autokinetic movement, found that extraverts were more susceptible to group pressure to change their judgments than were introverts. Furneaux,<sup>95</sup> in an attempt to explain more fully the apparent higher suggestibility of extraverts in interpersonal situations, asserted that the extravert has a higher drive level than the introvert as a result of his predisposition to attend to stimuli associated with the activities of other people.

However, Carment and Miles,<sup>96</sup> in a well-controlled study, found introverts were more likely than extraverts to change their opinion when confronted with persuasive communication favoring the alternative opinion. These results appear to offer support to the previous hypothesis that introverts condition more rapidly than extraverts but oppose Eysenck's contention that extraverts would be more suggestible to group pressure than introverts. Carment and Miles speculate that their result may be because extraverts

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<sup>94</sup> P. K. Srivastana, "Personality Types and Social Persuasibility," Journal of Psychological Research, Vol. 12, 1968, p. 12-16.

<sup>95</sup> W. D. Furneaux, "Neuroticism, Extraversion, Drive and Suggestibility," International Journal of Clinical and Experimental Hypnosis, Vol. 9, 1961, p. 195-214.

<sup>96</sup> D. W. Carment and C. G. Miles, "Persuasiveness and Persuasibility as Related to Intelligence and Extraversion," British Journal of Social and Clinical Psychology, Vol. 4, 1965, p. 1-7.

cannot learn a new response as rapidly as introverts, or because extraverts are not subject to the reinforcing and punishing verbal bombardment that introverts receive.

In spite of this latter evidence, the abundance of evidence appears to support Eysenck's contention that extraverts rather than introverts are more suggestible and sensitive to group pressure.

Within the field of perception, Witkin<sup>97</sup> has tried to build up a personality dimension on the basis of perceptual tasks which measure degree of perceptual determination by percepts. He distinguishes between field-dependent and field-independent perceivers. Field-dependent individuals as compared to field-independent individuals have more difficulty in terms of separating an item from its context. Thus field-dependent perceivers appear to be more dependent on cues from their environment than are field-independent perceivers. Although the evidence is limited, there is some empirical evidence which links field dependence and extraversion. Evans<sup>98</sup> found a Pearson coefficient of correlation of .391 (significant at  $p < .005$ )

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<sup>97</sup> H. A. Witkin, H. B. Lewis, M. Hertzman, K. Machover, D. Meissner, and S. Wapner, Personality through Perception: An Experimental and Clinical Study, New York,

<sup>98</sup> F. J. Evans, "Field Dependence and the Maudsley Personality Inventory," Perceptual Motor Skills, Vol. 24, 1967, p. 526.

between the E scale of the Maudsley Personality Inventory and the embedded figures test. Thus one might expect extraverts to be more dependent on cues from their environment than introverts. This hypothesis agrees with Eysenck's early contention<sup>99</sup> that extraverts are more dependent on external circumstances than introverts. Partial support for this hypothesis was offered by Ardis and Frazer<sup>100</sup> who found a significant relationship between introversion and reduced constancy in perception of shape; that is, extraverts showed a greater constancy in perception shape. Ardis and Frazer suggest this greater constancy for extraverts is primarily due to the extravert paying greater attention to his environment than the introvert. Thus the evidence suggests extraverts are more dependent than introverts on cues from their environment.

Barber and Silver<sup>101</sup> have argued that the experimenter bias effect is governed by the same behavioral principles that govern communication processes in general.

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<sup>99</sup> Eysenck, The Dynamics of Anxiety and Hysteria, p. 213-214.

<sup>100</sup> J. A. Ardis and Elizabeth Frazer, "Personality and Perception: The Constancy Effect and Introversion," British Journal of Psychology, Vol. 48, 1957, p. 48-54.

<sup>101</sup> Barber and Silver, op. cit., p. 1-29.



Similarly, Rosenthal<sup>102</sup> has stressed the commonality of the bias effect and other modes of social communication. Thus the studies concerning the relationship between extraversion-introversion and verbal conditioning, social desirability, persuasibility, and perception provide valuable clues as to the nature of the relationship between the level of extraversion-introversion of the subject and the extent to which the subject will be influenced by the experimenter's expectancy.

The studies reviewed in this section of the chapter indicate that introverts condition better and have a higher need for social approval than do extraverts. Therefore one might expect introverted subjects to be more attentive to their experimenter and thus more likely than extraverts to be influenced by E's expectancy. On the other hand, the studies also indicate that extraverts are more suggestible and are more dependent on cues from their environment than introverts. Therefore, on the basis of this evidence, one might expect extraverted subjects to be more affected by E's expectancy. No studies were found in the literature that have directly investigated the relationship between

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102 R. Rosenthal, "Teacher Expectation and Pupil Learning," in The Unstudied Curriculum, Washington, D.C., Association for Supervision and Curriculum Development National Education Association, 1970, p. 63.

the Eysenckian dimension of introversion-extraversion and the extent to which the subject will be influenced by the experimenter's expectancy. Thus the present study will attempt to clarify the relationship between level of extraversion-introversion of the subject and the extent to which the subject will be influenced by the experimenter's expectancy.

In the following section studies concerned with the relationship between extraversion-introversion and experimenter's performance on various tasks will be examined.

7. The Relationship between Extraversion-Introversion and Experimenter's Performance.

Eysenck, in the manual accompanying the Eysenck Personality Inventory, describes the extravert in the following manner: "outgoing, impulsive and uninhibited, having many social contacts and frequently taking part in group activities."<sup>103</sup> It would appear that extraverts might be expected to speak first, and be more persuasive than introverts. This hypothesis was supported by Carment and Miles<sup>104</sup> who found extraverts more persuasive when

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<sup>103</sup> H. J. Eysenck and Sybil B. G. Eysenck, Manual for the Eysenck Personality Inventory, San Diego, California, Educational and Industrial Testing Service, 1968, p. 6.

<sup>104</sup> Carment and Miles, op. cit., p. 1-7.

paired with an introvert in a situation where each held an opposite opinion. Etaugh,<sup>105</sup> in a later study, attempted to investigate the effects of E's level of extraversion upon S's rate of verbal conditioning. He hypothesized that E's extraversion would be positively correlated with Ss' performance on a verbal conditioning task. The predicted positive correlation between E's extraversion and Ss' was obtained, i.e., extraverted E's obtained better performance from their Ss than introverted Es. The above evidence suggests extraverts are more persuasive and obtain better performance from their Ss on verbal conditioning tasks than do introverts.

On the other hand, Ward,<sup>106</sup> in a recent study, offers support for the hypothesis that introverted Es transmit less ambiguous cues to their Ss than extraverted Es. She investigated the relationship between extraversion-introversion and accuracy in judging strangers. Her results indicated that extraverts provided a highly ambiguous target which led to more inaccurate judgment from their subjects than did introverts. It appeared that the introvert target

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105 C. F. Etaugh, "Experimenter and Subject Variables in Verbal Conditioning," Psychological Reports, Vol. 25, 1969, p. 575-580.

106 D. Ward, "Extraversion-Introversion and Neuroticism-Stability in Relation to Person Perception," Dissertation Abstracts, Vol. 30, 1969, p. 394-395.

provides less ambiguous cues to their raters and thus were judged more accurately than extraverted targets. The above evidence suggests introverts provide less ambiguous cues to their subjects than extraverts.

The studies reviewed in this section of the chapter indicate that extraverts are more persuasive and obtain better performance from their Ss on verbal conditioning tasks than do introverts. Therefore one might expect extraverted Es to be more effective in biasing their subjects than introverted Es. On the other hand, the studies also indicate that introverts provide less ambiguous cues to their subjects than extraverts; thus on the basis of this evidence introverted Es might be more effective in biasing their S. No studies were found in the literature that have directly investigated the relationship between the level of extraversion-introversion of E and E's effectiveness in influencing his S's response. Thus the present study will attempt to clarify the apparent contradictory evidence by examining the relationship between level of extraversion-introversion of E and E's effectiveness in influencing his S's response.

#### 8. Summary and Hypotheses.

This chapter has reviewed literature relating to the E-bias effect and Eysenck's extraversion-introversion dimension. In the first section of the chapter, the historical development of the present concern for the subject-experimenter interaction was discussed. The second

section discussed the variables affecting the E-bias effect. It was seen that the E-bias effect is an extremely complicated phenomenon which is difficult to demonstrate. The evidence presented strongly suggested that the stimulus must be ambiguous to allow the subject to be influenced by the experimenter's expectancy. In the third section, the manner in which the bias is mediated was examined. Although a number of hypotheses were proposed, it was concluded that the exact nature of how the bias is communicated is still largely unknown at the present time.

In the fourth section, the few studies which have examined the relationship between personality and the E-bias effect were reviewed. An argument was presented that the failure of previous studies to clarify the relationship between personality and the E-bias effect was due to disparities in design, conditions, and methods of analysis. In the fifth section, the development and description of Eysenck's theory of personality with emphasis on the extraversion-introversion dimension, was presented. In the sixth section, several studies that investigated the relationship between extraversion-introversion and subject's performance on a variety of tasks were examined. Several studies demonstrated a relationship between extraversion and subject's performance, while other studies revealed a relationship between introversion and subject's performance.

No studies were found in the literature that have directly investigated the relationship between the Eysenckian dimension of introversion-extraversion and the extent to which the subject will be influenced by the experimenter's expectancy. In the seventh and final section of the review of the literature, several studies examined the relationship between extraversion-introversion and the experimenter's effectiveness in persuading and obtaining performance from his subjects. It was seen that extraverts are more persuasive and obtain better performances from their subjects in a verbal conditioning task than do introverts. Introverts, however, were found to emit less ambiguous cues than extraverts. No studies were found in the literature that have directly investigated the relationship between level of extraversion-introversion and E's effectiveness in influencing his S's response. Thus, the evidence reviewed in the sixth and seventh sections did not furnish sufficient information to enable the author to formulate unidirectional hypotheses.

In view of the studies reviewed in this chapter, it is apparent that the transmission of the E-bias effect should occur with an ambiguous stimulus. Thus, the first hypothesis of the present thesis is that there should be a significant difference between positively and negatively biased groups with an ambiguous stimulus.

In its null form, the first hypothesis reads:

There is no significant difference between positively and negatively biased groups in their judgments of whether persons pictured in out-of-focus slides have been experiencing success or failure, as indicated by their ratings.

Since, with an ambiguous stimulus, the S has a need to attend to E for cues as to how to solve the problem, it appears that any variable which influences S's attention to E also influences the E-bias effect. One such variable that is likely to be a factor is S's personality. An argument was presented that the failure of previous studies to clarify the relationship between personality and the E-bias effect was due to disparities in design, conditions and methods of analysis. Thus, steps were taken in the present study to measure personality by a method of analysis which offered a sound theoretical background. Although no studies were found in the literature that directly investigated the relationship between the Eysenckian dimension of introversion-extraversion and the extent to which the subject will be influenced by the experimenter's expectancy, several studies indicated extraverts are more dependent than introverts on cues from their environment. Thus it appears there should be a significant relationship between extraversion and subject's performance in the E-bias effect.

In its null form, the second hypothesis reads:

There is no significant difference between positively and negatively biased groups, independent of the subject's personality type, operationally defined as scores on the Extraversion scale of the Eysenck Personality Inventory.

Since subjects under conditions of ambiguity use all available cues and information to formulate their own hypothesis about the nature of the experiment, the personality of E appears to be an important factor in the E-bias effect. Although no studies were found in the literature that directly investigated the relationship between the Eysenckian dimension of introversion-extraversion and the E's effectiveness in communicating his expectancy, one study indicated introverted Es emit less ambiguous cues than extraverted Es. Thus it appears there should be a significant relationship between introversion and E's effectiveness in communicating his expectancy.

In its null form, the third hypothesis reads:

There is no significant difference between positively and negatively biased groups, independent of the experimenter's personality type, operationally defined as scores on the Extraversion scale of the Eysenck Personality Inventory.



## CHAPTER II

### EXPERIMENTAL DESIGN

This chapter describes the methods used to test the experimental hypotheses stated in the preceding chapter. Section one describes the sample population and the criteria for selection. The second section presents the psychological instrument used to measure the personality dimension of extraversion-introversion. The third, fourth and fifth sections set forth the task, the biasing of E, and a description of the experimental procedure. Section six is devoted to the statistics used in the analysis of the data.

#### 1. The Sample.

One hundred and four English speaking male students were selected from the Introductory Psychology course at the University of Ottawa to serve as subjects for the experiment. All Ss had volunteered to participate in the experiment and were chosen on the basis of their scores on the Eysenck Personality Inventory (EPI), Form A and Form B. Of these, thirty-eight subjects had to be deleted from the sample because they failed to complete all aspects of the study.<sup>1</sup>

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<sup>1</sup> A detailed analysis of the attrition rate will be presented in Section 1, Chapter III.

The sixty-six subjects who completed the EPI, Forms A and B, were divided into two equal groups on the basis of their composite Extraversion scores. Thirty-three subjects, who obtained a score greater than or equal to twenty-seven, served as the high extraversion subjects for the project. Similarly, thirty-three subjects who obtained scores less than or equal to twenty-seven served as the low extraversion subjects for the project.

Eight English speaking male students were selected from the Introductory Psychology course at the University of Ottawa to serve as experimenters for the project. All experimenters volunteered to participate in the experiment following a telephone appeal made by the principal investigator. Four students who had a composite score  $\geq 36$  on the Extraversion scales of the EPI were selected as the high extraversion experimenters for the study. Similarly, four students who had a composite score  $\leq 14$  on the Extraversion scales of the EPI were selected as the low extraversion experimenters for the study.

The same population was used to select both experimenters and subjects to minimize differential confounding variables of the E-effect. For example, employing both male experimenters and subjects of the same approximate age, language, and other biosocial characteristics in each

of the treatment conditions reduced the possibility of differential results due to the E-effect.

## 2. Psychological Instrument.

The EPI, Forms A and B were administered to groups of potential subjects and experimenters. There was a two-week interval between the administration of Form A and the administration of Form B. Both forms of the instrument were utilized to ensure consistency in selecting subjects and experimenters who met the criteria of the study. Thus the Eysenck Personality Inventory was the instrument used in the present study to determine the independent variable, extraversion-introversion. The EPI was chosen as the psychological instrument over other personality tests because it is the instrument which is most highly correlated with Eysenck's definition of extraversion and introversion.

The EPI measures personality in terms of two orthogonal dimensions. These dimensions are identified as extraversion-introversion and neuroticism-stability. Each of these traits is measured by means of twenty-four questions, selected on the bases of item and factor analyses, to which the examinee answers "yes" or "no." A response distortion (Lie) scale is also included to detect attempts of examinees to falsify responses by answering the questions in a socially desirable manner. Parallel forms (Form A and

Form B) are available for situations, as in the present study, in which retesting is desired to ensure consistency. Each form consists of fifty-seven items which can be administered individually or in groups in about ten minutes. A copy of the EPI is included in Appendix 1.

The normative group for Form A, one of the forms used in the present study, is based on 1003 students tested at various colleges and universities throughout the United States. These students obtained a mean Extraversion score of 13.1, with a standard deviation of 4.1, and a mean Neuroticism score of 10.9, with a standard deviation of 4.7. The normative group for Form B, the other form used in the present study, is based on 239 students tested at various colleges and universities throughout the United States. This smaller population of students obtained a mean Extraversion score of 15.2, with a standard deviation of 3.5, and a mean Neuroticism score of 11.4, with a standard deviation of 4.8.

Two hundred thirty-six college students completed both Form A and Form B. These students obtained a combined mean Extraversion score of 28.2, with a standard deviation of 6.9, and a combined mean Neuroticism score of 21.5, with a standard deviation of 8.4.

The manual<sup>2</sup> indicates that both repeat reliability (test-retest) and split-half reliability (internal consistency) are quite high for the EPI. One group of ninety-two normal subjects was given the EPI and retested approximately one year later. The resultant coefficients of reliability are reported as .82 for the Extraversion scale, Form A; .85 for the Extraversion scale, Form B; .88 for the Extraversion scale, Forms A and B combined; .84 for the Neuroticism scale, Form A; .81 for the Neuroticism scale, Form B; and .84 for the Neuroticism scale, Forms A and B combined. Similarly, another group of twenty-seven subjects obtained comparable coefficients of reliability when retested nine months after being administered the EPI.

The split-half reliability based on 1655 normal subjects, obtained by using the Spearman-Brown prophecy formula, indicates coefficients of reliabilities running from .74 to .91 for the various scales and forms of the EPI.

Three types of validity are reported in the manual. The first, factorial validity, is the correlation between a scale and the scale factor which it proposes to measure. Thus numerous independent studies have confirmed the existence of the two independent factors of "emotionality"

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2 H. J. Eysenck and Sybil B. G. Eysenck, Manual for the Eysenck Personality Inventory, San Diego, California, Educational and Industrial Testing Service, 1968, p. 14-18.

and "extraversion-introversion" by means of factor analyses. Some of these independent studies are quoted in the manual.

Construct validity is a theoretical test of validity. The theory underlying the construction of the scales states that dysthymic neurotics (anxious and obsessional-compulsive neurotic) should have high scores on neuroticism and low scores on extraversion, while psychopaths and hysterics should have high scores on neuroticism but score higher on extraversion than the dysthymics. Eysenck, in his validation study, found hysterics and psychopaths to be significantly more extraverted than dysthymics, and all neurotic groups to be higher on neuroticism than normal groups.

The third type of validity, concurrent validity, requires that the Extraversion and Neuroticism factors be highly correlated with other measures purporting to measure these personality dimensions. In one study, the Extraversion scale correlated .79 with the Guilford (1940) Rathymic scale and the Neuroticism scale correlated .92 with Guilford Cycloid Disposition scale. Numerous other studies are cited in the manual to demonstrate that Extraversion and Neuroticism are highly correlated with other measures of personality.

The writer, in order to confirm the reliability of the EPI, calculated the Pearson product moment coefficient

of correlation<sup>3</sup> between the raw scores on the Extraversion scale of the EPI, Form A, and the raw scores on the Extraversion scale of the EPI, Form B. The resulting coefficient of correlation between the two scales was .799.

The evidence cited in the above section strongly indicates that the EPI is both a reliable and valid instrument to be used with confidence in selecting the subjects and experimenters for this study.

### 3. The Task.

In this section the nature of the stimulus and the manner in which the slides were prepared will be described. This section also relates how the slides were presented to the subject and what the subject was required to do.

The task consisted of pictures of persons' faces which the Ss were required to judge whether the person pictured had been experiencing success or failure. To help the Ss make more exact judgments, a rating scale ranging from -10 extreme failure to +10 extreme success with intermediate labelled points was placed immediately before the Ss. The rating scale used in the study is illustrated in Figure 1. The ten photographs had been selected from

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<sup>3</sup> A. L. Edwards, Statistical Analysis (3rd ed.), New York, Holt, Rinehart & Winston, 1969, p. 72.

# RATING SCALE

| <b>Extreme<br/>Failure</b> | <b>Moderate<br/>Failure</b> | <b>Mild<br/>Failure</b> | <b>Mild<br/>Success</b> | <b>Moderate<br/>Success</b> | <b>Extreme<br/>Success</b> |
|----------------------------|-----------------------------|-------------------------|-------------------------|-----------------------------|----------------------------|
| <b>-10 -9 -8</b>           | <b>-7 -6 -5</b>             | <b>-4 -3 -2 -1</b>      | <b>+1 +2 +3 +4</b>      | <b>+5 +6 +7</b>             | <b>+8 +9 +10</b>           |

Figure 1.- Rating Scale Used in Study.



fifty-seven photographs obtained from magazines on the basis of the ratings of 10<sup>4</sup> Ss at the University of North Dakota.<sup>4</sup> All ten photographs were rated on the average as neither successful nor unsuccessful, and for each the mean rating evoked fell between +1 and -1. The distribution of ratings evoked by each of the photos was symmetrical with a mean photo rating of zero on the ten selected photographs.

For the purpose of this study the ten selected photographs were made into 35 millimeter slides. The procedure involved photographing the pictures and altering the negatives so that the pictures were slightly out of focus thereby producing a "soft face" slide. The negatives were then adjusted to reduce the image to their original size. The image projected a dark figure with a white background. An example of one of the slides is presented in Figure 2. The ten out-of-focus slides described above represent the "ambiguous" stimulus of the study.

The slides were presented to S seated two feet from a transparent screen and projected a 4" x 6" image. E was seated at a right angle facing S and on S's right hand side. These conditions were used to facilitate the non-verbal communication between E and S without interfering with E's

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<sup>4</sup> Robert Rosenthal, Experimenter Effects in Behavioral Research, New York, Appleton-Century-Crofts, 1966, p. 144.



Figure 2.- Sample Stimulus Slide Used in Study.

task of presenting the slides. Each slide was presented to S by E until S indicated his choice by recording his answer. Thus each S was guaranteed sufficient time to observe E or to act independently if he so desired. A record sheet and pencil were placed in front of all Ss to record their responses. The record sheet used in the study is illustrated in Figure 3. After S had written down his answer E switched the slide by means of a remote control attached to the slide projector.

#### 4. The Biasing of Experimenters.

This section describes the manner by which the principal investigator (I) influenced the experimenter's expectation of the results of the experiment.

Eight Es, consisting of four extraverted and four introverted Es, were randomly assigned either to the +5 bias group or to the -5 bias group. Sampling techniques that ensured two extraverts and two introverts in both the positive and negative biased groups were utilized.

The positively biased group of Es were told that previous research had found that Ss averaged a +5 rating, whereas negatively biased Es were told that previous Ss averaged a -5 rating. All Es were motivated to perform by being told that their participation in this study would be a major contribution to the principal investigator's

RECORDING SHEET

NAME \_\_\_\_\_

AGE \_\_\_\_\_

SEX \_\_\_\_\_

| <u>NO.</u> | <u>RATING</u> |
|------------|---------------|
| 1          | _____         |
| 2          | _____         |
| 3          | _____         |
| 4          | _____         |
| 5          | _____         |
| 6          | _____         |
| 7          | _____         |
| 8          | _____         |
| 9          | _____         |
| 10         | _____         |

SUBJECT # \_\_\_\_\_

MEAN \_\_\_\_\_

EXPERIMENTER \_\_\_\_\_

Figure 3.- Record Sheet Used in Study.

doctoral dissertation. The instructions read to E by I are a modification of those used by Rosenthal.<sup>5</sup> The exact instructions read to E were as follows:

You have been asked to participate in a research project developing a test of empathy. The reason for your participation in this project is to standardize results of experiments of this type. There is the problem in psychological research of different examiners getting somewhat different data on the same tests as a function of individual differences in both subjects and experimenters. Therefore, to standardize the tests it is better methodological procedure to use groups of experimenters.

You will now be asked to run a series of subjects and obtain from each ratings of slides. The experimental procedure has been typed out for you and is self-explanatory.

According to previous research of this nature, others have found Ss of the type you will be running have averaged a -5 rating under similar conditions that we are using. You should similarly expect to get these results with your Ss. Since this is part of my doctoral dissertation your running these subjects will be a major contribution. Just read the instructions to the subjects. Say nothing else to them except hello and good-bye. Good luck!

All Es received the same instruction except that one-half of the Es were biased to expect positive rating from their Ss and one-half were biased to expect negative ratings.

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<sup>5</sup> R. Rosenthal, G. W. Persinger, Linda Vikan-Kline, and K. L. Fode, "The Effect of Experimenter Outcome-bias and Subject Set on Awareness in Verbal Conditioning Experiments," Journal of Verbal Learning and Verbal Behavior, Vol. 2, 1963, p. 275-283.

### 5. Procedure.

In addition to the instructions given in the preceding section, E was also trained in the use of the slide projector. Upon completion of this training, I requested E to read the experimental procedure outlined before him. The exact instructions E was to read were as follows:

In front of you, you will find the instructions you are to read to your subjects, a sheet of paper that each subject will use to record his ratings of the photos and a projector to present pictures on a screen.

After recording data from each subject at the top of the recording sheet and reading instructions to the subject, give the recording sheet to your subject.

When you are ready to begin, say "This is the first slide." (Ss will record their own rating.) Do not proceed to the next slide until the S has indicated his response. After the experiment is complete, thank the subject and then usher him out the door.

Total the ratings of the ten photos, and find the average (mean) for each subject after the subject has left the room. Be sure to number your subjects from 1 to 10.

Each E ran between seven and nine Ss.

Each S arrived at the experimental room and was greeted by E. Ss were spaced at seven-minute intervals and were randomly assigned to one of eight treatment conditions. That is, the extraverted subjects, as previously chosen, were eligible to participate in one of four treatment groups. Similarly, the introverted subjects were eligible to participate in one of four treatment groups.

E read identical instructions to all his Ss. These instructions were a modification of those employed by Rosenthal.<sup>6</sup> The exact instructions read to S were as follows:

I am going to read to you some instructions. No questions can be answered about this experiment. O.K.?

We are in the process of developing a test of empathy. The test is designed to show how well a person is able to put himself into someone's place. You will see a series of photographs. For each one I want you to judge whether the person pictured has been experiencing success or failure. To help you make more exact judgments you are to use this rating scale. As you can see the scale runs from -10 to +10. A rating of -10 means that you judge the person to have experienced extreme failure. A rating of +10 means that you judge the person to have experienced extreme success. A rating of -1 means that you judge the person to have experienced mild failure, while a rating of +1 means that you judge the person to have experienced mild success. You are to rate each photograph as accurately as you can. Write down the rating you assign each photograph. Indicate the number of the rating and the sign. All ready? Here is the first slide. (No further explanation may be given although all or part of the instructions may be repeated.)

Each S was given ten slides and asked to rate each slide in terms of success or failure. A rating scale was provided to assist the S in his choice.

It is the writer's conviction that the experimental design outlined in this chapter fulfills McGuire's requirements for the mediation of the E-bias effect.

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<sup>6</sup> R. Rosenthal, "The Effect of the Experimenter on the Results of Psychological Research," in B. A. Maher (ed.), Progress in Experimental Personality Research, Vol. 1, New York, Academic Press, 1964, p. 79-114.

## 6. Statistical Analysis.

The ratings of the slides have been obtained in the described manner by the experimenter. The S's rating of the ten slides served as the dependent variable of this experiment. In order to investigate the reliability of the rating procedure, a measure of reliability was obtained by correlating the algebraic summation of the S's ten ratings obtained in one session with the algebraic summation of the S's ten ratings obtained in a second session. The test-retest reliability of S's ratings was calculated using the Pearson product moment correlation coefficient. The significance of the coefficient of correlation between the algebraic summation of the S's ten ratings obtained in one session with the algebraic summation of the S's ten ratings obtained in a second session was assessed by the use of the following t test:<sup>7</sup>

$$\underline{t} = \frac{r\sqrt{N-2}}{\sqrt{1-r^2}}$$

The results are reported and discussed in Chapter III.

After examining the reliability of the rating procedure, the present study investigated the possible relationship between the personality of S, personality of E, and the E-bias effect.

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<sup>7</sup> Edwards, op. cit., p. 171.



The statistical design followed a 2x2x2 fixed factorial analysis of variance model.<sup>8</sup> The three factors treated were bias, personality of E, and personality of S. The bias factor consisted of the positive biasing instructions read to E by I or the negative biasing instructions read to E by I. The personality of E factor consisted of two levels of extraversion, a high extraversion group and a low extraversion group. Similarly, the personality of S factor consisted of two levels of extraversion. Subjects were assigned either to the low extraversion or high extraversion groups on the basis of their composite Extraversion scores on the EPI. The high extraverted subjects were eligible to participate in one of four treatment groups and indicated their preference on the basis of their availability. Similarly, the low extraverted subjects were eligible to participate in one of four treatment groups. This design was selected to enable an analysis of both main and interaction effects.

In addition to being treated by a 2x2x2 fixed factorial analysis of variance model, the three independent variables were each analyzed by a nonparametric chi square test.<sup>9</sup> A nonparametric statistic was applied to the

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<sup>8</sup> B. J. Winer, Statistical Principles in Experimental Design, New York, McGraw-Hill, 1962, p. 162-174.

<sup>9</sup> Edwards, op. cit., p. 72.

individual subject's ratings to eliminate the possibility that the subject's judgment of the slides was artificially inflated due to the wide range inherent in the rating scale used in the present study.

The research design, procedures, and statistics used in the analysis of the data have been presented in this chapter. The results of the experiment will be presented and discussed in the following chapter.

## CHAPTER III

### PRESENTATION AND DISCUSSION OF RESULTS

This chapter is devoted to the presentation and discussion of the results of this experiment. A summary of the raw data is presented in Appendix 2. In the first section of this chapter, the results of the statistical operations outlined in chapter two are presented. The second section focuses on the interpretation of the results and possible implications for future research in this area.

#### 1. Presentation of Results.

##### A. Attrition Data

Data for those subjects who failed to complete all the requirements of the project are presented in Appendix 3. The high attrition rate appears to be related to the lengthy time interval required for the collection of data. It appears several potential subjects failed to participate in all phases of the project due to conflicts in schedules and other unforeseen events. Inspection of these results indicates a slightly higher rate of attrition among high extraversion subjects than low extraversion subjects.

B. Selection Data for Groups of High and Low  
Extraversion Subjects

Two groups of thirty-three students were selected on the basis of their composite Extraversion scores obtained on two administrations of the Eysenck Personality Inventory. The mean Extraversion composite score for the high extraversion group of Ss was 32.1, for the low extraversion group of Ss, 22.7. A significant difference in composite scores was found between the high and low extraversion subject groups,  $t = 11.19$ ,  $p < .05$ . The mean age of the high extraversion group of Ss was 21.4 years, for the low extraversion group of Ss, 21.5 years. Since all Ss were males and enrolled in an English speaking psychology course at the University of Ottawa, the two groups were essentially equivalent in terms of the factors of sex, age, education and language.

C. Selection Data for Groups of High and Low  
Extraversion Experimenters

Two groups of four students were selected from a larger group of male, English speaking psychology students enrolled at the University of Ottawa, on the basis of their composite Extraversion scores obtained on two administrations of the Eysenck Personality Inventory. The mean Extraversion composite score for the high extraversion groups

of Es was 36.8, for the low extraversion group of Es, 13.2. Clearly, the high and low groups of Es differ markedly in terms of level of extraversion. The mean age for the high extraversion group of Es was 21.5 years, for the low extraversion group of Es, 20.0 years. Since all the Es were male, English speaking students enrolled at the University of Ottawa, the two groups of Es were essentially equivalent in terms of the factors of age, sex, education and language.

#### D. Reliability of the Rating Procedure

As it has been noted previously, a review of the literature reveals only one study which was specifically concerned with the reliability of the Rosenthal person-perception task. Friedman<sup>1</sup> obtained a test-retest reliability coefficient of .60 between S's mean ratings.

However, the task utilized in the present study is a modification of the original Rosenthal task. In view of this modification it was necessary to determine the reliability of this instrument prior to its use in the present study. Fifty-seven Ss rated the slides on two separate occasions. There was a forty-eight hour interval between the first and second administrations. The results yielded

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<sup>1</sup> N. Friedman, The Social Nature of Psychological Research, New York, Basic Books, 1967, p. 42.

a test-retest reliability coefficient of .71 between S's composite ratings. The  $t$  test yielded a value of 7.48, which is significant beyond the .001 level of probability. Therefore the author concludes the rating procedure used in the study appears to have sufficient reliability to justify its use in the present study.

E. Analysis of Variance for Subjects' Mean  
Rating of the Slides

To investigate the significance of group differences in S's mean ratings, a three-way analysis of variance for S's mean rating was used. A summary of these data is presented in Table I.<sup>2</sup> No significant differences could be predicted from the main effects. That is, no significant differences were observed between positively and negatively biased groups, high and low extraversion Ss, and high and low extraversion Es.

However, a significant interaction between E's level of extraversion and S's level of extraversion,  $F(1,48) = 4.13$ ,  $p < .05$ , was observed. A comparison of the means assigned to the slides by high and low extraversion Ss, interacting with high and low extraversion Es is presented

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<sup>2</sup> The sample was reduced to fifty-six in these calculations to ensure an equal number of observations under each treatment. This condition permits the same E=S ratio in each treatment condition.

Table I.-

Analysis of Variance of Mean Ratings for Positively and  
Negatively Biased, High and Low Extraversion  
Groups of Es and Ss.

| Source of Variation | SS    | df | MS    | F ratio |
|---------------------|-------|----|-------|---------|
| A (Experimenter)    | 2.49  | 1  | 2.49  | -       |
| B (Subject)         | 3.81  | 1  | 3.81  | -       |
| C (Bias)            | .04   | 1  | .04   | -       |
| AB                  | 11.15 | 1  | 11.15 | 4.13*   |
| AC                  | 1.71  | 1  | 1.71  | -       |
| BC                  | 1.85  | 1  | 1.85  | -       |
| ABC                 | .22   | 1  | .22   | -       |
| Within cell         | 129.4 | 48 | 2.70  |         |

\*p < .05

Note: The mean ratings for positively and negatively biased, high and low extraversion groups of Es and Ss, which were employed in the analysis of variance are given in Appendix 4.

in Figure 4. Table II presents a summary of the analysis of variance for the simple main effects for high and low extraversion groups of Es and Ss. Analysis of the simple main effects showed a significant difference between Es interacting with high extraversion Ss,  $F(1,48) = 4.48$ ,  $p < .05$ . No significant difference was found between Es interacting with low extraversion Ss,  $F(1,48) < 1.00$ . Analysis of the simple main effect of level of extraversion of S indicates a significant difference between Ss interacting with low extraversion Es,  $F(1,48) = 5.19$ ,  $p < .05$ . No significant difference was found between Ss interacting with high extraversion Es.

Observation of the data in Table I reveals no other significant difference among the treatment conditions. The hypothesis of homogeneity of variance was not contradicted by the experimental data.

#### F. Chi Square Results

To eliminate the possibility that the subject's judgment of the slides was artificially inflated due to the wide range inherent in the rating scale, a chi square test of significance for each of the three independent variables was calculated. The dependent variable was the algebraic sum of the nominal score of S's ten ratings.



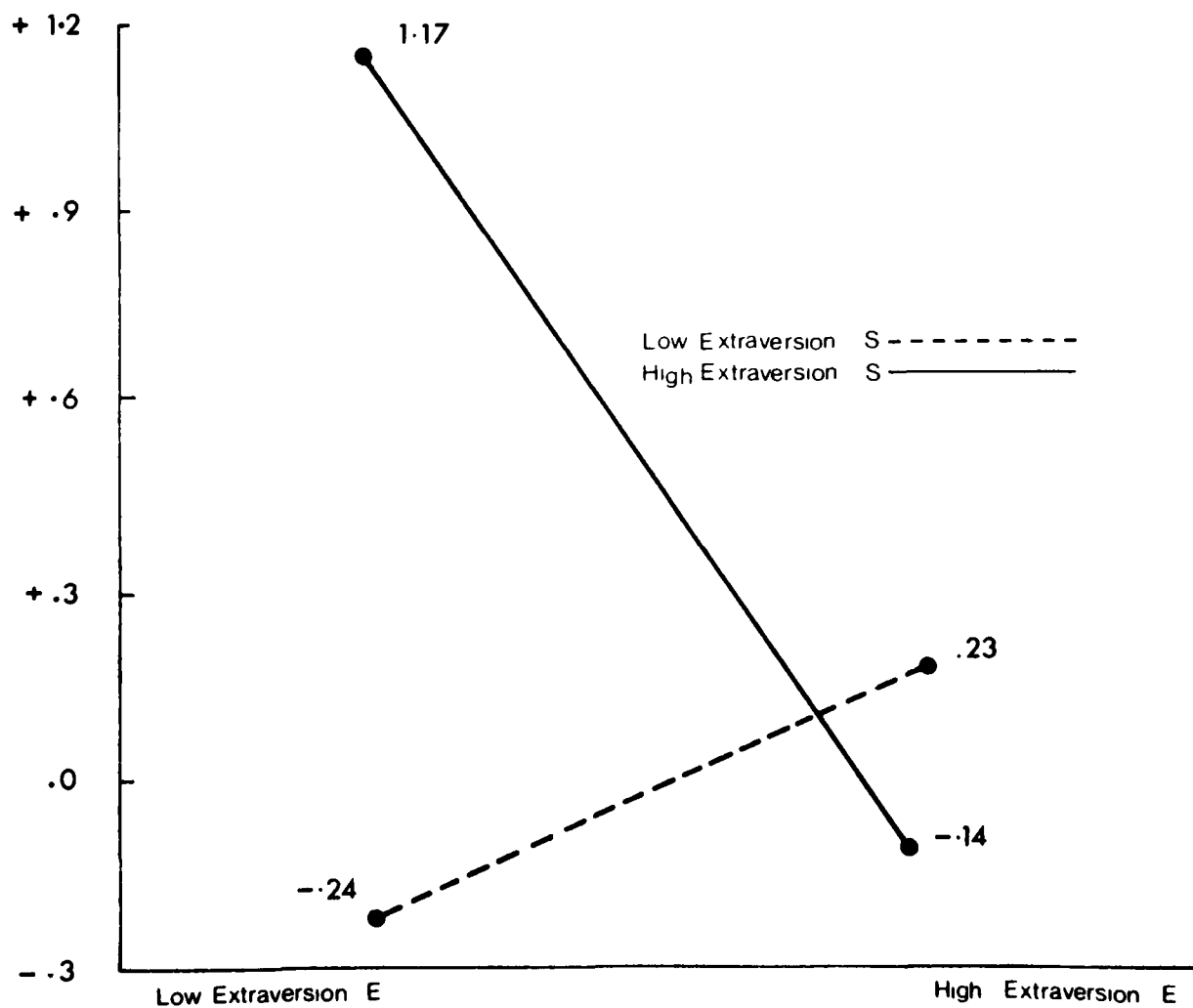


Fig 4 - A comparison of means assigned to the slides by high and low extraversion Ss interacting with high and low extraversion Es

Table II.-

Analysis of Variance of the Simple Main Effects for High  
and Low Extraversion Groups of Es and Ss.

| Source of Variation                      | SS     | df | MS    | F     |
|------------------------------------------|--------|----|-------|-------|
| AB (Experimenter-Subject)                | 11.15  | 1  | 11.15 | 4.13* |
| A for b1<br>(S with low extraversion E)  | 14.0   | 1  | 14.0  | 5.19* |
| A for b2<br>(S with high extraversion E) | .97    | 1  | .97   | -     |
| B for a1<br>(E with low extraversion S)  | 1.56   | 1  | 1.56  | -     |
| B for a2<br>(E with high extraversion S) | 12.09  | 1  | 12.09 | 4.48* |
| Within cell                              | 129.41 | 48 | 2.70  |       |

\*p < .05

These frequencies were partitioned and analyzed in three different ways and the resultant chi square analyses are provided in Table III. Inspection of these results indicates non-significant differences among the three independent variables and suggests that the S's ratings of the slides were not artificially inflated.

## 2. Interpretation of Results.

The results have been presented in the preceding section. In this section the findings will be interpreted and related to the research literature. Implications for future research will also be discussed.

The first hypothesis this study was designed to test, i.e., there is no significant difference between positively and negatively biased groups in their judgments of whether persons pictured in out-of-focus slides have been experiencing success or failure, as indicated by their ratings, cannot be rejected from the findings of the present investigation. This finding is contrary to that found in several previous studies which demonstrated the E-bias effect with an ambiguous stimulus. Marwit and Marcia,<sup>3</sup>

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<sup>3</sup> S. J. Marwit and J. R. Marcia, "Tester Bias and Response to Projective Instruments," Journal of Consulting Psychology, Vol. 31, 1967, p. 253-258.

Table III.-

Frequencies and Chi Square Values of Experimenters,  
Subjects and Bias Treatment Conditions.

|              | O  | E    | O  | E    | Total N | $\chi^2$ |
|--------------|----|------|----|------|---------|----------|
| Experimenter |    |      |    |      |         |          |
| positive**   | 15 | 15   | 15 | 15   | 30      |          |
| negative     | 10 | 10.5 | 11 | 10.5 | 21      |          |
| zero         | 8  | 7.5  | 7  | 7.5  | 15      |          |
| Total N      | 33 |      | 33 |      |         | .10*     |
| Subject      |    |      |    |      |         |          |
| positive     | 15 | 15.5 | 16 | 15.5 | 31      |          |
| negative     | 11 | 10   | 9  | 10   | 20      |          |
| zero         | 7  | 7.5  | 8  | 7.5  | 15      |          |
| Total N      | 33 |      | 33 |      |         | .12      |
| Bias         |    |      |    |      |         |          |
| positive     | 15 | 15   | 16 | 16   | 31      |          |
| negative     | 9  | 9.7  | 11 | 10.3 | 20      |          |
| zero         | 8  | 7.3  | 7  | 7.7  | 15      |          |
| Total N      | 32 |      | 34 |      |         | .23      |

\* .05 level of significance  $\chi^2 (2) = 5.99$ .

\*\* The dependent variable was the algebraic sum of the nominal score of S's ten ratings.

with the Holtzman inkblot, and Masling,<sup>4</sup> using the Rorschach inkblot test, found that the subject's responses were significantly altered by the expectancy of the experimenter. However, a recent study by Compton<sup>5</sup> failed to confirm this hypothesis. Compton obtained a significant bias effect using a structured task but failed to demonstrate the E-bias effect with a more ambiguous task. Although it is possible that the stimulus used in the present study failed to reflect a sufficient degree of ambiguity to permit the mediation of the bias, the failure in this investigation to reject the first hypothesis appears primarily due to a failure in the transmission process in which the bias is communicated from the principal investigator to the experimenter, and from the experimenter to the subject. In addition, the demand characteristics which operated in this investigation may have led to failure to reject the first hypothesis of this study.

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<sup>4</sup> J. Masling, "Differential Indoctrination of Examinees and Rorschach Responses," Journal of Consulting Psychology, Vol. 29, 1967, p. 198-201.

<sup>5</sup> J. W. Compton, "Experimenter Bias: Reaction Time and Types of Expectancy Information," Perceptual Motor Skills, Vol. 31, 1970, p. 159-168.

As noted in the review of the literature, McGuire,<sup>6</sup> in attempting to clarify the nature of the mediation of the E-bias effect, postulated an eight-step transmission process. Failure in any one of these eight links apparently would be sufficient to interfere with the mediation of the bias. The present study, like the majority of studies in this area, failed to check the effectiveness of the bias instructions. Thus it is possible that the experimenter may not have been paying attention to the principal investigator when the induced expectancy was transmitted. Therefore, the experimenter may have forgotten, embellished or modified the induced expectancy so that what he communicated to his subjects differed considerably from what the principle investigator intended the experimenter to communicate. Bootzin,<sup>7</sup> in a recent study, offers empirical support that the experimenter's communication may differ significantly from the induced expectancy. In addition to possibly altering the induced expectancy, the apparent breakdown in the transmission process may be due to the experimenter's failure to believe the bias given, thereby ignoring the

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6 W. J. McGuire, "Personality and Susceptibility to Social Influence," in E. F. Borgotta and W. W. Lambert (eds.), Handbook of Personality Theory and Research, Chicago, Rand McNally, 1968, p. 1130-1187.

7 R. R. Bootzin, "Induced and Stated Expectancy in Experimenter Bias," in Proceedings of the 77th Annual Convention of the APA, Vol. 4, 1969, p. 365-366.

communication and attempting to fulfill the stereotype of the scientist by being totally objective.

In addition to the apparent breakdown in the transmission process, failure in the present study to find a difference between positively and negatively biased groups may be due to the subtle and unique set of demand characteristics which operated in this investigation. It might be recalled that both E and S were selected from the same population and thus were essentially equivalent in terms of sex, age, education and language. This procedure was followed in order to reduce the possibility of obtaining differential results due to the E-effect.

Thus it would seem that the E and S were of equal status in this investigation. In equating the status of the E and the S the present study apparently substantially reduced the probability of obtaining a significant effect between the positive and negative bias groups. Rosenthal,<sup>8</sup> summarizing a number of studies in this area, found that high status Es as compared to low status Es had four times the probability of influencing their S's responses.

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<sup>8</sup> R. Rosenthal, "Interpersonal Expectations: Effects of the Experimenter's Hypothesis," in R. Rosenthal and R. L. Rosnow (eds.), Artifact in Behavioral Research, New York, Academic Press, 1969, p. 228.

Silverman<sup>9</sup> similarly observed that graduate students, as opposed to professors, failed to obtain significant effects replicating well-established experimental findings. It seems that naive, low status Es do not perform as well as more experienced, high status Es.

The probability of obtaining significant differences between positively and negatively biased groups appears to have been further reduced by the manner in which Ss were recruited for the experiment. The principal investigator who recruited Ss did not reveal his status as a Ph.D candidate, and thus may have reduced his status as a researcher to equal terms with the Ss and Es, thereby further reducing the probability of the induced expectancy being accepted by E.

Recently Jacob<sup>10</sup> and Minor<sup>11</sup> have found that the probability of hypothesis-confirming behavior on the part of the S would be directly related to the E's ability to exert influence upon S's future. This lack of influence

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9 I. Silverman, "Motives Underlying the Behavior of the S in the Psychological Experiment," paper read at the APA, Chicago, 1965.

10 T. Jacob, "Experimenter Bias Effect as a Function of Demand Characteristics and Experimenter Investment," Psychological Reports, Vol. 28, 1971, p. 1003-1010.

11 M. W. Minor, "Experimenter-Expectancy Effect as a Function of Evaluative Apprehension," Journal of Personality and Social Psychology, Vol. 15, 1970, p. 333-337.



over S's future may account at least partially for the failure of the E's expectancy to be transmitted to his S.

Another reason for the non-significant results in the present study may have been the use of male Es and Ss. Bloom and Tesser,<sup>12</sup> in a recent experiment, found no expectancy effect using male E and male S. They concluded that male Ss appear to be less influenceable than female Ss. This conclusion received support from Rosenthal and his associates<sup>13</sup> who have observed that the probability of demonstrating the E-bias effect is increased significantly when the E is male and the S is female.

The results of the present study appear to be in agreement with a multitude of previous studies which have failed to replicate or demonstrate the E-bias effect. Jacob,<sup>14</sup> Wessler,<sup>15</sup> and Barber et al.<sup>16</sup> all failed to

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12 Robert Bloom and Abraham Tesser, "On Reducing Experimenter Bias: The Effects of Forewarning," Canadian Journal of Behavioral Science, Vol. 13, 1971, p. 198-207.

13 R. Rosenthal, G. W. Persinger, R. C. Mulry, Linda Vikan-Kline and M. Grothe, "Changes in Experimental Hypothesis as Determinants of Experimental Results," Journal of Projective Techniques and Personality Assessment, Vol. 28, 1964, p. 465-469.

14 T. Jacob, "The Experimenter Bias Effect: A Failure to Replicate," Psychonomic Science, Vol. 13, 1968, p. 239-240.

15 R. L. Wessler, "The Experimenter Effect on a Task-ability Problem Experiment," Dissertation Abstracts, Vol. 27, 1966, p. 2173.

16 T. X. Barber, A. Forgionne, S. F. Chaves, D. S. Calverley, J. D. McPeake, and Barbara Bowen, "Five Attempts to Replicate the Experimenter Bias Effect," Journal of Consulting and Clinical Psychology, Vol. 33, 1969, p. 1-6.

replicate the E-bias effect within the framework of Rosenthal's basic paradigm. In an effort to explain the apparent disparity between studies, like the present one, which failed to demonstrate the bias phenomenon, and others which have done so, Barber and Silver<sup>17</sup> have suggested that the reliability of the E-bias effect may be questionable. Thus the results of this investigation may be seen as a reflection of the unreliability of the bias phenomenon. However, this interpretation appears to be ruled out on the basis of the significant test-retest reliability coefficient found between S's composite ratings. Thus the results of the present investigation indicate that the task used in the majority of the studies which have investigated the E-bias effect is a fairly stable and reliable one.

From the analyses of the S's mean and individual ratings the second hypothesis that there is no significant difference between positively and negatively biased groups, independent of the subject's personality, was not rejected. Similarly, the third hypothesis that there is no significant difference between positively and negatively biased groups,

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17 T. X. Barber and M. J. Silver, "Fact, Fiction and the Experimenter Bias Effect," Psychological Bulletin, Monograph Supplement, Vol. 70, 1968, p. 24.

independent of the experimenter's personality type, was also not rejected. Thus neither S's nor E's personality measures were related to the expectancy bias in the present study. This finding is in agreement with a previous study which also failed to obtain a significant relationship between S's and E's personality measures and the E-bias effect. Bootzin<sup>18</sup> investigated the relationship between the S's and E's scores on three self report tests<sup>19</sup> and the expectancy effect in order to discover personality variables of Es and/or Ss which maximize or minimize the E-bias effect. However, his results indicated neither S's nor E's personality measures were related to the expectancy effect.

However, Friedman<sup>20</sup> and Engram<sup>21</sup> obtained a significant interaction between the expectancy effect and measures

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18 R. R. Bootzin, "Expectancy and Individual Differences in Experimenter Bias," The Journal of General Psychology, Vol. 84, 1971, p. 303-312.

19 These include the Internal-External Locus of Control Scale, the Marlowe-Crowne Social Desirability Scale, and the Gold Dominance Scale.

20 N. Friedman, D. Kurland, and R. Rosenthal, "Experimenter Behavior as an Unintended Determinant of Experimental Results," Journal of Projective Techniques and Personality Assessment, Vol. 29, 1965, p. 479-490.

21 W. C. Engram, "One Aspect of the Social Psychology of Experimentation: The E-effect and Related Personality Characteristics in the E," Dissertation Abstracts, Vol. 28, 1968, p. 3260-3261.

of selective personality variables. These results indicated professionalism, dominance, and responsibility are important characteristics of Es who were successful in influencing the performance of their Ss. One reason for the discrepancy between the results of the present study and the studies cited above may be the use of the dyadic interaction model in this investigation. The use of the dyadic interaction model without directly measuring their interaction may have masked any singular influence that the personality of E and S may have had upon the E-bias effect.

Another possible explanation for the non-significant interaction between bias and level of extraversion of E and S may be the way the mechanisms of extraversion and introversion operated in the present study. It seems that the mechanisms underlying both extraversion and introversion may either have cancelled each other out or may have operated in the same direction.

Another reason for the non-significant interaction between bias and personality measures of E and S may be the small sample size utilized in the present study. Masling<sup>22</sup> has argued that experimenter bias appears to contribute only a small portion of the total variance and that only under certain conditions, e. g., when the task is ambiguous, will experimenter bias be statistically significant. Campbell and

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22 J. Masling, "Role Related Behavior of the S and Psychologist and Its Effect upon Psychological Data," in Nebraska Symposium on Motivation, Vol. 6<sup>4</sup>, 1966, p. 93.

and Fiske<sup>23</sup> have similarly found that personality variables typically account for only a small percentage of the total variance. Thus, any research attempting to study the relationship between personality variables and the E-bias effect is likely to account for only a very small percentage of the total variance, thereby needing an unusually large sample population to approach statistical significance. The present study was unable to utilize a large sample size due to difficulties encountered in acquiring a homogeneous population of subjects and experimenters.

Although the present study did not find a significant relationship between the personality measures of E and S and the E-bias effect, there was a significant relationship between personality measures of E and S and the S's mean ratings. Thus high extraversion Ss rated the slides significantly higher when interacting with low extraversion Es than with high extraversion Es. Similarly, low extraversion Es obtained significantly higher ratings from high extraversion Ss than low extraversion Ss. This finding is in agreement with previous studies which have similarly found that personality variables do influence S's responses.

It seems that when the personalities of E and S are diametrically opposite, the S rates the slides much more favorably than when the personalities of E and S are similar. Es interacting with Ss of a similar personality

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23 D. T. Campbell and D. W. Fiske, "Convergent and Discrimination Validation by the Multitrait-multimethod Matrix," Psychological Bulletin, Vol. 56, 1959, p. 81-105.

seemingly generate a somewhat more competitive and non-cooperative atmosphere than when interacting with an S of an opposite personality. It might be that when the personalities of E and S are similar there is a conflict for power in the interaction such that S attempts to exert control over the situation by behaving in a noncooperative manner. With this noncooperative attitude the S may subsequently rate the slides negatively. However, when the E interacts with an S of an opposite personality type there is no struggle for power and the E thus provides an atmosphere in which the S is made to feel good. Subsequently the S is more likely to be cooperative and project his feeling of well-being onto the ambiguous slide, thereby rating the slides more positively.

This study has demonstrated that the E's and S's personality do influence the S's behavior in a psychological experiment. However, the study did not clearly establish a relationship between the E's and S's level of extraversion and the E-bias effect.

Implications for further research in this area are numerous. However, from the results of this investigation it appears that a study which focuses on either the relationship between the personality of the experimenter and the E-bias effect, or the relationship between the personality of the subject and the E-bias effect, would help to

clarify the relationship between bias and the personality variable, extraversion-introversion. In addition, this study might investigate the relationship between the personality variable, extraversion-introversion, and the E-bias effect under conditions which maximize the transmission of the bias, thereby providing information about the effect of the personality variable, extraversion-introversion, on the E-bias effect under optimum conditions.

A second possibility that arises from this investigation would be a study in which physiological correlates of behavior could be monitored during the actual E-S interaction. This type of study might help to clarify the manner in which the bias is mediated.

A third possibility that might be worthy of further study would be the systematic investigation of the relative status among the experimenter, subject and principal investigator and the relationship to the E-bias effect. Status, it would seem, is a crucial variable in the mediation of the bias. A related variable seemingly worthy of future consideration would be the extent to which E's influence over S's future behavior affects S's performance in a psychological experiment.

## SUMMARY AND CONCLUSIONS

The present study was primarily designed to assess the relationship between experimenter's and subject's personality and the E-bias effect and secondarily to check the reliability of the transmission of the E-bias effect with an ambiguous stimulus.

The first hypothesis tested stated that there is no significant difference between positively and negatively biased groups in their judgments of whether persons pictured in out-of-focus slides have been experiencing success or failure, as indicated by their ratings. A second hypothesis tested stated that there is no significant difference between positively and negatively biased groups, independent of the subject's personality type, operationally defined as scores on the Extraversion scale of the Eysenck Personality Inventory. In addition, a third hypothesis was also tested, and stated that there is no significant difference between positively and negatively biased groups, independent of the experimenter's personality type, operationally defined as scores on the Extraversion scale of the Eysenck Personality Inventory.

An analysis of variance was used as the statistical test of significance for all the hypotheses. The first hypothesis was also tested by means of a chi square test of significance. The results of both the chi square test and



analysis of variance were statistically nonsignificant and therefore all hypotheses were not rejected. However, a statistically significant interaction between E's level of extraversion and S's level of extraversion was observed. The failure of the present study to find a significant relationship between the personality measures of E and S and the E-bias effect was explained as being due to a breakdown in the transmission process, the unique set of demand characteristics operating in this investigation, the use of the dyadic interaction model, and the small sample size utilized in this experiment. The significant relationship between personality measures of E and S and the S's mean ratings suggested that the experimenter's and subject's personality do influence the subject's behavior in a psychological experiment.

To check the reliability of the E-bias effect with an ambiguous stimulus, a test-retest reliability of coefficient was calculated between S's composite ratings. The significance of the coefficient of correlation between S's composite ratings was assessed by use of a t test. The t test was statistically significant and suggested that the task used in this and other studies investigating the E-bias effect is a fairly stable and reliable one.

It was concluded that both E's and S's personality do influence the S's behavior in a psychological experiment

and that this is a very fertile area for research. A number of topics for future research were suggested.

## BIBLIOGRAPHY

Barber, T. X. and M. J. Silver, "Fact, Fiction, and the Experimenter Bias Effect," Psychological Bulletin, Monograph Supplement, Vol. 70, 1968, p. 1-29.

This paper is a critical review of many of the studies in the literature which demonstrated the E-bias effect. Important suggestions and implications for future research are presented. It was this paper that led to the investigation of the reliability of the task in the present study.

Bootzin, R. R., "Expectancy and Individual Differences in Experimenter Bias," Journal of General Psychology, Vol. 84, 1971, p. 303-312.

This experiment was relevant to the present study because it utilized the dyadic interaction model while investigating the personality variables of Es/or Ss which maximize or minimize the E-bias effect.

Engram, W. C., "One Aspect of the Social Psychology of Experimentation: The E Effect and Related Personality Characteristics in the Experimenter," Dissertation Abstracts, Vol. 28, 1968, p. 3260-3261.

This thesis revealed some of the personality correlates of the E-bias effect. Psychological-mindedness and responsibility were two important attributes of successful Es.

Evans, F. J., "Field Dependence and the Maudsley Personality Inventory," Perceptual Motor Skills, Vol. 24, 1967, p. 526.

The data here suggest that there is a positive correlation between extraversion and field-dependent perceivers. This evidence suggests that extravert Ss are more dependent on cues from their Es than introvert Ss.

Eysenck, H. J., The Biological Basis of Personality, Springfield, Ill., Charles C. Thomas, 1967, xvii-399 p.

This book presents a summary of the research distinguishing between introversion-extraversion. In addition, a neurophysiological model is postulated to explain the observed differences between the behavior of introverts and extraverts. This text is the major source of the theoretical background of this research project.

Farley, F. H., "Social Desirability, Extraversion and Neuroticism: A Learning Analysis," Journal of Psychology, Vol. 64, 1966, p. 113-118.

This study shows that introverts endorsed more socially desirable responses than extraverts and offers support for the hypothesis that introverted Ss would be more influenced by their Es than extraverted Ss.

Friedman, N., D. Kurland, and R. Rosenthal, "Experimenter Behavior as an Unintended Determinant of Experimental Results," Journal of Projective Techniques and Personality Assessment, Vol. 28, 1965, p. 479-490.

One of the first experiments to investigate the personality variables of E which serve to maximize the bias effect. Es, whose experimental behavior reflected greater interpersonal involvement or warmth, obtained ratings of the photos as more successful. Es, whose experimental behavior reflected a greater task orientation, greater competence, and a more professional manner, obtained ratings significantly more in accordance with their expectancy.

McGuire, W. J., "Personality and Susceptibility to Social Influence," in E.F. Borgatta and W.W. Lambert (eds.), Handbook of Personality Theory and Research, Chicago, Rand McNally, 1968, p. 1130-1187.

This article discusses research relating personality and susceptibility to social influence. Six principles are cited as underlying personality-influenciability relationships. One, the mediation principle, argues that opinion change is not a direct response but the net outcome of a chain of behavioral steps. This principle offers some clues as to the nature of the mediation of the E-bias effect. This study was also important in interpreting the results of this investigation.

Masling, J., "Role-related Behavior of the Subject and the Psychologist and its Effect upon Psychological Data," Nebraska Symposium on Motivation, Vol. 14, 1966, p. 67-103.

This paper outlines the behavior of the subject and the experimenter under ambiguous conditions. The rationale of this behavior is also presented.

Rosenthal, Robert, Experimenter Effects in Behavioral Research, New York, Appleton-Century-Crofts, 1966, vii-464 p.

This text is the single most comprehensive source book for both the E-effect and the E-bias effect. Many of the procedures applied in the present investigation were adopted from this source.

Rosenthal, Robert, "Interpersonal Expectations: Effects of the Experimenter's Hypotheses," in R. Rosenthal and R. L. Rosnow (eds.), Artifact in Behavioral Research, New York, Academic Press, 1969, p. 181-277.

This article summarizes the most recent findings of studies dealing with both the E-effect and the E-bias effect. The author discusses possible reasons for failure of some studies to demonstrate the E-bias effect.

APPENDIX 1

THE EYSENCK PERSONALITY INVENTORY (EPI)

# EYSENCK PERSONALITY INVENTORY

## FORM A

**By H. J. Eysenck  
and Sybil B. G. Eysenck**

Name\_\_\_\_\_ Age\_\_\_\_\_ Sex\_\_\_\_\_

Grade or Occupation\_\_\_\_\_ Date\_\_\_\_\_

School or Firm\_\_\_\_\_ Marital Status\_\_\_\_\_

## INSTRUCTIONS

Here are some questions regarding the way you behave, feel and act. After each question is a space for answering "Yes," or "No."

Try and decide whether "Yes," or "No" represents your usual way of acting or feeling. Then blacken in the space under the column headed "Yes" or "No."

Work quickly, and don't spend too much time over any question; we want your first reaction, not a long drawn-out thought process. The whole questionnaire shouldn't take more than a few minutes. Be sure not to omit any questions. Now turn the page over and go ahead. Work quickly, and remember to answer every question. There are no right or wrong answers, and this isn't a test of intelligence or ability, but simply a measure of the way you behave.

| Section of Answer<br>Column Correctly<br>Marked |                                     |
|-------------------------------------------------|-------------------------------------|
| Yes                                             | No                                  |
| <input checked="" type="checkbox"/>             | <input type="checkbox"/>            |
| Yes                                             | No                                  |
| <input type="checkbox"/>                        | <input checked="" type="checkbox"/> |

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|                                                                                                                                 | E   | N  | L |
|---------------------------------------------------------------------------------------------------------------------------------|-----|----|---|
| 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. Does your mood often go up and down?                                                                                         | Yes | No |   |
| 8. Do you generally do and say things quickly without stopping to think? .                                                      | Yes | No |   |
| 9. Do you ever feel "just miserable" for no good 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 stranger? . . .                                             | 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 |   |

|                                                                                                                                  | E   | N  | L |
|----------------------------------------------------------------------------------------------------------------------------------|-----|----|---|
| 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 many 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 |   |



APPENDIX 1A

PRINCIPAL INVESTIGATOR'S TELEPHONE APPEAL

## APPENDIX 1A

## PRINCIPAL INVESTIGATOR'S TELEPHONE APPEAL

All experimenters volunteered to participate in the experiment following a telephone appeal made by the principal investigator. In the telephone appeal, the principal investigator stressed to each potential experimenter the importance that their contribution would be making toward the principal investigator's doctoral dissertation. In addition, the value of such a learning experience was also emphasized. Potential experimenters were told by the principal investigator that by participating in the present experiment they might gain valuable insights into the nature of experimental psychology. Experimenters were further motivated to participate by being told they would get further information about the nature of the project when they began the experiment. An additional factor which may have further served to gain their cooperation was the principal investigator's assurance that their part in the experiment would not exceed one-and-a-half hours.

## APPENDIX 2

### TABULATED RAW DATA OF THE STUDY

## APPENDIX 2

Table A.-

Raw Scores of High Extraversion Ss Interacting with High  
Extraversion Es under +5 Bias Conditions.

| Subject | EPI            |                | Slides |    |    |   |    |    |    |    |    |    |
|---------|----------------|----------------|--------|----|----|---|----|----|----|----|----|----|
|         | E <sub>A</sub> | E <sub>B</sub> | 1      | 2  | 3  | 4 | 5  | 6  | 7  | 8  | 9  | 10 |
| 1       | 13             | 15             | -7     | -9 | 3  | 4 | 5  | 8  | -5 | -8 | -6 | 5  |
| 2       | 12             | 17             | 1      | -4 | 5  | 7 | -3 | -5 | 5  | 4  | -2 | -5 |
| 3       | 18             | 19             | 6      | 4  | 4  | 4 | -4 | -7 | -9 | -7 | 3  | 5  |
| 4       | 14             | 18             | 5      | -8 | -5 | 7 | 6  | -1 | 4  | 9  | -6 | 2  |
| 5       | 18             | 19             | 2      | -6 | 2  | 6 | -4 | 4  | 8  | 8  | -3 | 3  |
| 6       | 20             | 17             | 1      | -7 | -8 | 5 | 2  | -3 | -1 | -7 | -8 | 1  |
| 7       | 18             | 15             | 1      | -3 | 6  | 8 | 5  | 2  | -1 | -5 | -2 | 4  |
| 8       | 14             | 16             | 1      | -2 | -1 | 5 | -4 | -6 | -6 | -6 | -3 | 6  |

Raw Scores of Low Extraversion Ss Interacting with High Extraversion Es under +5 Bias Conditions.

[illegible]

Table C.-

Raw Scores of Low Extraversion Ss Interacting with Low  
Extraversion Es under +5 Bias Conditions.

| Subject | EPI            |                | Slides |    |    |   |    |     |     |    |    |    |
|---------|----------------|----------------|--------|----|----|---|----|-----|-----|----|----|----|
|         | E <sub>A</sub> | E <sub>B</sub> | 1      | 2  | 3  | 4 | 5  | 6   | 7   | 8  | 9  | 10 |
| 1       | 9              | 14             | 6      | -4 | 4  | 2 | -5 | -7  | -6  | -3 | -8 | -5 |
| 2       | 14             | 11             | -1     | -5 | 4  | 5 | 1  | -3  | -5  | -1 | -6 | 5  |
| 3       | 10             | 14             | 1      | -7 | -7 | 7 | -4 | -10 | -10 | -7 | -7 | -4 |
| 4       | 14             | 10             | -1     | -2 | 1  | 5 | 7  | -3  | 6   | 5  | -8 | -3 |
| 5       | 12             | 14             | 1      | -8 | 5  | 8 | -3 | -5  | -4  | -3 | -4 | -6 |
| 6       | 10             | 16             | 3      | 1  | 5  | 6 | 4  | -2  | 2   | -1 | -1 | 4  |
| 7       | 8              | 13             | 4      | 4  | 4  | 5 | 2  | 5   | 1   | -1 | -4 | -1 |
| 8       | 14             | 13             | 3      | -9 | 6  | 6 | -1 | 2   | 4   | 8  | -3 | 2  |

Table D.-

Raw Scores of High Extraversion Ss Interacting with Low  
Extraversion Es under +5 Bias Conditions.

| Subject | EPI            |                | Slides |    |    |    |    |    |    |    |     |    |
|---------|----------------|----------------|--------|----|----|----|----|----|----|----|-----|----|
|         | E <sub>A</sub> | E <sub>B</sub> | 1      | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9   | 10 |
| 1       | 13             | 16             | -7     | -1 | 6  | 4  | -3 | 8  | -1 | -2 | -2  | 3  |
| 2       | 19             | 15             | 1      | -3 | 2  | 7  | 5  | -4 | 3  | 1  | -6  | 3  |
| 3       | 13             | 15             | -8     | -4 | 4  | -1 | 4  | 10 | -5 | 7  | -5  | 7  |
| 4       | 13             | 15             | -6     | -4 | 4  | 7  | 7  | 8  | 8  | -4 | -8  | 6  |
| 5       | 15             | 22             | -6     | -3 | 4  | 5  | -2 | 8  | 6  | -1 | -9  | -5 |
| 6       | 15             | 17             | 5      | -5 | 7  | -1 | -7 | 1  | 8  | 5  | -10 | 7  |
| 7       | 13             | 16             | -4     | -2 | 4  | 1  | -2 | 2  | 1  | 3  | 2   | 4  |
| 8       | 16             | 2-             | -7     | 4  | 7  | 5  | 8  | 8  | 4  | 6  | -9  | -9 |
| 9       | 12             | 15             | -8     | -6 | -2 | 1  | 2  | -2 | -5 | 5  | 6   | -1 |

Table E.-

Raw Scores of High Extraversion Ss Interacting with High  
Extraversion Es under -5 Bias Conditions.

| Subject | EPI            |                | Slides |    |    |    |    |    |    |    |    |    |
|---------|----------------|----------------|--------|----|----|----|----|----|----|----|----|----|
|         | E <sub>A</sub> | E <sub>B</sub> | 1      | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 |
| 1       | 15             | 17             | -6     | -4 | 2  | -7 | -8 | -1 | 6  | 5  | -3 | 8  |
| 2       | 16             | 18             | -8     | -1 | 9  | 7  | 2  | -3 | -8 | -2 | 3  | 4  |
| 3       | 13             | 18             | -3     | -8 | -5 | 4  | 1  | -2 | -3 | -5 | 1  | -1 |
| 4       | 14             | 16             | -1     | 1  | 1  | -1 | -1 | -1 | -1 | 1  | -1 | 1  |
| 5       | 15             | 16             | -10    | -4 | -6 | -2 | 3  | 3  | 6  | 5  | -4 | 5  |
| 6       | 18             | 18             | -8     | -3 | -1 | 2  | -1 | 3  | 7  | 4  | 1  | 3  |
| 7       | 11             | 16             | -3     | -1 | 2  | 4  | 1  | -2 | 5  | 1  | -2 | 1  |
| 8       | 14             | 17             | 6      | -2 | 3  | -4 | -1 | 1  | 6  | -5 | -7 | -2 |
| 9       | 17             | 19             | -3     | 1  | 4  | 7  | -2 | -7 | 8  | -3 | -4 | -2 |



Table F.-

Raw Scores of Low Extraversion Ss Interacting with High  
Extraversion Es under -5 Bias Conditions.

| Subject | EPI            |                | Slides |    |    |    |     |    |    |   |    |    |
|---------|----------------|----------------|--------|----|----|----|-----|----|----|---|----|----|
|         | E <sub>A</sub> | E <sub>B</sub> | 1      | 2  | 3  | 4  | 5   | 6  | 7  | 8 | 9  | 10 |
| 1       | 14             | 12             | 2      | 5  | 8  | 1  | -3  | -1 | 2  | 6 | -4 | -7 |
| 2       | 12             | 13             | -10    | -6 | -1 | -1 | -10 | -6 | 6  | 6 | -1 | 6  |
| 3       | 14             | 12             | 10     | -5 | 1  | -9 | 5   | -6 | -9 | 3 | 6  | -5 |
| 4       | 9              | 9              | 1      | -1 | 1  | 3  | 1   | -4 | 2  | 1 | 1  | 1  |
| 5       | 13             | 14             | -6     | 1  | 6  | 2  | -2  | 5  | 8  | 9 | -1 | 3  |
| 6       | 7              | 13             | 1      | -1 | 5  | 3  | -5  | 5  | 1  | 8 | -1 | -5 |
| 7       | 5              | 11             | 4      | 6  | -3 | 1  | -6  | 4  | -8 | 3 | 6  | 7  |
| 8       | 9              | 16             | -8     | 2  | 8  | 4  | 8   | -3 | -8 | 9 | -4 | 9  |
| 9       | 12             | 10             | -7     | 3  | 7  | -4 | 1   | 5  | -3 | 3 | -8 | 7  |

Table G.-

Raw Scores of Low Extraversion Ss Interacting with Low  
Extraversion Es under -5 Bias Conditions.

| Subject | EPI            |                | Slides |    |    |    |    |    |     |     |     |    |
|---------|----------------|----------------|--------|----|----|----|----|----|-----|-----|-----|----|
|         | E <sub>A</sub> | E <sub>B</sub> | 1      | 2  | 3  | 4  | 5  | 6  | 7   | 8   | 9   | 10 |
| 1       | 10             | 15             | 3      | 5  | 8  | 7  | 5  | 8  | 4   | -1  | -3  | 3  |
| 2       | 14             | 11             | -9     | -5 | 5  | 10 | 10 | 4  | 10  | -10 | -10 | 10 |
| 3       | 7              | 9              | -5     | -1 | 4  | 5  | -7 | -5 | 6   | 7   | -1  | -1 |
| 4       | 13             | 12             | -10    | -7 | 7  | 1  | -1 | -4 | -10 | 8   | -1  | 1  |
| 5       | 8              | 11             | -8     | -3 | 4  | 7  | 3  | 4  | 7   | 2   | -3  | 5  |
| 6       | 13             | 13             | 5      | -4 | 9  | 2  | -1 | -4 | 2   | 1   | -8  | -5 |
| 7       | 12             | 9              | -3     | 3  | -6 | 4  | -9 | -6 | -9  | 9   | -5  | 9  |
| 8       | 8              | 16             | -10    | -1 | 3  | 2  | 2  | 3  | 4   | 1   | 1   | 3  |
| 9       | 11             | 11             | -7     | -3 | 6  | -5 | -4 | -8 | 4   | 7   | 4   | 6  |

Table H.-

Raw Scores of High Extraversion Ss Interacting with Low  
Extraversion Es under -5 Bias Conditions.

| Subject | EPI            |                | Slides |    |    |   |    |    |    |   |    |    |
|---------|----------------|----------------|--------|----|----|---|----|----|----|---|----|----|
|         | E <sub>A</sub> | E <sub>B</sub> | 1      | 2  | 3  | 4 | 5  | 6  | 7  | 8 | 9  | 10 |
| 1       | 11             | 16             | 5      | -1 | 5  | 5 | -4 | 5  | 5  | 7 | 1  | 7  |
| 2       | 17             | 19             | -7     | -2 | 2  | 3 | -1 | -3 | 5  | 4 | -8 | -6 |
| 3       | 18             | 19             | -10    | 5  | 6  | 1 | 4  | 4  | -4 | 5 | -9 | 5  |
| 4       | 14             | 16             | 6      | -3 | -2 | 4 | 4  | -4 | 1  | 6 | -4 | 3  |
| 5       | 18             | 18             | -8     | -1 | 7  | 3 | -6 | -2 | 8  | 9 | -4 | -8 |
| 6       | 14             | 16             | -6     | -8 | 5  | 2 | -4 | -7 | 3  | 6 | -3 | 7  |
| 7       | 16             | 16             | 6      | -1 | 2  | 8 | 7  | -8 | 6  | 5 | 9  | 10 |

## APPENDIX 3

### ATTRITION DATA OF THE STUDY

Table A.-

Scores Yielded by the Eysenck Personality Inventory (EPI)  
for those Subjects Who Filed to Complete all the  
Requirements of the Study.

| Subject | EPI            |                |
|---------|----------------|----------------|
|         | E <sub>A</sub> | E <sub>B</sub> |
| 1       | 14             |                |
| 2       | 15             |                |
| 3       | 6              |                |
| 4       | 17             |                |
| 5       | 19             |                |
| 6       | 16             |                |
| 7       | 19             |                |
| 8       | 7              |                |
| 9       | 12             |                |
| 10      | 13             |                |
| 11      | 11             |                |
| 12      | 13             |                |
| 13      | 8              |                |
| 14      | 13             |                |
| 15      | 14             |                |
| 16      | 15             | 17             |
| 17      | 11             | 17             |
| 18      | 14             | 19             |
| 19      | 17             | 17             |
| 20      | 16             | 20             |
| 21      | 13             | 15             |
| 22      | 17             | 19             |
| 23      | 13             | 18             |
| 24      | 16             | 17             |
| 25      | 14             | 14             |
| 26      | 16             | 20             |
| 27      | 11             | 19             |
| 28      | 14             | 13             |
| 29      | 12             | 15             |
| 30      | 10             | 16             |
| 31      | 7              | 7              |
| 32      | 12             | 10             |
| 33      | 12             | 9              |
| 34      | 6              | 12             |
| 35      | 14             | 13             |
| 36      | 15             | 9              |
| 37      | 8              | 10             |
| 38      | 8              | 10             |
| 39      | 11             | 15             |

#### APPENDIX 4

MEAN RATINGS FOR POSITIVELY AND NEGATIVELY BIASED,  
HIGH AND LOW EXTRAVERSION GROUPS OF Es AND Ss

Table A.-

Mean Ratings for Positively and Negatively Biased,  
High and Low Extraversion Groups of Es and Ss.

| Bias          | Mean Ratings |            |            |           |           |            |           |           |
|---------------|--------------|------------|------------|-----------|-----------|------------|-----------|-----------|
|               | High Ext E   | High Ext S | High Ext E | Low Ext S | Low Ext E | High Ext S | Low Ext E | Low Ext S |
| posi-<br>tive | .3*          |            | 1.0        |           | .9        |            | -2.6      |           |
|               | -.1          |            | .2         |           | .9        |            | -.6       |           |
|               | 1.3          |            | -.9        |           | 1.8       |            | -4.8      |           |
|               | 2.0          |            | 1.6        |           | -.3       |            | .7        |           |
|               | -2.5         |            | -1.9       |           | 1.0       |            | -1.9      |           |
|               | 1.5          |            | .8         |           | .7        |            | 2.1       |           |
|               | -1.6         |            | 1.0        |           | 3.5       |            | 2.3       |           |
| nega-<br>tive | -.8          |            | -1.7       |           | 3.5       |            | 1.5       |           |
|               | .3           |            | -.9        |           | -1.3      |            | .2        |           |
|               | -2.1         |            | .6         |           | .7        |            | -1.6      |           |
|               | -.4          |            | .2         |           | 1.1       |            | 1.8       |           |
|               | .7           |            | 1.1        |           | -.2       |            | -1.3      |           |
|               | -.5          |            | -1.7       |           | -.5       |            | .8        |           |
|               | -.1          |            | .4         |           | 4.4       |            | .0        |           |

\* Each score represents the mean of the S's ratings of the ten slides.

APPENDIX 5

ABSTRACT OF

Extraversion-Introversion and the  
Experimenter Bias Effect



## APPENDIX 5

### ABSTRACT OF

#### Extraversion-Introversion and the Experimenter Bias Effect<sup>1</sup>

This study endeavored to investigate the possible relationship between experimenter's and subject's personality and the E-bias effect. In addition, the reliability of the E-bias effect with an ambiguous stimulus was explored.

Two groups of thirty-three high and low extraversion male subjects, selected on the basis of the Eysenck Personality Inventory, judged the degree of success or failure experienced by persons pictured in out-of-focus slides. Positive or negative biases had been induced in each of eight high and low extraversion male experimenters, selected on the basis of the Eysenck Personality Inventory, who tested subjects in one of eight treatment conditions. All subjects and experimenters were sampled from similar populations and were essentially equivalent in terms of the factors of sex, age, education and language. An analysis of variance and chi square test of significance were used to determine the significance of the relationship between

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<sup>1</sup> David M. Nozick, doctoral thesis presented to the School of Graduate Studies of the University of Ottawa, Ontario, December 1972, x-108 p.

experimenter's and subject's personality and the E-bias effect.

The results of the analyses indicate a non-significant relationship between the personality measures of the experimenter and the subject and the E-bias effect. However, a significant relationship between personality measures of the experimenter and the subject and the subject's mean ratings was observed.

To determine the reliability of the instrument, fifty-seven subjects rated the slides on two separate occasions. The results of the correlational analysis reveal a significant test-retest coefficient of correlation. It was concluded that the task used in this and other studies investigating the E-bias effect is a fairly stable and reliable one.

It was further concluded that both the experimenter's and subject's personality do influence the subject's behavior in a psychological experiment and that this is a very fertile area for research.