THE UNIVERSITY OF MANITOBA

# SUBJECTS' ATTITUDES TOWARD PSYCHOLOGICAL RESEARCH AS A DETERMINANT OF EXPERIMENTAL RESULTS

by

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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

IN PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE DEGREE OF MASTER OF ARTS

DEPARTMENT OF PSYCHOLOGY

WINNIPEG, MANITOBA

October, 1971

# ABSTRACT OF THESIS

This study was designed to test the hypothesis that subjects' willingness to comply with the demand characteristics of the experiment is positively related to their attitudes toward psychological research. The Psychology Research Survey (PRS) was developed to measure subjects' attitudes toward experimentation in psychology. A one-session opinion change task in which subjects' opinions about vivisection were obtained before and after a pro-vivisection message was employed to convey the demand characteristics. Although all subjects showed significant opinion change, it was found, as predicted, that subjects with more positive attitudes toward psychological research showed significantly greater opinion change than subjects with less positive attitudes. In addition, correlations between PRS scores and pre-test scores were non-significant, while correlations between PRS scores and both post-test and opinion change scores were significant. The implications of subjects' attitudes toward psychological research as a determinant of experimental results were discussed.

ACKNOWLEDGEMENTS

The author wishes to express his appreciation to Dr. J.G. Adair, without whose help and encouragement this research could not have been accomplished. The author also wishes to express his appreciation to Dr. M.S. Aftanas for his assistance with the statistical analysis.

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# CHAPTER I

# INTRODUCTION

Recent investigations into the social psychology of experimentation have brought to the attention of psychologists the need to question the objectivity of their research findings. There is a growing body of evidence to indicate that the interaction between experimenter and subject can unintentionally, yet systematically, affect experimental results, thus confounding treatment effects. To date much of this research has focused on the experimenter's influence upon data contamination. Rosenthal (1964), for example, has indicated that certain experimenter characteristics such as sex, anxiety level, need for approval, and experience can systematically affect the data produced by subjects. Rosenthal (1966) and others have also demonstrated that even the experimenter's expectations as to how subjects will perform can be unintentionally communicated to the subject and thus have a significant bearing on the outcome of the experiment. In contrast to this investigator-centered research, the subject, as a source of systematic bias,

has received comparatively little detailed experimental attention.

Traditionally, researchers in the behavioural sciences have assumed a completely passive subject matter in much the same way as do physical scientists. However, the role of psychology is not to study inanimate objects. Its function is to investigate human behaviour. Psychologists dealing with human subjects are, at the same time, dealing with perceiving and feeling individuals, capable of reacting to all of the stimuli present in a situation. The psychological experiment involves an interaction between experimenter and subject. Though the experimenter may wish to regard it as a rigidly controlled interaction, it is not reasonable to expect the subject to view it as anything other than a small segment of his overall social contact with other people. Thus subjects will respond not only to the experimenter's instructions and task, but to the total environment, as is the case in other social encounters. The present study was undertaken to examine an aspect of this characteristic of the subject and to investigate its contribution to the problems generated by the social nature of psychological research.

Subjects' Cooperative Behaviour

Recent systematic concern with the subject as a contributor to methodological difficulties began with Henry Riecken (1958). In his discussion of some of the sources of unintended variance in social-psychological experiments, he described data collection as a social process with "features in common with other situations and events of human interaction." According to Riecken, the experiment is a one-sided procedure in which the subject is invited to participate, without knowing what will be required of him. He assumes a subordinate role in this relationship and often responds without knowledge of whether his behaviour is appropriate for the situation. However, the appropriateness of his behaviour in the experiment is important to the subject, as he wishes to be favourably regarded in this situation, as in other social interaction. His task, then, is to determine during the course of the experiment what is "correct" behaviour, and to respond accordingly so that he will appear in the best possible light. Riecken referred to this tendency as the subject's desire to "put his best foot forward". He stated that the degree to which this personal goal will affect the subject's behaviour will

vary dependent upon his preconceptions and needs, the hints furnished by the experimenter's actions and instructions, and the setting in which the experiment takes place.

Although Riecken clearly outlined the problems posed by the social nature of behavioural research, it was left to others to provide the empirical data to support and document those concerns.

Riecken's interest in the subject as a source of unintended variance in the psychological experiment was also shared by Martin Orne. As a result of his study of certain aspects of hypnosis, Orne (1959) concluded that much of the behaviour generally attributed to the hypnotic state could be accounted for by subjects' knowledge of, and willingness to comply with, the experimenter's hypothesis. He introduced the concept of "demand characteristics", stating "perhaps subjects performed better in the wake state because of the demand characteristics of the experiment, i.e., my expectation that they should do so".

Following additional analysis, Orne (1962) elaborated his notion of demand characteristics. He described the experimental situation as a special form of

social interaction which carries with it a well-defined role expectation for the subject. The typical student subject, according to Orne, fulfills his role by a willingness to comply with any and all experimental instructions, even if it involves boredom, discomfort or pain. This readiness to comply follows from the subject's high regard for the aims of science and experimentation in general which he holds as a university student. He feels with the researcher that the particular experiment in which they are engaged will contribute to science and hence he wants it to work. He wants to be a good subject, and a good subject is one who produces the data expected of him.

In short, Orne envisioned the subject as having a set to cooperate because he wishes to validate the experimental hypothesis. Before he can cooperate however, the subject must ascertain the object of the experiment. He looks for clues in the experimental situation which will signal to him what behaviour the investigator wants. It is these clues which Orne has labelled the demand characteristics of the experiment. The clues to which the subject attends include the rumors about the research, the information conveyed during the

original solicitation, the person of the experimenter, the setting of the laboratory, the explicit and implicit communications during the experiment proper and the experimental procedure itself. Thus, Orne proposed that the subject's behaviour in the experiment will be determined in part by the experimental variables and in part by the perceived demand characteristics of the experimental situation. The extent to which the subject's behaviour is related to the demand characteristics rather than to the experimental variables will in large measure determine both the extent to which the experiment can be replicated and the extent to which generalizations can be drawn about the effect of the experimental variables in non-experimental contexts.

To support his position Orne intentionally varied the demand characteristics in a simulated sensory deprivation experiment. The experimental subjects were told that they were participating in a sensory deprivation experiment and were exposed to all the accoutrements common to such studies, including release forms and a red panic button. In fact, the treatment condition was four hours' isolation in a well-lighted room without any sensory deprivation whatsoever. The control subjects were

told that they were controls for a sensory deprivation experiment. The treatment condition for these subjects was exactly the same as for the experimental group (four hours' isolation) except that the release forms and the panic button were omitted. All subjects were administered ten tests which had previously shown sensitivity to sensory deprivation effects. The tests employed were word recognition, reversible figure alternation, the digit-symbol subtest of the Wechsler Adult Intelligence Scale, the MacQuarrie-Morris Test of Mechanical Ability, simple form perception, size constancy, spiral aftereffects, logical deductions, mirror tracing and spatial orientation. Measures were taken before and after the isolation period. The ten tests provided fourteen measures as some of the tests provided for multiple methods of scoring. On 13 of the 14 measures, experimental subjects showed greater sensory deprivation "symptoms" than the control subjects. Six of the fourteen criteria achieved statistical significance, while an overall analysis confirmed the expected results at the .001 level. Here, then, was an instance in which four hours of isolation, coupled with differing sets of demand characteristics, yielded different experimental results.

Since 1962, a number of authors have accepted Orne's challenge to "determine under what circumstances demand characteristics significantly affect subjects' experimental behaviour". In addition to Orne's work on hypnosis and sensory deprivation, the influence of demand characteristics on experimental results has been demonstrated in studies of attitude change (Holz & Rosnow, 1967; Sherman, 1967; Cowan & Komorita, 1968; and Silverman, 1968), verbal conditioning (Holmes, 1967; Mondy, 1968; and Page & Lumia, 1968), the cognitive meaning of words (Cataldo, Silverman & Brown, 1967), and the volunteer status of subjects (Rosnow & Rosenthal, 1966).

In contrast to the position that subjects cooperate with the experimenter in the interests of science, Rosenberg (1965) suggested another reason for their support. He described the experimental setting as anxiety producing for the subject and stated that the subject approaches the experiment with the expectation that the psychologist will endeavour to evaluate his ability, emotional adequacy or mental health. Even when the subject is convinced that his adjustment is not being directly studied, he is likely to think that the

experimenter is, nevertheless, bound to be sensitive to any behaviour that indicates poor adjustment or immaturity. This tendency on the part of the subject is referred to as evaluation apprehension. Evaluation apprehension is defined by Rosenberg as:

> "An active, anxiety-toned concern that he (the subject) win a positive evaluation from the experimenter, or at least that he provide no grounds for a negative one." (p.29)

Subjects with high levels of evaluation apprehension will look to the experimenter's instructions, explanations and measures for clues about the kinds of responses that will be considered healthy or unhealthy, mature or immature. In other words, they will develop hypotheses about how to win positive evaluation or avoid negative evaluation. The experimental data generated by such subjects will be influenced by the hypotheses they have formed.

To experimentally demonstrate the effect of evaluation apprehension on research results, Rosenberg (1965) altered the procedure used by Cohen (1962) in an investigation of the cognitive consistency-dissonance controversy. In Cohen's study, subjects identified as possessing a negative position on a topic were offered payment of $0.50, $1.00, $5.00 or $10.00 to write an

essay in support of the topic. After completion of the essay, their attitude toward the topic was compared to a control group, also identified as possessing a negative position on the subject. Members of the control group, however, were not required to write the essay and did not receive any payment. The attitude change of the experimental subjects after writing the essay was found to be inversely related to the size of the reward they received. This result was interpreted by Cohen as support for the dissonance reduction position. Rosenberg hypothesized that the size of the reward for the high reward subjects would be viewed by them as out of proportion to the task required (writing the essay) and hence they would suspect that the experimenter was testing some other facet of their behaviour, thus evoking evaluation apprehension. He separated the essay writing and opinion measure portions of the study and presented them to the subjects as two separate and unrelated experiments. Under this condition when opinion measure was not associated with payment, size of reward and attitude change were positively related. This reversal of results under the altered procedure was interpreted by Rosenberg as evidence that evaluation apprehension can

produce systematic bias in this type of experiment.

Rosenberg's concept of evaluation apprehension is applicable primarily to experimental situations in which the subject feels his performance is being measured in a somewhat devious manner. A necessary condition for its occurance is that the subject's initial suspicion of being evaluated is confirmed in the early stages of his encounter with the experimenter. Subsequent researchers have employed the evaluation apprehension concept primarily in relation to cognitive dissonance studies. However, Rosenberg has contributed to the study of the social psychology of psychological research by providing another example of subjects' perception of the experiment influencing their results.

In summary then, Riecken has suggested, and Orne and Rosenberg have demonstrated, that the subject looks to the experimental setting for clues or demand characteristics which will signal to him the behaviour which will be "proper" in that particular setting. They further posit that the subject acts upon that information in a way which systematically affects the data generated from the experimental treatment. Though each of the authors ascribe different motivation to the subject -- Riecken,

a desire to put his best foot forward; Orne, a desire to be a good subject and validate the experimental hypothesis; Rosenberg, a desire to avoid negative evaluation -- all assume a readiness on the subject's part to produce the data that he interprets the experimenter wants and expects.

Subjects' Uncooperative Behaviour

Although there is strong evidence to support the view that subjects perform as they feel the experimenter wants them to, there are exceptions. There have also been studies in which subjects, having recognized what was expected of them, appeared to respond in a negative fashion. These exceptions can most conveniently be grouped into two classifications.

The first classification has been labelled the "boomerang effect". As the name implies, this is a response in the opposite direction from the one anticipated. For example, Brehm (1966) observed that subjects responded to a persuasive communication with a boomerang response when the attempt to influence was too blatant. A similar finding was noted by Rosenthal and Fode (1963) when experimenters were offered an inordinately large payment to obtain predicted results in an experimenter expectancy study.

The boomerang effect becomes operative when the demand characteristics are very obvious or extreme. Orne anticipated that such a condition could well evoke a response seemingly at odds with the demand characteristics of the situation, but concluded that the boomerang effect posed no difficulty for his position. He wrote:

> "If the demand characteristics are so obvious that the subject becomes fully conscious of the expectations of the experimenter, there is a tendency to lean over backwards to be honest. Therefore, if the subject becomes acutely aware of the experimenter's expectations, there may be a tendency for biasing in the opposite direction." (1962, p.780)

The subject is still motivated to be a good subject and to act in the best interests of science. However, in this case his need to validate the experimental hypothesis is superceded by a higher need - the need to be completely honest in his reporting.

The second exception to the notion of the co-operative subject suggests a completely different motivation. While this classification also includes subjects who understand what is expected of them but who are not prepared to act in accord with that understanding, unlike the boomerang group, there is no suggestion that they are responding to a higher "scientific" priority. Instead, they appear to respond with what Masling (1966)

has termed a "screw you" attitude. An anecdotal report by Goldberg (1965) illustrates the "screw you effect". Subjects had the opportunity of performing for a second time either a weight or taste discrimination task. The taste discrimination was the less pleasant of the two as it involved solutions which were bitter. A female subject who chose to replicate the tastes in preference to the weights stated that, since she did not like psychology, psychologists, brainwashing or attempts to control behaviour, "I chose tastes because I knew you wanted me to pick the weights".

Argyris (1968) has recently expressed a similar point of view. He equates subjects' behaviour in resisting the experimenter to that of low-level employees who attempt to "beat" management. According to Argyris:

> "If one likes the experimenter, then he cooperates. If he does not, he may enjoy botching up the works with such great skill that the experimenter is not aware of his behaviour." (p.187)

Here, then, are instances of subjects who recognized what was expected of them but who, rather than cooperate, consciously and deliberately acted in a contrary manner.

Individual Differences in Subjects' Behaviour

Evidence has been cited to support the notion that in some instances subjects cooperate with the experimenter,

while in other cases subjects are uncooperative. There is additional evidence to indicate that in some experiments both subject motivations may be found. Holmes (1967a) employed a verbal conditioning task and divided subjects, on the basis of their self report, into two groups: those who were aware of the reinforcement contingency (demand characteristics) and those who were unaware of it. Of the 30 subjects judged to be aware, 14 consistently responded to the demand characteristics. While all of the aware subjects had solved the problem of the experiment and could verbalize what was expected of them, approximately one-half supplied it and one-half did not.

A similar finding was reported by Cowan & Komorita (1968) following their investigation of the relationship between demand characteristics, subjects' awareness of the intent of the experimenter and attitude change. The same questionnaire was used for one-half of the subjects as a measure of awareness of the experimenter's expectancy and for the other half as a post-test. Higher scores (more acceptance of the persuasive message) were obtained when the instrument was identified as a measure of awareness than when it was presented in the traditional

way as a post-test. Again, there was evidence that some of their subjects recognized that the experimenters wanted more acquiescence to the persuasive message than they were prepared to provide on the post-test.

A further investigation by Holmes (1967b) associated with verbal conditioning provides added insight into subjects' experimental behaviour. He concluded that hypothesis confirming responses were the result of two subject-related variables. First, the subject has to develop an awareness of the reinforcement contingency, i.e., know what to do; second, he must make a decision to cooperate or not cooperate. According to Holmes, performance is not simply dependent on a recognition of the demand characteristics. After the subject has solved the problem of the experiment, he has another internal problem to solve; whether, and to what extent, he will respond to the demand characteristics which he has identified. The evidence from Holmes' work and that of Cowan & Komorita indicates that though the demand characteristics in a particular experiment may be common for all subjects, their willingness to comply with them is not.

If subjects exhibit a differential willingness to respond to demand characteristics, it would be fruitful to

identify those variables which influence some subjects to respond in a cooperative manner and others to ignore them or respond uncooperatively. Holmes (1967a) has once again provided data suggestive of an answer. He found that the number of previous psychological experiments the subject had participated in positively influenced his willingness to respond to demand characteristics. More experienced subjects showed greater willingness to respond. In a second study reported in the same paper, he found that previous experimental experience was also positively related to subjects' attitudes towards psychological research. Subjects having served in more experiments viewed behavioural research as more scientific and valuable than their lesser experienced counterparts. It may well be then, that subjects' willingness to respond to demand characteristics is positively related to their attitudes toward the worth of psychological experimentation. If such is the case, any particular subject's performance in the experimental setting will be determined by the experimental variables, the subject's perception of the demand characteristics, and his decision in regard to compliance with the demand characteristics. His decision to comply will, in turn, be related to his attitude toward

psychological research. As attitudes toward research will vary across subjects along a continuum from positive to negative (as is the case with attitudes on any topic), it follows that subjects' willingness to comply with the demand characteristics will vary in parallel along a continuum from cooperative to uncooperative. This study was designed to investigate these relationships. By holding the experimental variables and demand characteristics constant, it was expected that subjects' performance on the experimental task would be positively related to their level of willingness to respond to the demand characteristics, as defined by attitudes toward psychological research. Two studies reported by Krasner et al provide encouragement for this notion.

In the first study (Krasner, Ullman and Fisher, 1964), the authors conditioned favourable attitudes toward research and the experimenter by verbally reinforcing subjects' positive responses to statements which were favourable about medical science. They found that the subjects whose attitudes had been conditioned performed better on a motor task than did a control group. The investigators concluded that the increased performance was attributable to either (a) the favourable attitudes of the

experimental subjects resulting in a stronger effort to "help" the experimenter, or (b) the facilitating effect of the social reinforcement itself, or a combination of both factors. In a follow-up study, Krasner (Krasner, Knowles & Ullman, 1965) controlled for the social reinforcement effect and concluded that positive attitudes toward research and the experimenter are reflected in increased performance by subjects.

Recently the relationship between subjects' attitudes toward psychological research and experimental performance has been more directly examined.[1] Wicker (1969) measured subjects' attitudes relative to scientific research, psychological research, participating as a subject in psychological research, and the Psychology Department's policy regarding students' participation as subjects in psychological research, by means of semantic differential evaluative scales. The measures were correlated with subjects' later willingness to participate in experiments.

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[1] The studies reported by Wicker, Page, Kennedy & Cormier and Holmes & Applebaum appeared in the literature after the data had been collected for the present study. It should be noted therefore, that these studies, while relevant, did not enter into the formulation of the rationale and design of this study.

Of the four concepts, attitudes relating to participating as a subject and the Department's policy were the only two that correlated significantly with later participation, and even these relationships were quite small.

Page (1969) also measured subjects' attitudes towards psychological research by means of a semantic differential rating. He found no relationship between scale scores and performance on a verbal conditioning task. The semantic differential technique was also employed by Kennedy & Cormier (1970) to measure subjects' pre-experimental attitudes towards research and participation in research. They found no relationship between attitudes and performance on a verbal conditioning task. However, they point out that their study may not be generalizable to other university populations because of the traditional lack of experimental activity at the college in which the investigation was conducted.

More recently Holmes & Applebaum (1970) manipulated, and then employed a questionnaire to measure, subjects' attitudes toward psychological experiments. They were particularly interested in the effects of positive and negative experimental participation history on attitudes toward experiments and subject cooperation in a verbal

conditioning study. Previous to the criterion verbal conditioning study, subjects participated in three experiments designed to suggest to them that psychological research was either interesting, scientific, and important or dull, unscientific, and a useless waste of time. Subjects in a control condition participated in only the criterion experiment. The authors found that the positive experimental history subjects exhibited more favourable attitudes toward experimentation and better performance on the criterion task than did the control or negative history subjects. Thus the evidence to date indicates that the relationship, if any, between subjects' attitudes toward psychological research and performance in the experimental setting is by no means clear.

Statement of the Problem

It has been demonstrated that demand characteristics, i.e., extraneous factors that convey the experimental hypothesis to the subject, are present in the experimental setting. Riecken, Rosenberg and Orne have indicated that subjects respond to these cues by confirming the hypothesis and in so doing, systematically bias the experimental results. Riecken has proposed that subjects are motivated in this manner because of a desire to put their best foot

forward; Rosenberg, because of evaluation apprehension; and Orne, because of a desire to be a good subject and to verify the experimenter's hypothesis, although occasionally this desire can result in a boomerang effect if the demand characteristics are too blatant. Masling, on the other hand, has stated that sometimes subjects respond with a "screw you" attitude. This is the case in which subjects are aware of what the experimenter wants from them but are not prepared to translate this awareness into performance.

In contrast to these polar positions, studies reported by Holmes and Cowan & Komorita suggest that although subjects are confronted with common demand characteristics, there are considerable individual differences in compliance with the experimenter's hypothesis. According to Holmes, the critical difference between subjects is in their willingness to comply once they have recognized the demand characteristics. The present study tests the assumption that these subject differences in willingness to cooperate with the experimenter are related to differences in attitudes toward psychological research.

To test this assumption requires an experimental design in which demand characteristics are prominent and common for all subjects. The opinion change paradigm is

particularly appropriate for the purpose because of its obvious demand characteristics. This is illustrated by the careful examination for methodological difficulties this paradigm has received (Holz & Rosnow, 1967; Sherman, 1967; Cowan & Komorita, 1968; and Silverman, 1968). The demand characteristics have been found to be particularly apparent in the design where a pre-test is followed by a persuasive communication which in turn is followed by a post-test. Under these conditions subjects easily recognize that some change is expected by the experimenter. Orne has more succinctly stated:

> "If a test is given twice with some intervening treatment, even the dullest college student is aware that some change is expected, particularly if the test is in some obvious way related to the treatment." (1962, p.779)

While Orne (1962) has also stated that any or all of the features of the experimental setting may signal the hypothesis being tested to the subject, it is the pre-test, persuasive communication, post-test, design which is being relied upon to convey the demand characteristics in this study. To check that subjects do in fact recognize that a change in opinion is expected on the post-test, the design includes a post-experimental questionnaire asking subjects what they considered the experiment was about, and the hypothesis being tested.

A second feature of the opinion change paradigm is that it allows for degrees of change on the topic ranging from no acceptance to complete acceptance of the persuasive message. Subjects have the opportunity to express their level of willingness to respond to the demand characteristics. For these two reasons then, amount of opinion change was selected as the dependent variable in this study.

In addition to the opinion change task, the design requires a measure of subjects' attitudes toward psychological research. It is also necessary to employ a format which permits subjects to express their attitudes about experimentation along a continuum from highly positive to highly negative. As there was no suitable measure available[2], the necessary instrument had to be developed.

The experimental design provides then, independent measures of subjects' attitudes relative to research in psychology and their response to a persuasive message. It was hypothesized that subjects demonstrating more positive attitudes toward psychological research would evidence more compliance with the demand characteristics and therefore,

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[2] The scale developed by Holmes & Applebaum was not available at the time this study was completed.

greater acquiescence to the persuasive message than would subjects with less positive attitudes. Rejection of the null hypothesis will mean that subjects' performance in the experimental setting is related in a positive way to their attitudes toward psychological experimentation.

# CHAPTER II

# METHOD

The experimental design relates subjects' attitudes towards psychological research to their performance in an opinion change study. Quantitative measures of each are therefore required.

## Development of a Measure of Subjects' Attitudes toward Psychological Research

As no suitable scale was available, it was necessary to develop a measure of subjects' attitudes toward psychological research. The scale is based primarily on Orne's description of the student subject. Orne postulated that the student subject has a high regard for the aims of science in general, and for psychological experimentation in particular. The scale measures subjects' reactions to this postulation.

Initially a questionnaire was constructed providing a five-level response option to 62 statements which paraphrase Orne's detailed description of subjects' perceived role in experiments. Examples of the statements employed are: "Most students are 'good subjects',

that is, they perform well in the role of experimental subjects"; "Subjects in psychology experiments are 'contributors to science'"; "Psychology has proven its worth as an experimental science". The questionnaire was administered to a sample of 202 advanced psychology students. Subjects were divided into two groups (high and low) on the basis of their total score. The high group consisted of all subjects who scored above the sample mean. Those below the sample mean were assigned to the low group. An item analysis testing each statement for its ability to differentiate high and low scores was performed. On the basis of this analysis, 30 of the statements were retained and 32 discarded. An additional 30 statements were constructed and the amended questionnaire of 60 items was administered to another sample of 200 students. A second item analysis was performed and again the non-discriminating items were discarded.

In its final form, the scale contains 52 items presented in a five-choice Likert format. Items are stated negatively and positively with equal frequency. Items are also stated in the third person or impersonally, so that subjects who have not previously participated

in experiments can indicate their attitude toward psychology. The subject is given the response options of strongly disagree, disagree, undecided, agree, and strongly agree. Thus, the range of possible scores is 52 to 260, with high scores reflecting positive attitudes relative to psychological research. Utilizing a standard IBM answer sheet for the recording of responses, the scale requires approximately 20 minutes to complete. The scale, which has been labelled the Psychology Research Survey (PRS), is presented in Appendix A.

Although the PRS has face validity, because of the method of constructing items, and checks of reliability have yielded split-half coefficients of .89 to .95, the construct validity has yet to be verified. It is only through studies such as the present one that relationships between the PRS and external criteria can be demonstrated.

Opinion Change Study

Subjects. The subjects were 144 Introductory Psychology students at the University of Manitoba, who were fulfilling a research participation requirement for the course. Subjects volunteered for this particular experiment by signing lists left at a central location within the Psychology Department. As there were no

restrictions as to sex, the sample contained 54 female and 90 male subjects.

Opinion Change Material. The opinion change task was one developed previously by Molnar (1955) to measure opinions about animal vivisection. The material was successful in changing students' opinions toward vivisection in four previous studies (Molnar, 1955; Lana, 1959, 1961, 1966). Unlike the more commonly employed opinion topics such as racial prejudice, political preferences and fraternities, the vivisection material did not require special adaptation for the Canadian university student population and therefore was especially suited for use in this study.

The material consists of a neutral statement approximately 250 words in length, giving a factual and unbiased description of vivisection; a pro-vivisection communication of approximately 500 words, and taking about five minutes to read; and a Likert-type ten-item, six-alternative questionnaire which is used as both pre-test and post-test. High scores on the measures indicate pro-vivisection opinion with the range of possible scores being from 10 to 60. A copy of the material used is presented in Appendix B.

Procedure. Subjects were tested in groups of 15 to

20 each in one-hour testing sessions. The data collection was completed over a four-day period. All subjects received exactly the same instructions and experimental treatment. The instructions were presented so as to ensure that the demand characteristics for the task were clear and uniform. When the subjects were seated, they were told:

> "First of all, I want to thank you for participating in this experiment. In this study, we are investigating the effect that presenting material in different ways may have on the opinions people form about a subject. You are one of several groups which will be employed. For this group, we are concerned about any difference which may occur when the material is presented in written form versus orally. On this sheet, which I will pass out, is a statement on animal vivisection. The passage will describe what vivisection is all about. I want you to read the statement once, and then turn the sheet over. If there are any questions, please ask them now. I can't answer questions once we have begun."

The neutral statement on vivisection was then distributed. When it had been read by all subjects, it was collected and the pre-test distributed with the instructions:

> "Now please complete this questionnaire. Make sure that you fill in your name and student number in the spaces provided."

The name and student number were required on the pre-test, the post-test, and the PRS so that scores on the three instruments could be related. When the pre-test had been completed by all subjects, it was collected and the

PRS introduced with the following instructions:

> "As you may know, Dr. Adair has been working in cooperation with other North American universities to gather student reactions to serving as subjects in psychological experiments. He has already administered this questionnaire to about half of the introductory class and has asked that it be included in research projects whenever possible, so that he can obtain the largest possible sample. Have any of you been exposed to it yet? Okay, then, just follow the directions on the sheet."

These instructions were designed to create in subjects the idea that the PRS and the attitude change task were two independent studies. On the post-experiment questionnaire, only one student verbalized awareness of a relationship between the two "studies".

The PRS was passed out, and subsequently collected, followed by:

> "Now we can return to our own study. I want you to listen carefully to this tape."

The pro-vivisection message, which had previously been recorded by the experimenter, was presented. At its conclusion, the post-test questionnaire (which was identical to the pre-test) was distributed with the instructions:

> "Please complete this questionnaire. Make sure that you fill in your name and student number in the spaces provided."

The post-test was collected and the post-experimental questionnaire distributed. A copy is presented in Appendix C.

The following instructions were given:

> "Now, would you please complete this sheet. There is no need to put your name on it, but we do require your student number."

When the questionnaire was completed, the subjects were thanked and dismissed.

In preparation for the analysis of the data, three groups of 36 subjects each were selected from the total sample on the basis of their PRS scores - a low group which comprised all subjects whose scores fell in the first quartile of the PRS score distribution; a medium group comprising the 25% of subjects whose scores clustered around the median of the PRS score distribution; a high group comprising all subjects whose scores fell in the fourth quartile of the PRS score distribution. Thus, data from 108 of the 144 subjects were employed in the analysis. The three groups were selected so that performance on the opinion change task could be compared at the middle and two extreme positions on the attitudes toward psychological research continuum.

# CHAPTER III

## RESULTS

It was predicted that subjects' willingness to comply with the demand characteristics of the experiment would be positively related to their attitudes toward psychological research, as defined by PRS scores. Subjects were divided according to the distribution of their PRS scores into high, medium and low groups. Specifically, it was hypothesized that subjects demonstrating more positive attitudes toward psychological research would show greater opinion change than would subjects with less positive attitudes.

The mean vivisection pre-test and post-test scores together with the mean difference in opinion change scores for each of the three groups are presented in Table 1. Each of the opinion change scores are in the expected direction, i.e., increasingly larger differences are found with increasingly positive attitudes relative to psychological experimentation. To test the hypothesis that the mean change for the three groups was significantly different, a two-way analysis of variance (Hays, 1963) was employed. The summary of this analysis is presented in

Table 1

Mean Pre-Test, Post-Test and Difference Opinion Scores for High, Medium and Low PRS Groups

| PRS GROUPS | MEAN PRE-TEST OPINION SCORES | MEAN POST-TEST OPINION SCORES | MEAN DIFF. |
|---|---|---|---|
| Low | 35.806 | 38.583 | 2.7 |
| Medium | 36.000 | 40.528 | 4.5 |
| High | 37.028 | 43.806 | 6.8 |

Table 2. As may be seen in this table, the interaction between vivisection opinion change measures and PRS scores was significant ($F=5.00$, $p<.01$). A graphical representation of this interaction is presented in Figure 1. From the analysis and the graphical representation, it may be seen that the prediction that subjects with more positive attitudes toward psychological research would show greater opinion change was confirmed.

The main effect for PRS groups was also significant ($F=3.55$, $p<.05$), indicating that subjects in the three PRS groups responded differently on the pre-test and post-test measures taken in combination. Thus, there was the possibility that the more positively motivated subjects also had more positive opinions about vivisection even before being exposed to the persuasive message. This possibility was tested by a one-way analysis of variance (Hays, 1963) on only the pre-test scores for the three groups. The summary of this analysis is presented in Table 3. The between-groups effect was not significant ($F<1$), thus assuring that when subjects began the study their opinions about vivisection were not already significantly different.

Table 2

Analysis of Variance of Pre- and Post-Test Opinion Scores for High, Medium and Low PRS Groups

| Source | df | MS | F |
|---|---|---|---|
| PRS | 2 | 193.94 | 3.55* |
| Between Ss | 105 | 54.59 | |
| PrT-PsT | 1 | 1190.00 | 82.22*** |
| PRS X PrT-PsT | 2 | 72.41 | 5.00** |
| Within Ss | 105 | 14.47 | |
| Total | 215 | | |

* $p<.05$
** $p<.01$
*** $p<.001$

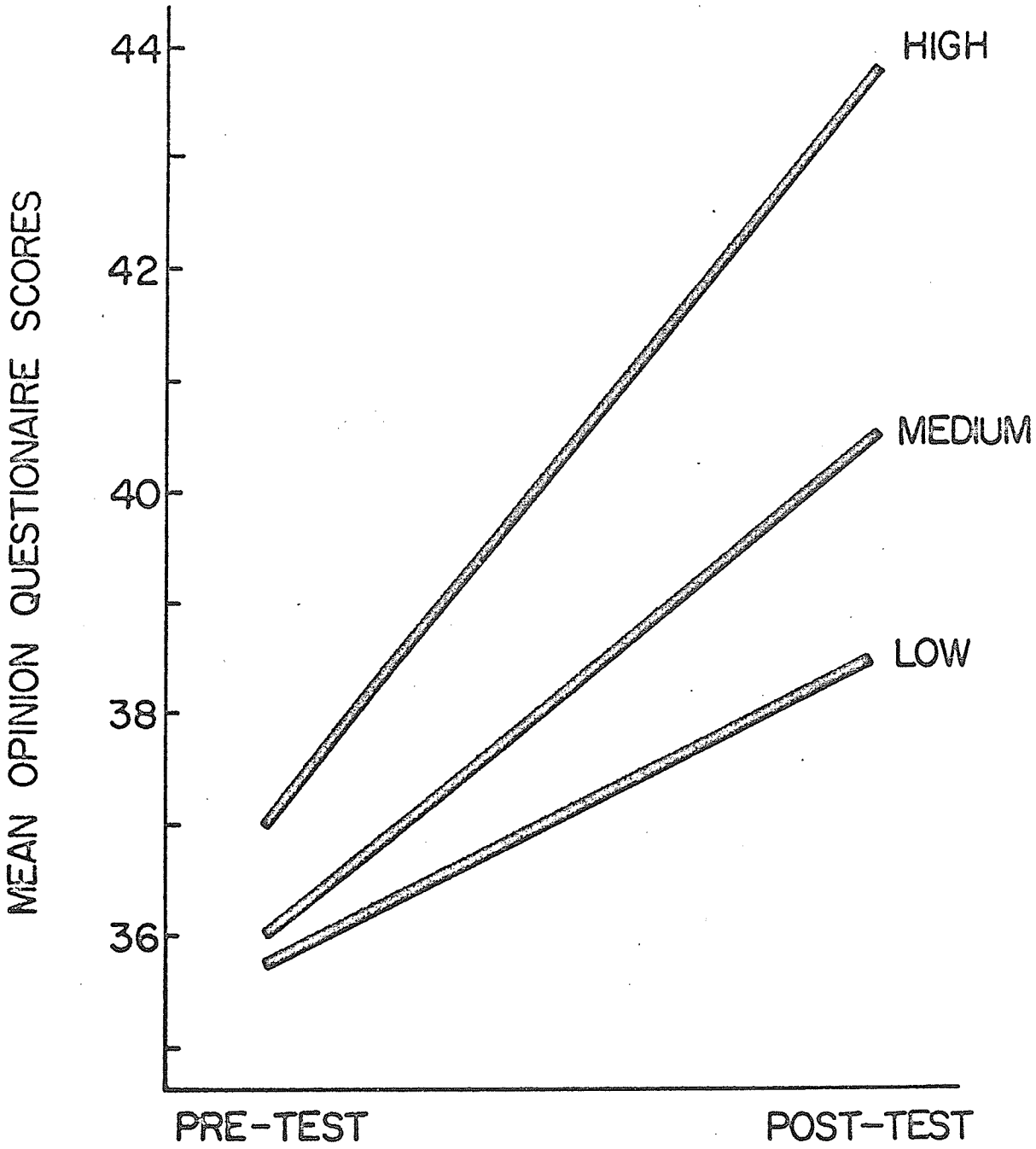


Fig. 1. Mean pre- and post-test opinion scores for high, medium and low PRS groups.

Table 3

Analysis of Variance of Pre-Test Opinion Scores for High, Medium and Low PRS Groups

| Source | df | MS | F |
|---|---|---|---|
| Between Ss | 2 | 15.307 | 0.463 |
| Within Ss | 105 | 33.057 | |
| Total | 107 | | |

Finally, it was also found in the initial analysis that the main effect for attitude change, i.e., the PrT-PsT source in Table 2, was significant ($F=82.22$, $p<.001$). This indicated that the persuasive message was quite successful in influencing all subjects' opinion on the topic. Even the subjects with the poorest attitudes relative to experimentation showed significant opinion change ($t=2.04$, $p<.05$). This significant main effect for opinion change was consistent with the previous findings of Molnar and Lana.

To further test the relationships between subjects' attitudes toward research in psychology and opinion change behaviour, correlations between PRS scores and pre- and post-test opinion measures were performed. It was found that PRS scores correlated only .08 with pre-test scores; however, they correlated .31 ($p<.01$) with post-test measures. Similarly, PRS scores correlated significantly with opinion change scores, i.e., the difference between pre-test and post-test scores ($r=.28$, $p<.02$). These findings further demonstrate a positive relationship between PRS and opinion measure scores after exposure to the persuasive message whereas none had existed previously.

Unfortunately the post-experimental questionnaire

was not quantifiable as not all of the subjects completed it fully. However, inspection of the responses that were volunteered about the object of the study and the hypothesis being tested indicated a general awareness that a more positive opinion about vivisection was expected on the post-test.

# CHAPTER IV

# DISCUSSION

The results clearly demonstrated a positive relationship between subjects' attitudes toward psychological research and the extent of their opinion change. In other words, all subjects entered the study with approximately the same feelings toward vivisection, but with different attitudes relative to experimentation, as determined by the PRS. They were presented with the demands of the experiment, i.e., with an obvious appeal to show a more favourable position towards vivisection, and their opinions were measured again. The magnitude of opinion change exhibited by subjects was functionally related to their previously expressed feelings about research. These findings confirm that subjects' attitudes toward psychological research influence their compliance with demand characteristics.

It was assumed that subjects' experimental behaviour would range along a continuum from uncooperative to cooperative in parallel with their attitudes toward psychological experimentation. However, although subjects with less positive attitudes showed least opinion change,

the extent of that change was nevertheless significant. In other words, the low PRS scorers were not uncooperative; they were merely less cooperative than the high scorers.

It had been suggested previously (Holmes, 1967a, 1967b; Holmes & Applebaum, 1970) that when subjects are confronted with common demand characteristics, some respond in a positive fashion while others either ignore them or respond negatively. According to this view, the critical difference between subjects is in their willingness to comply once they have recognized what the demand characteristics are. The present findings indicate that in the opinion change paradigm where the demands are very obvious, subjects do cooperate, and that their level of cooperation is related to their attitudes toward experimentation. Thus the results of this study suggest that subjects' attitudes will affect their willingness to comply, and further, that attitudes toward psychological research may be an important variable in studies in which demand characteristics are a factor.

Although the data has been interpreted from the perspective of subjects' response to demand characteristics, it may also be viewed from the more traditional perspective of attitude change research. McGuire (1968) has identified

certain source variables - credibility, attractiveness and status - as positively influencing subjects' responsiveness to opinion change material. The possibility that subjects with high PRS scores were more responsive to the persuasive message because they were more influenced by the source rather than because of a greater tendency to comply with demand characteristics must therefore be considered.

To accept this interpretation is to deny that demand characteristics were recognized and acted upon by subjects in this study. However, the analysis of responses on the post-experimental questionnaire revealed that responding subjects almost unanimously volunteered their recognition that change was expected of them on the post-test. Approximately one-half indicated that the purpose of the study was to test for differences in method of presentation (written vs. orally), as was outlined in the instructions. While not all of these subjects volunteered a hypothesis, those that did indicated that the hypothesis being tested was that the verbal presentation, i.e., the pro-communication, would be the more effective. The remaining subjects freely stated that the purpose of the study was to change attitudes and most commented

upon the persuasive feature of the second communication. Since all subjects who commented felt they were to respond positively to the spoken message or to positively change their attitude, the assumption that subjects were uninfluenced by demand characteristics must therefore be rejected.

There is, however, an interesting parallel between the present study and the current attitude change literature. Sherwood (1965) and others have indicated that subjects' feelings about the experimenter will influence their behaviour in the experiment. Subjects with positive feelings produce greater attitude change than subjects with negative feelings. However, in the university setting, experimenters are usually professors or senior students, while subjects are usually drawn from the introductory courses. In most instances, subjects are unlikely to have had much prior association with the experimenter and consequently, little opportunity to form an opinion of him. But each subject has had an opportunity to form opinions about research. It may well be then, that the compliance in opinion change studies which has previously been attributed to subjects' regard for the experimenter may in fact be an expression of the subject's

feeling about psychological experimentation.

The approach used in the present study of measuring subjects' attitudes about research and observing their subsequent performance should be contrasted with the approach of Holmes. In recent studies (Holmes, 1967a, 1967b; Holmes and Applebaum, 1970), he has been concerned with the effect of subjects' prior experiences and experiments on their subsequent perception of experimentation and their performance in them. Most recently he has demonstrated that participation in dull, non-scientific and useless experiments immediately preceeding a criterion study negatively affected subjects' attitudes toward experimentation and their actual performance in the criterion task.

In contrast, the method employed in the present study does not manipulate attitudes but measures them as they already exist. While previous experimental experience will undoubtedly have an influence on subjects' attitudes, other factors such as interest, knowledge, and success in psychology courses will very likely prove to have a bearing as well. It is unlikely that students' attitudes about experimentation remain constant over their scholastic life. Therefore, a "bad experience" with experiments could occasion an immediate negative attitude which may mellow as the subject

accumulates more positive experiences with psychology. The PRS provides the means for measuring subjects' attitudes at any particular time, and may be helpful to those investigators who are concerned about the interaction of such extraneous variables with the experimental manipulations.

In conclusion, the present results indicate that in an experimental situation where the demand characteristics are obvious, subjects' attitudes toward psychological research influence their performance. The more performance is influenced by such subject-related variables rather than by the experimental treatments the less generalizable will be the findings and less will be the likelihood that those findings will be replicated by other populations. Since in many psychological studies the design is such that subjects quickly become aware of the results that the experimenter expects, subjects' attitudes may be a variable which accounts for some of the individual differences obtained. At the very least, the present results suggest that subjects' attitudes toward psychological research is a variable requiring further investigation.

# CHAPTER V

## SUMMARY AND CONCLUSIONS

It has been demonstrated that demand characteristics, i.e., extraneous factors in the experiment which convey the hypothesis to the subject, are present in the experimental setting. Recent studies have indicated that subjects respond to these demand characteristics differentially, i.e., some cooperate while others ignore them or respond uncooperatively. It was proposed in this study that subjects' willingness to cooperate is related to their attitudes toward psychological research. The hypothesis tested was that subjects with more positive attitudes would show greater compliance with the demand characteristics than would subjects with less positive attitudes.

The Psychology Research Survey (PRS) was developed to measure subjects' attitudes toward psychological research. A one-session opinion change task was employed to convey the demand characteristics. The hypothesis was tested by comparing PRS scores with the difference between pre- and post-test scores. From the total sample of 144 subjects, three groups of 36 subjects each were selected on the basis of their PRS scores. The groups

consisted of the top, intermediate and bottom quartiles of the PRS score distribution. Subjects read a neutral statement on vivisection, completed the pre-test, responded to the PRS, listened to a tape-recorded pro-vivisection communication, and completed the post-test. Finally, they filled out a post-experimental questionnaire.

The results confirmed the prediction that subjects with more positive attitudes toward psychological research would show the greater opinion change. Differences between subjects' pre-test opinions were non-significant and, although all subjects showed significant opinion change, the differences between PRS groups were significant. In addition, correlations between PRS scores and pre-test scores were non-significant, while correlations between PRS scores and post-test and opinion change scores were significant.

It was concluded that attitudes toward psychological research are an important variable in studies in which demand characteristics are a factor.

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# APPENDIX A

## Psychology Research Survey

# PSYCHOLOGY RESEARCH SURVEY

As you may know, some of the practices commonly used in psychological experiments employing human subjects are coming under review. The Director of the U.S. Public Health Service has made known his concerns in this area. As a result, prominent psychologists at Harvard, Columbia and Northwestern Universities are now investigating the psychological experiment from the subject's point of view.

As most subjects are drawn from University students, their opinions are being sought. The attached questionnaire is being sent to certain North American universities to sample student feelings about psychology and psychologists, as they function within the framework of the psychological experiment. From this and other work, it is hoped to establish a set of guide lines which will govern future investigations.

This is the first large scale and systematic enquiry into students' feelings about acting as subjects. We would ask you, then to complete the questionnaire frankly and honestly.

A standard IBM answer sheet is provided for your responses. Do not make any marks on the questionnaire itself.

1. Enter your name, sex, age and today's date on the top row of the answer sheet.

2. In the space labelled "school", indicate the Faculty in which you are enrolled (for example: Arts, Science, etc.)

3. In the space provided for "grade or class", indicate your University year.

4. In the section provided for "identification number", write your student identification number in the column headed by the red arrow. Blacken in the adjoining spaces corresponding to these numbers.

5. Check that you have correctly filled in the required information, as later in the year the questionnaire will be given to other classes in other courses and it is imperative that there not be duplications in this survey.

6. Now turn to the questionnaire and read question one. Select the response which best describes your feelings on this statement in accordance with the following scale.

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| STRONGLY DISAGREE | DISAGREE | UNDECIDED | AGREE | STRONGLY AGREE |

If, for example, you strongly agree with the statement, blacken in the number 5 space for question 1 on the answer sheet like this:

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1. | | | | | |

If you strongly disagree with it, blacken in the number 1 space on the answer sheet for question 1.

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1. | ▬▬▬ | ▬▬▬ | ═══ | ═══ | ═══ |

As you can see, you have a choice of: (1) strongly disagree, (2) disagree, (3) undecided, (4) agree, and (5) strongly agree for each statement. Disregard the T and F at the top of the comumns. Make your judgments in accordance with your degree of acceptance or rejection of the statement. However, you should try to avoid the "undecided" response as much as possible, as it is your feelings (either positive or negative) towards each of the statements that is being sought.

7. Proceed to answer each of the items, recording your answers on the answer sheet.

* * * * * * * * * * *

1. Most psychology experiments are worthless since even the most carefully controlled experiments lead to inconclusive results.

2. Through experimentation psychologists have made a real contribution to the understanding of man.

3. Psychologists would be better advised to forget the laboratory, and go into the field where the "real people and problems" are.

4. Many of the questions asked in testing are personal and are none of the experimenter's business.

5. Given a free choice, most students would be willing to volunteer for experiments.

6. Many experimenters are smug and take a pretty high-handed attitude with subjects.

7. Most experiments in psychology are concerned with trivial observations of artificial behavior.

8. Tests and other experimental manipulations are generally not reliable measures of personality and behavior.

9. Most experiments deal with such a small segment of behavior that they are meaningless in the broad picture.

10. People generally express their real feelings on psychological tests.

11. Psychology experiments are fun but do not prove anything.

12. Human behavior is too complex to cut up and study piece by piece in the laboratory.

13. Most people would say that their experience as a subject in psychological experiments was favourable.

14. When an individual signs up for an experiment, it involves a commitment to do what is asked to the best of his ability.

15. Most students participate willingly in experiments.

16. People rarely express their "real" selves in psychology experiments.

17. Experiments in psychology have no value because of the inherent diversity of man and his environment.

18. Many experimenters ask too much from their subjects.

19. Experiments are nothing but "busy work" for psychologists.

20. Psychology experiments are too time consuming.

21. Some experimenters just seem to be waiting for the subjects to make fools of themselves.

22. As a matter of personal pride, most individuals would try to do their best when acting as a subject.

23. Experimentation is of no practical value in the understanding of the fundamental causes of behavior.

24. The psychological journals are mostly filled with unimportant trivia.

25. It doesn't matter too much what subjects do; the experimenter usually manipulates the data to prove his hypothesis anyway.

26. Psychological tests are generally reliable measures of personality.

27. Laboratory studies in psychology are too artificial to produce valid data.

28. Most students are "good" subjects, that is, they perform well in their role as experimental subjects.

29. Many subjects in psychological experiments go through the motions without really trying.

30. The experimental method can be used effectively in the study of human behavior

31. Subjects in most psychology experiments are treated with respect.

32. The experimental approach to psychology has been both fruitful and helpful in understanding human nature.

33. Most experimenters are considerate and polite in their treatment of subjects.

34. Participation in psychology experiments is not a great imposition on students.

35. Psychologists sometimes forget that subjects are still human beings.

36. Through psychological tests and experiments psychologists have acquired the knowledge to predict behavior in many real life situations.

37. Most students follow the experimenter's instructions carefully so that they will be able to perform as a good subject.

38. Laboratory studies in psychology have contributed significantly to the knowledge of mankind.

39. The complexity of individuals make it necessary to study human behavior under controlled conditions.

40. From experiments, psychologists can validly generalize to the population-at-large.

41. Subjects in most psychology experiments are treated as guinea pigs.

42. Many students do not cooperate and therefore make poor subjects.

43. Psychology has proven its worth as an experimental science.

44. Any minor discomfort that subjects may go through such as electric shock, embarrassment, etc., is worth it in the long run.

45. Psychological data is useless because its interpretation is based on the manipulation of statistics.

46. Many students feel a responsibility to cooperate in any way possible in the pursuit of knowledge.

47. Subjects frequently feel manipulated by the experimenter.

48. Participation in psychological experiments is a waste of the students' time.

49. Students should not be asked to give up their time to serve as subjects.

50. College students tend to share with experimenters the hope that the study in which they are participating will in some material way contribute to science.

51. Subjects in psychology experiments are "contributors to science."

52. Experiments in psychology almost always involve deception or "tricking" the subject in some way.

# APPENDIX B

## Opinion Change Material

NEUTRAL VIVISECTION COMMUNICATION -
READ BY SUBJECTS

## Vivisection Opinion Questionnaire

This is a survey of what people think about a social question - vivisection. The term vivisection refers to the surgical operation on live animals for purposes of medical research. Many different kinds of animals are used for these purposes. Some of the most common are guinea pigs, albino rats, dogs, cats, monkeys and, less frequently, horses, chickens and pigeons. Operations performed on these animals often result in their death. Sometimes animals are sacrificed in order to examine damage to various cells or tissues of the body. Often, parts of the body of the animal are removed to study the effect this has on certain reactions.

Many times it is impossible to use anesthetics on the animals because of the nature of the research. They probably suffer some pain as the scientist attempts to discover information about disease or about a function of a particular part of the body.

There have often been newspaper campaigns in various cities to get antivivisection laws passed which would limit these practices performed by medical and other researchers. The American Medical Association usually supports vivisection as necessary for medical science. The newspapers point out certain cases where abuses of animals have been flagrant. There are antivivisection societies which distribute literature to anyone who wants it about the abuses of vivisection practices. Occasionally a state legislature considers, and sometimes passes, a bill to restrict or outlaw vivisection.

PRO VIVISECTION COMMUNICATION -
RECORDED

Research with animals may seem cruel and inhumane, but the benefits gained from such research far outweigh the injustice done to these homeless animals. We are told by noted medical men that, without such research, many lifesaving cures of modern medicine would never have been discovered. Probably no single factor in man's fight against diesase has done more to relieve suffering than the laboratory animal. Many new surgical techniques have been developed through animal experimentation. Dr. C.A. Hufnagel of Georgetown Medical School reports that twelve new lifesaving techniques in heart surgery have been perfected since 1939 through animal studies. Animal experiments are serious efforts to find cures and better treatments for the ailments and diseases of men.

There may be occasional cases of cruelty, but on the whole work done with animals in approved laboratories cannot be described as cruel. Dogs and other animals receive substantially the same treatment during and after operations as do humans. Anesthetics are usually administered to reduce suffering. Most research workers say a healthy and happy animal is necessary in research. Consequently, they usually give their animals better care than do most pet owners.

Most of the animals used for research are obtained from local city pounds. These animals are lost or unwanted and would ordinarily be destroyed. Scientists are human; they are animal lovers too, but since these unwanted and unclaimed dogs are to die, it is to the advantage of science and mankind that they die in a laboratory. It has been reported that in Boston, 33,000 unclaimed dogs--animals who could have helped advance science greatly--have been rendered into soap and fertilizer. Wouldn't it have been wiser to use these animals in research than to just destroy them?

As has been pointed out by the American Medical Association, the techniques and procedures learned from animal experimentation are also used by veterinarians. Not only has human suffering been relieved, but so has animal suffering. Nearly everyone, human and animal alike, benefits from animal research.

Last year, the newspapers carried the story of a little girl who had been stricken with a serious heart disease. This innocent infant wasn't expected to live. She had lost weight and was almost a skeleton. She had been in extreme pain for months. A few weeks ago, the story appeared in the papers that this poor little girl who had been all but given up for dead was now a happy, normal child once again. Due to recent laboratory experiments on animals, doctors had discovered a way to create a plastic heart which could cure this hopeless disease. Had it not been for the sacrifice of these laboratory animals, this story might not have had a happy ending.

# Vivisection Opinion Questionnaire

NAME_____ STUDENT NUMBER_____
Last First Initial

Directions: Print your name and student identification number in the space provided. Answer the statements listed below. The best answer to each statement is your own personal opinion. We have tried to cover many different points of view. You may find yourself agreeing strongly with some of the statements, disagreeing just as strongly with others, and perhaps uncertain about others. Whether you agree or disagree with any statement, you can be sure many other people feel the same way that you do.

Read each statement and indicate your answer by placing a mark in the column which corresponds with your opinion.

1. I DISAGREE STRONGLY
2. I DISAGREE MODERATELY
3. I DISAGREE SLIGHTLY
4. I AGREE SLIGHTLY
5. I AGREE MODERATELY
6. I AGREE STRONGLY

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1. Most dogs destroyed in pounds would be of little value in medical research. | _ | _ | _ | _ | _ | _ |
| 2. Most surgical procedures are learned under the watchful eye of a surgeon while operating on humans -- not on laboratory animals. | _ | _ | _ | _ | _ | _ |
| 3. Many times, the same vivisection experiment is performed again and again, without conclusive results. | _ | _ | _ | _ | _ | _ |
| 4. Scientists should substitute new and better methods of carrying on their investigation for inconclusive operations on animals. | _ | _ | _ | _ | _ | _ |
| 5. In animal experiments, animals do not suffer--anesthetics are always administered. | _ | _ | _ | _ | _ | _ |
| 6. Animals in pounds would normally be destroyed, therefore, they should be used in animal experiments. | _ | _ | _ | _ | _ | _ |
| 7. Animals are man's friends and should not be treated cruelly. | _ | _ | _ | _ | _ | _ |
| 8. Work done with animals in laboratories cannot be described as cruel. | _ | _ | _ | _ | _ | _ |
| 9. All experiments on animals are serious efforts to find cures and better treatments for the ailments and diseases of men. | _ | _ | _ | _ | _ | _ |
| 10. Animals experimentation is justified if the animals do not suffer. | _ | _ | _ | _ | _ | _ |

MAKE SURE THAT YOU HAVE FILLED IN YOUR NAME AND STUDENT NUMBER.

TURN THE PAGE

# APPENDIX C

## Post-Experimental Questionnaire

SUBJECT'S QUESTIONNAIRE

What do you think the experiment was about?

What do you think I am trying to prove, or, more specifically, what would my hypothesis be?

Were there any features of the experiment that you wondered about? What were they?

Did you respond to the questionnaires on vivisection as you thought you should or were you completely objective?

From your participation in this study, how significant do you feel this study was? Please check one.

_____highly significant

_____very significant

_____significant

_____insignificant

_____very insignificant

_____highly insignificant