SOME EFFECTS OF THREAT APPEAL IN MESSAGES ABOUT HAZARDS OF GRIZZLY BEARS IN NATIONAL PARKS: AN EXPERIMENT

Dissertation for the Degree of Ph. D.

MICHIGAN STATE UNIVERSITY
RONALD WAYNE HODGSON

1974

This is to certify that the

thesis entitled

Some Effects of Threat Appeal in Messages About Hazards of Grizzly Bears in National Parks: An Experiment

presented by

Ronald Wayne Hodgson

has been accepted towards fulfillment of the requirements for

Doctor of Philosophy degree in Resource Development

Milton H. Steinmueller

Major professor

Date August 9, 1974

O-7639

ABSTRACT

SOME EFFECTS OF THREAT APPEAL IN MESSAGES ABOUT HAZARDS OF GRIZZLY BEARS IN NATIONAL PARKS: AN EXPERIMENT

By

Ronald Wayne Hodgson

Messages describing the consequences of a grizzly bear attack have been suggested to persuade national park visitors that bears are dangerous and that precautions are necessary when hiking in grizzly country. However, strong threat has been reported to be less persuasive than mild threat and to be associated with aggression and defensive avoidance. Thus, strong warnings about bear hazards may be counter-productive.

Three levels of two kinds of threat, (1) inhibition threat, emphasizing the gruesome consequences of an attack, and (2) anticipation threat, emphasizing the probability of an attack, were manipulated experimentally to evaluate the following hypotheses.

Hypothesis One: When anticipation threat is used, subjects exposed to higher levels of threat will evaluate the grizzly bear as more dangerous than will subjects exposed to lower levels of threat. The level of threat will not be related to evaluations of grizzly bear aesthetics.

When inhibition threat is used, subjects exposed to higher levels of threat will evaluate the grizzly bear as more dangerous and less aesthetic than will subjects exposed to lower levels of threat.

Hypothesis Two: When inhibition threat is used, the amount of aggression displayed by subjects will vary directly with the level of threat. When anticipation threat is used, no relationship between the level of threat and aggression will be observed.

Hypothesis Three: When anticipation threat is used, the likelihood that a subject will seek further information about grizzly bears will increase with the level of threat. When inhibition threat is used, the likelihood that a subject will seek further information about grizzly bears will decrease as the level of threat increases.

A written threat appeal was prepared for each treatment. The messages were incorporated in test booklets and distributed at random to 100 wilderness survival students. One week later, the same students received a second questionnaire. A total of 78 usable observations were collected. The major results are:

1. Grizzlies are not rated significantly more dangerous by subjects exposed to strong threat than by subjects exposed to mild threat.

2. Anxiety is directly related to the level of inhibition threat.

3. Subjects with higher levels of anxiety are more likely to think about how to avoid or survive an attack, perhaps to the exclusion of further information about the threat.

4. Subjects exposed to inhibition threat are more aggressive than subjects exposed to anticipation threat.

The use of strong threat messages to warn of grizzly bear hazards probably will not cause visitors to perceive the bear as more dangerous and it probably will be associated with aggression and defensive avoidance. Strong threat appeals are, therefore, not recommended.

Results must be generalized to management situations with some caution at this point, however. The research was conducted under controlled conditions using subjects similar to but not sampled from

the population of wild land recreators. This laboratory experiment should be followed by a field experiment before communication strategies are fully elaborated. Under field conditions, the threat may seem more immediate and, therefore, more real. Magnitudes of observed relationships would, no doubt, change. Nevertheless, there is sufficient evidence of undesirable consequences associated with strong threat to advise that it not be employed in warnings of bear hazards unless the relationships observed here are contradicted by the results of field research.

Two other findings warrant mention. First, the aesthetic evaluation of the grizzly and the safety evaluation are significantly correlated, indicating the image of the grizzly in the minds of visitors may be well integrated and difficult to change. This suggests the need for a communication program that reaches the visitor beyond the boundries of the on-site recreation experience.

Secondly, the relationship between kind of threat and aggression is strong evidence of the existence of two kinds of threat. Further research on threat appeal in persuasion should define the level of threat in terms of combinations of anticipation and inhibition threat.

SOME EFFECTS OF THREAT APPEAL IN MESSAGES ABOUT HAZARDS OF GRIZZLY BEARS IN NATIONAL PARKS: AN EXPERIMENT

By

Ronald Wayne Hodgson

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Resource Development

1974

ACKNOWLEDGMENTS

An expression of special appreciation is due Dr. Milton Steinmueller, chairman of the doctoral committee and director of the dissertation for his contribution to my education and career goals. Also, appreciation is extended to Professor Daniel Chappelle, Professor Sanford Farness, Professor Robert Marty and especially to Professor Vincent Farace for their help as members of the committee in developing a course of study and the dissertation.

Margot Haet and Judi Mihalic provided assistance and David Mihalic made the suggestion and participated in the definition of the problem that led to the research upon which the dissertation is based.

The contribution of the anonymous visitors to Glacier National Park and the students in the wilderness survival course who agreed to act as subjects in the survey and experiment is acknowledged. Without their willing assistance, the research could not have been conducted.

One's family always shares the burden of a doctoral program, listening, encouraging, and deferring many satisfactions. Susan Hodgson and Fred and Verda Hodgson offered that, and, in addition, contributed materially to the course of study and the research. Thanks for such assistance cannot be expressed adequately.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

CHAPTER I

INTRODUCTION

> Thus, many Americans are removed from regular contact with open spaces and to a considerable degree have lost the ability of their forefathers to conduct themselves properly and safely in a truly natural environment. . . . Uncomfortable, unpleasant, and, on occasion, disastrous experiences result from lack of understanding.[1]

The Problem

To be mauled and disfigured or killed by a grizzly bear is, perhaps, no worse than to suffer the same fate in any of the twentieth century accidents of labor or war. Yet, to be attacked by a giant predator in the wilderness is, at once, alien and primevally familiar. The thought of it stirs deep emotions and the news of grizzly bears killing two teen-age girls on the same night in Glacier National Park astounds and saddnes more than the news of many more deaths in Memorial Day traffic accidents.

The safety of recreators in grizzly country takes on an importance out of proportion to the likelihood that harm will befall those who use the wilderness. Sentiment attending publicized grizzly bear attacks on human beings in national parks can lead to demands in the public press for the elimination of the bear from the parks and

---

[1] C. Frank Brockman and Lawrence C. Merriam, Jr., Recreational Use of Wild Lands (New York: McGraw-Hill Book Company, 1973), p. 7.

responses in the same press that parks are for bears, not for people.[2] Aroused public sentiment can erode the ability of the National Park Service to meet its management objective if political pressure forces the agency to greatly restrict the freedom of either bears or human beings.

National parks, of course, are for bears and for people. In 1916, Congress established the National Park Service and instructed the agency to, ". . . conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."[3] The protection of the grizzly is one of the reasons national parks exist, but the protection of the bear is justified by the pleasure its existence provides to human beings.[4] Severe restriction of human use and elimination of grizzlies

---

[2]Gairdner B. Moment, "Bears and Conservation: Realities and Recommendations," Biological Sciences, 19:11 (November, 1969), 1019-1020; Gairdner B. Moment, "Bears: The Need for a New Sanity in Wildlife Conservation," Biological Sciences, 18:12 (December, 1968), 1105-1108; Gairdner B. Moment, "Man-Grizzly Problems--Past and Present, Implications for Endangered Species," Biological Sciences, 20:11 (November, 1970), 1142-1144; "Letters," Biological Sciences, 19:3 (March, 1969), 201-203.

[3]U. S., Congress, House, National Park Service Act, H.R. 15522, 64th Cong., 1st sess., 1916, p. 535.

[4]Aldo Leopold discusses a land ethic in A Sand County Almanac (Oxford University Press, 1949) which declares in part, that wild things like grizzly bears have a right to a continued existence, at least in spots, in the natural state. Surely, that is possible for the grizzly even with human use of its range. The North American aborigines shared the bears' range, naturally, perhaps from the time man appeared on the continent.

If total exclusion of man is necessary, however, that is the role of wildlife refuges, not of national parks. Considerable confusion

both are incompatible with the Park Service objective. When emotions are high, however, the Park Service's position will please neither those who propose the elimination of grizzlies nor those who would keep people from the bears. Agencies with unpopular policies experience difficulties with funding and sometimes find themselves in court.

The welfare of both the agency and the back country recreator depends upon the success of programs to reduce the number of attacks by grizzly bears on human beings. The safety of the wild land recreator depends upon how he behaves before or during an encounter with the grizzly. Unfortunately, most recreators are unfamiliar with the animal. Only 31 per cent of the visitors surveyed in Glacier National Park in 1973 could give one or more correct identifying characteristics of grizzly bears. Common sense under such circumstances is unlikely to be a competent guide.

The same visitors thought the grizzly to be "very aesthetic" but only "slightly dangerous." That image compounds the difficulty of relying on the common sense of the recreator to guide his behavior. Such an image of the grizzly would predict "approach" behavior that might result in insufficient caution when in the vicinity of bears or when traveling in grizzly country.* The fact that visitors to the national parks continue to leave their automobiles to photograph and feed bears along roadways in spite of warnings that bears are dangerous, illustrates the problem.

---

attends the definition of national parks in the minds of environmentalists. The organic legislation clearly states the resources of national parks are to be protected for, not from, the pleasures of human use.

The number of encounters with grizzlies that end in attack can be reduced by modifying the behavior of the bears or of human beings. The options for controlling bear behavior are few. Elimination or caging the grizzly in national parks would be unacceptable within the context of the current management objectives. Less drastic measures can contribute to the reduction of attacks, however. Some of the problem results from an association between human scent and food learned by grizzlies that have fed on garbage.[5] Bears can be excluded from garbage dumps and kept out of campgrounds. It may even be possible through frightening to teach the bears to avoid campgrounds.[6] However, ultimately, the success of bear management depends upon the behavior of recreators.

A program to persuade recreators that grizzlies are dangerous and to educate them in ways to avoid or survive an attack is under way in the parks inhabited by the bear. To the extent that the visitors surveyed in the 1973 study in Glacier National Park are typical, the program is not as successful as might be desired. The use of strong threat appeal describing in detail the agony of an attack and its aftermath has been suggested to make it more effective.[7] One could argue that a visitor exposed to such descriptions could not avoid

---

[5]Stephen Herrero, "Human Injury Inflicted by Grizzly Bears," BioScience, 20:21 (November, 1970), 593-597.

[6]Ibid.

[7]Gairdner B. Moment, "Man-Grizzly Problems," op. cit. Moment does not specifically suggest a threat appeal of this nature, but the tone of the writing clearly implies that suggestion.

reevaluating the danger of the grizzly and consequently would be motivated to adopt safe behavior while in grizzly country.

However, strong threat appeals may be associated with undesirable side effects and some studies have found strong threat to be inferior to milder threat in persuading receivers to adopt the recommendations of the source of the communication. The results of communication research on the efficacy of threat appeals are conflicting. Strong threat cannot be unequivocally recommended nor rejected on the basis of research reported to date.

Defensive avoidance and aggression are two mechanisms advanced to explain the superiority of low levels of threat appeal sometimes observed and the possibility of two kinds of threat with different effects on these mechanisms has been suggested as an explanation of the conflicting findings reported for experiments manipulating the level of threat. Aggression and defensive avoidance are both undesirable if the bear management communication program of the National Park Service is to meet its objectives.

An aggressive visitor may be unwilling to obey traffic regulations, camping rules, and other regulations designed to protect the visitor and the resource. As aggression increases, the need for law enforcement may increase as the number of minor violations increases, taking resources away from other park management tasks. If the hypothesized intransigence resulting from exposure to strong threat messages extends to non-compliance with rules about feeding bears or disposing of garbage, the use of strong threat might indirectly aggravate the

grizzly bear problem by reinforcing the bears' learned association between human scent and food.

Message effects on the desire for further information about grizzly bears is another important consideration. If the message succeeds in causing the visitor to evaluate the grizzly as more dangerous but also results in defensive avoidance manifested in a reluctance to be exposed to more information about bears, the message will defeat its own purposes. Especially in the recreation setting characterized by freedom of choice, voluntary learning must be relied upon. All the necessary information could not be contained in a single message. At best, the most important facts can be presented and sources of more complete information identified. To a large extent, the visitor must voluntarily seek out more detailed information from displays, interpretative programs, and literature made available by the Park Service.

Scope

An effort has been made to provide some of the information necessary to answer the question, "Should stronger threat appeals be incorporated in communications designed to persuade recreators to adopt certain behavior patterns while in grizzly country?" Specifically, the effects of strong threat on aggression, defensive avoidance, and the evaluations of the safety and aesthetics of the grizzly bear are investigated.

The effects of the level of threat are studied for two kinds of messages, one that emphasizes the painful and unpleasant consequences

of an attack (inhibition threat), and another which emphasizes the probability that an attack will occur (anticipation threat). This addresses the question, "Does inhibition threat motivate defensive avoidance while anticipation threat motivates coping behavior?" The effects of different levels of threat and different kinds of threat on the adoption of recommended behavior is not tested directly.

Research Questions

1. Will subjects exposed to stronger threat evaluate the grizzly bear as more dangerous than will subjects exposed to milder threat? Will the effect be the same for both kinds of threat?

2. Will subjects exposed to stronger threat evaluate the grizzly bear as less aesthetic than will subjects exposed to milder threat? Will the effect be the same for both kinds of threat?

3. Will subjects exposed to stronger threat be more aggressive than subjects exposed to milder threat? Will the effects be the same for both kinds of threat?

4. Will subjects exposed to stronger threat tend to avoid further exposure to information about grizzly bears more than subjects exposed to milder threat? Will the effect be the same for both kinds of threat?

Wild land recreators are faced with a variety of dangers within national parks which are not common in day-to-day life. These dangers can be classified into three broad categories: dangers from other human beings, dangers from inanimate sources, and dangers from animals. The safety of the recreator, in all cases, ultimately depends upon his behavior which, in turn, depends, to a large degree, on his knowledge, skill, and attitude. Consequently, communication programs to influence knowledge, skill, and attitude can contribute to recreator safety in wild lands.

Some examples of dangers which might be the topic of communication programs, and, therefore, of research efforts such as this one are: theft of belongings in campgrounds, falls from high places, hot springs, slides on snowbanks, hypothermia resulting from exposure to weather or immersion in cold water for prolonged periods, and bears. Grizzly bears were chosen to represent the class of animate threats because, (1) They have been a subject of management controversy of immediate importance to the National Park Service, (2) The experimenter is familiar with Glacier National Park and the problem of grizzly bears there, and (3) Grizzly bears have a high interest value, making recruitment of experimental subjects easier.

The value of the research to management of wild lands for recreation is not confined by the narrow application to grizzly bear warnings. Although logical extention to other topics is not strictly possible, the results of this research have implications for the preparation of communication strategies for other kinds of threat as well.

Hypotheses

Hypothesis One: When anticipation threat is used, subjects exposed to higher levels of threat will evaluate the grizzly bear as more dangerous than will subjects exposed to lower levels of threat. The level of threat will not be related to evaluations of grizzly bear aesthetics.

When inhibition threat is used, subjects exposed to higher levels of threat will evaluate the grizzly bear as more dangerous and less aesthetic than will subjects exposed to lower levels of threat.

Hypothesis Two: When inhibition threat is used, the amount of aggression displayed by subjects will vary directly with the level of threat. When anticipation threat is used, no relationship between the level of threat and aggression will be observed.

Hypothesis Three: When anticipation threat is used, the likelihood that a subject will seek further information about grizzly bears will increase with the level of threat. When inhibition threat is used, the likelihood that a subject will seek further information about grizzly bears will decrease as the level of threat increases.

Methods

The hypotheses are investigated in an experiment using Michigan State University students enrolled in a wilderness survival course during Spring Quarter, 1974 as subjects. Six different treatments were prepared using three levels and two kinds of threat. Subjects were assigned at random to the six treatments in approximately equal numbers. Data were collected in two sessions one week apart. The follow-up was necessary to determine the effects of the treatments on information seeking.

Each of the six messages was incorporated in a test booklet with scales to measure evaluations of safety and aesthetics of grizzly bears, aggression, information seeking, and anxiety. Background information used to compare the subjects with visitors surveyed in Glacier National Park in 1973 was also collected. The test booklets were randomly ordered and distributed to the students in the classroom. The follow-up consisted of a single sheet of questions including an identification number for purposes of matching the responses, measures of information seeking, and a measure of anxiety.

None of the measures used achieved interval or ratio level. In addition, information from a survey of visitors to Glacier National Park done in 1973 indicated evaluations of the aesthetics of the grizzly bear to be skewed toward the unaesthetic. Therefore,

nonparametric analysis of variance, chi square, and rank order correlation statistics were used to test the null hypothesis of no relationship among the variables of the various research hypotheses.

Limitations

1. The hypotheses were investigated by means of an experiment using college students rather than actual visitors to grizzly country as subjects. Because the students were enrolled in a wilderness survival course, one might assume they are similar in important respects to recreators who hike and camp in wilderness inhabited by grizzly bears. Nevertheless, the results cannot logically be generalized to that population of recreators in the same way that the results of a random survey of wild land recreators might be. Nor can they be generalized with the same confidence one might have in the results of a field experiment. However, the necessary degree of control could not have been achieved in a field experiment under the constraints imposed by national park management considerations and certainly could not have been achieved in a survey.

Nevertheless, an experiment employing students as subjects in the classroom environment is not the same as an experiment employing actual wild land recreators within the grizzly bear's environment. Obviously, the threat cannot seem as real and urgent within the classroom as it might in Glacier National Park. Students might easily discount or ignore the threat; it might be more difficult for a backpacker in the park to do so.

Furthermore, the students have invested little in the way of ego, time, and money in the commitment to hike in grizzly country. The

recreator in the park has. Consequently, learning of the grizzly bear threat or being reminded of it would have a greater impact on the recreator; effects of the threat should be more pronounced in the field than they are in the laboratory. The arousal of aggression provides an example. A recreator in Glacier National Park, convinced to abandon a planned hike by a threatening message, will be more frustrated than will a student convinced not to plan such a hike. The recreator's frustration would be expected to increase his propensity for aggression.

The experiment reported here, therefore, is the first of a two-phase investigation of the effects of the level of threat in bear-warning messages. The second phase should be an experiment under field conditions in which the relationships first explored under the more easily and less expensively controlled and manipulated laboratory conditions are tested further. Until that phase is completed, generalizations must be applied with some caution.

2. The research does not deal with the central question of the relative merits of strong as opposed to mild threat and anticipation as opposed to inhibition threat in persuading recreators to adopt specified behaviors. That topic would be more appropriate to a field experiment. Had it been incorporated in the present study, only the expressed intention to adopt the suggested behavior could have been measured. However, if the results of the present study show the side effects of increased threat to be undesirable, the relative persuasiveness of the messages would be of little importance to management. Threat appeal would be rejected in favor of some other kind of appeal.

If the expected side effects do not occur, other tests of the effects of level of threat on persuasion building on the findings of this study would be appropriate.

3. No control group unexposed to threat appeal or exposed to a non-threat appeal was used because the addition of a seventh or eighth treatment would have required more subjects for adequate statistical analysis than were available. Consequently, nothing can be said with regard to the relative efficacy of threat and non-threat appeals. Only the effects of three levels of two kinds of threat are compared.

4. There was an attrition from 100 subjects in the first testing session to 78 total usable observations paired between the first session and the follow-up. It is possible that the students absent from the second class session were influenced in their decision to stay away by the anxiety aroused by the messages used in the first session. If that is the case, the full impact of the treatments was not measured and the observed results may be conservative.

Organization

The research and theory pertinent to the effects of threat appeals on persuasion and the side effects of aggression and defensive avoidance are discussed in Chapter Two. Arguments relevant to the hypotheses are made. The research experience with earlier operations of the concepts of anticipation and inhibition threat provides a basis for the definition and manipulation of those concepts in this research.

The hypotheses are presented and discussed in Chapter Three. Operational definitions of the concepts and a description of the experimental procedures are included. The appropriateness of the wilderness survival student as a subject in the experiment is also discussed.

The results of the tests of each of the hypothesis are described in Chapter Four. Data are summarized in tables and figures and the values of test statistics and their levels of significance are presented. The results are briefly interpreted and summarized.

Chapter Five is the final chapter. It begins with a summary of the research followed by conclusions in which the meaning of the findings for grizzly bear management communications and for threat appeal theory are discussed. The chapter concludes with several recommendations for management and for subsequent research.

CHAPTER II

FEAR AROUSAL AND PERSUASION: A REVIEW OF THE LITERATURE

> The main conclusion which emerges from the entire set of findings is that the overall effectiveness of a persuasive communication will tend to be reduced by the use of a strong fear appeal. . . .[1]
>
> The findings . . . indicate that the high-fear message was clearly more effective than the low-fear message. . . .[2]

Introduction

A considerable body of literature on the effects of strong as opposed to mild threat appeals in persuasion has amassed since Janis and Feshbach reported their well-known study in 1953. In spite of the extensive work on the subject, no indisputable consensus about the effectiveness of threat appeal exists. The failure of studies in the area to support one another has led to several reviews of literature in an effort to explain the apparent contradictions.

Reviews of the literature and a large number of the individual study reports were inspected in considering the desirability of stronger threat in bear-warning communication. Higbee's review was the most

---

[1] Irving L. Janis and Seymour Feshbach, "Effects of Fear-Arousing Communications," Journal of Abnormal and Social Psychology, 48:1 (January, 1953), 78-92.

[2] Murray A. Hewgill and Gerald R. Miller, "Source Credibility and Response to Fear-Arousing Communications," Speech Monographs, 32:2 (June, 1965), 95-101.

analytical and generated the largest number of hypotheses to explain observed contradictions. Therefore, it was selected for explicit discussion. McGuire's work offers a general model useful in explaining conflicts.

Janis and Feshbach's research results were the long-accepted explanation of the relative merits of strong as opposed to mild threat. Since their study manipulated the gruesomeness of threat appeal, it is the logical choice as an example of inhibition threat research. Hewgill and Miller were described by Higbee as examples of anticipation threat. Their report contained enough message detail to verify that the probability of threat was, indeed, manipulated. Finally, Leventhal and Trembly reported an investigation of the effects of anticipation and inhibition threat, but inspection of their study indicated inadequate operations for the two kinds of threat. Because they purport to have investigated the same variables studied here, their report is reviewed in some detail.

Background

In 1969, Kenneth Higbee published a review of the threat appeal research reported since 1953 and concluded, "Most relevant research has indicated that high threat is superior to low threat in persuasion."[3] Conflicting findings are too frequent, however, to easily be accepted as the result of chance or experimantal error. Consequently, a number of attempts have been made to provide a basis upon which to reconcile

---

[3]Kenneth L. Higbee, "Fifteen Years of Fear Arousal: Research on Threat Appeals: 1953-1968," Psychological Bulletin, 72:6 (June, 1969), 426-444.

the differences. The theoretical explanations have generally dealt with postulated interferences that counteract the motivating effect of threat. The result is a nonmonotonic relationship between the level of threat and persuasion, the relationship being positive at lower levels and negative at higher levels.[4]

An alternate theory postulates two kinds of threat. Inhibition threat which emphasizes the pain and discomfort that will attend the threatened event is hypothesized to result in interfering behaviors. Anticipation threat, emphasizing the likelihood that the threatened event will occur, on the other hand, is hypothesized to be free from interference. Therefore, persuasion should increase with the level of anticipation threat and decrease with the level of inhibition threat. Two of the interferences frequently discussed are aggression and defensive avoidance.

The experiment reported here deals with aggression and defensive avoidance as main effects and manipulates both the level of threat and the kind of threat. The literature reviewed in this chapter discusses the various hypothesized relationships between the levels and kinds of threat and aggression and defensive avoidance. The review of literature is begun with a discussion of the two kinds of threat and the suspected associations of the two kinds of threat with aggression and defensive avoidance. The discussion is illustrated with the methods and results of three experiments reported by Janis and Feshbach, Hewgill and Miller,

---

[4]William J. McGuire, "Personality and Susceptibility to Social Influence," in Handbook of Personality Theory and Research, ed. by Edgar F. Borgatta and William W. Lambert (Chicago: Rand McNally & Company, 1968), pp. 1143-44.

and by Leventhal and Trembly. The chapter is concluded with a summary of the consensus with regard to the effects of the two kinds of threat on aggression and defensive avoidance.

Two Kinds of Threat Appeal

Higbee concluded after a review of published threat appeal research that, "At least two different kinds of fear have been manipulated." Inhibition fear is aroused by ". . . gruesome, vivid descriptions and pictures." It is a ". . . nauseated, sick feeling." Anticipation fear, on the other hand, ". . . appears to be somewhat more concerned with the likelihood of experiencing the threat than with the gruesome seriousness of the threat."[5] Higbee includes Janis and Feshbach among the studies manipulating inhibition threat and Hewgill and Miller among the studies manipulating anticipation threat.[6]

Anticipation fear is the subjective probability that an event associated with negative feelings (affect) will occur. Inhibition fear defines the expected magnitude of the negative feelings the event will arouse should it occur. If there is little probability that the event will occur, even if a great deal of negative feeling would be likely to be associated with it, there is little reason to take action. If the probability of an event associated with only a little negative affect is high, the motivation to avoid the event would also be relatively high. Fear motivation is a function of both anticipation and inhibition threat.

---

[5] Higbee, "Fifteen Years," op. cit., p. 434.

[6] Ibid.

However, there seems reason to believe the two kinds of fear will predict different behaviors to reduce the motivating tension. Since anticipation fear represents the probability the negative event will occur and because the likelihood of an event can often be influenced by the subject, anticipation threat should result in coping behavior. Inhibition fear, on the other hand, represents the estimated magnitude of negative feelings to be experienced if the event should occur. That, perhaps, seems a function of fate rather than behavior, or to be relatively fixed. If one falls through the ice while skating, one will be very cold. There are few ways to fall in ice water and not be cold.

Individuals have learned that it is possible to influence the probability that events will occur by behavior patterns. The probability of falling throuch the ice can be reduced by testing the thickness before skating and by avoiding certain places where springs or currents may make the thickness uncertain. At the same time, individuals have learned that the magnitude of negative feelings they will experience should the event occur is largely outside their control. The only way sure to reduce the magnitude of negative feelings is to not think about the threat, thus eliminating the negative feelings of anxiety. Inhibition threat, therefore, should result in defensive avoidance.

Anticipation threat, then, should predict coping behavior such as the adoption of safety precautions in grizzly country which reduce the probability of an attack. Inhibition threat should predict defensive avoidance unless the recommendations that accompany the threat clearly reduce to zero the magnitude of negative feeling to be expected

if the event occurs.[7] Subjects aroused by inhibition threat will reduce emotional tension, in Janis and Feshbach's words, by ". . . becoming aggressive," or, ". . . becoming motivated to ignore or minimize the importance of the threat."[8]

Janis and Feshbach

In their pioneer study, "Effects of Fear Arousing Communications," Janis and Feshbach found attitude change to be inversely related to the level of threat used. Their subjects were students in the freshman class of a Connecticut high school. Their topic was dental hygiene. Fear was aroused by varying the emphasis on the painful and ugly consequences of tooth decay.

The strong threat message was illustrated by, ". . . a series of eleven highly realistic photographs which portrayed tooth decay and mouth infections." The message was explicitly directed to the receiver using such devices as ". . . statements to the effect that, 'This can happen to you.'" The milder messages were less explicit and were illustrated with less gruesome photographs. The mildest version used charts and photographs of completely healthy teeth instead of photographs of diseased mouths.[9]

---

[7] If inhibition fear were aroused and there were clear means of reducing the magnitude of negative feelings, inhibition fear might also result in coping behavior. In the experiments arousing inhibition fear, recommendations have been on ways to avoid the event, not on how to reduce the magnitude of affect arousal. The appropriate recommendations for inhibition fear reduce the expected magnitude of negative feelings. The appropriate message for anticipation fear reduces the subjective probability that the event will occur.

[8] Janis and Feshbach, "Effects of Fear-Arousing," op. cit., pp. 78 and 92.

[9] Ibid., pp. 78-92.

Inhibition Threat.--Subjects exposed to the strong threat message used in this experiment might be expected to have a more vivid mental picture of the destruction to themselves that could occur as a result of dental neglect than those subjects exposed to milder versions of the message. Therefore, the expected magnitude of negative feelings to be associated with disease of the mouth should have been greatest for the high threat group and least for the low threat group. Predictions of the likelihood of contracting diseases seems not to have been varied, only the magnitude of the consequences.

Inhibition fear has been defined by Leventhal and Trembly as fear of self-damage.[10] The fear aroused by Janis and Feshbach certainly was the result of drawing attention to the personal, physical consequences of dental neglect and qualifies as inhibition fear.

The feelings aroused by inhibition threat differ from the feelings aroused by anticipation threat. Leventhal and Trembly found depression, disgust, aggression, and concern for the self to be greater for subjects aroused by inhibition threat. Both inhibition threat and anticipation threat increased reports of anxiety and fear.[11]

The experiment by Janis and Feshbach manipulating inhibition threat resulted in an inverse relationship between the level of threat and persuasion. The experimenters were able, on the basis of their data, to attribute the results to defensive avoidance and perhaps to aggression.[12]

---

[10] H. Leventhal and G. Trembly, "Negative Emotions and Persuasion," Journal of Personality, 36:1 (March, 1968), 154-168.

[11] Ibid., p. 154.

[12] Janis and Feshbach, "Effects of Fear-Arousing," op. cit.

Janis and Feshbach concluded that the use of fear arousing material in the persuasive messages, ". . . not only failed to increase the effectiveness of the communication, but actually interfered with its overall success."[13] They attribute the results to defensive avoidance and an ". . . (acquired) motivation to avoid subsequent exposure to internal and external cues which were present at the time the fear reaction was aroused."[14] They felt that aggression was not a major factor in the results they observed, but would not rule it out as a potentially serious source of interference.[15] In this example of an experiment manipulating inhibition threat, defensive avoidance was identified as the source of interference and aggression as a potential source of interference (see Table 1).

Hewgill and Miller

Hewgill and Miller sought to test an hypothesized interaction between source credibility and level of fear aroused. They expected high threat to be more effective than mild threat in persuading the receiver when the receiver perceived the source as highly credible. On the other hand, the mild threat was predicted to be more effective than the high threat when source credibility was perceived to be low. They found high threat superior to mild threat in the high source credibility case, but no difference in the low source credibility case. The results in the low credibility case were inconclusive, however, as

---

[13] Ibid., p. 87.

[14] Ibid., p. 90.

[15] Ibid., p. 89.

TABLE 1.--The Experiment by Janis and Feshbach Manipulated the Level of Threat by Increasing the Number and Explicitness of References to the Gruesome Consequences of Dental Neglect. The Numbers of References to Various Classes of Gruesome Threats Used in the Three Messages are Tabulated Here.

Consequence Described	Strong Threat Message	Moderate Threat Message	Minimal Threat Message
Pain from toothaches	11	1	0
Cancer, paralysis, blindness or other secondary disease	6	0	0
Having teeth pulled, cavities drilled, or other painful dental work	9	1	0
Having cavities filled or having to go to the dentist	0	5	1
Mouth infections: sore, swollen, inflamed gums	18	16	2
Ugly or discolored teeth	4	2	0
"Decayed" teeth	14	12	6
"Cavities"	9	12	9
TOTAL REFERENCES to unfavorable consequences	71	49	18

Source: Irving L. Janis and Seymour Feshbach, "Effects of Fear-Arousing Communications," Journal of Abnormal and Social Psychology, 48:1 (January, 1953), p. 80.

that treatment failed to arouse differential fear between high and mild threat.[16]

Hewgill and Miller found results diametrically opposed to those of Janis and Feshbach. Janis and Feshbach found high threat to interfere with persuasion; Hewgill and Miller found it to facilitate persuasion! It might be as Hewgill and Miller suggest: the threat to family, especially when presented by a highly credible source, is more difficult to repress than the threat to self. However, the explanation might as easily lie in the different kinds of fear aroused.

Anticipation Threat.--All of the messages used by Hewgill and Miller contained the same basic information. Fear levels were manipulated by inserting, ". . . thirteen statements concerning physical injury or death to spouses and children."[17] Examples of the messages indicate the likelihood of experiencing the threatened event is the variable manipulated rather than the magnitude of the negative feelings to be experienced should the event occur.

Emphasis in Hewgill and Miller is on the numbers of persons who might be injured or killed if community fallout shelters are not provided rather than upon vivid description of the radiation sickness that the victims would suffer. Those subjects exposed to the high threat message can be expected to subjectively estimate the probability of injury in an attack to be higher than the probability estimated by those subjected to the low threat message. The two groups might be

---

[16]Hewgill and Miller, "Source Credibility and Response," op. cit., p. 99.

[17]Ibid., p. 96.

expected to have approximately equal mental pictures of the magnitude of self-destruction experienced in the event of an attack.

Three examples from the messages used by Hewgill and Miller to arouse fear illustrate the anticipation as opposed to the inhibition nature of the threat they employed: ". . . the children of thousands of families would be killed in a nuclear war;" ". . . since many of them will perish if such protection is not available;" and "Even minimal community shelter precautions would spare the lives of thousands of adults and children."[18] The authors used references to radiation sickness but apparently did not vary the gruesomeness of the descriptions from message to message.

Hewgill and Miller manipulated anticipation threat. When the source of the threat appeal was perceived as having high credibility, the relationship between the level of threat and persuasion in the Hewgill and Miller experiment was positive. No interference from aggression or defensive avoidance was observed.

Levanthal and Trembly

Leventhal and Trembly attempted to test the differential effects of anticipation and inhibition threat. They felt anticipation fear would be aroused by ". . . descriptions of threat agents, their approach and method of attack." Inhibition fear would be aroused by description of destruction. Anticipation threat would facilitate persuasion by exciting attention to the environment and ways of avoiding danger.

---

[18] Ibid., p. 96.

Inhibition threat would lead, from a focus on self-destruction, to ". . . depression, anger, and a sense of loss."[19]

The authors had two objectives. The first was to associate descriptions of a danger agent and descriptions of the destruction attending the threat with the feelings associated with the two kinds of fear. The second was to test the hypothesis that anticipation threat would be associated with coping behavior while inhibition threat would be associated with defensive avoidance.

Subjects were male high school students between 16 and 20 years old. All were licensed drivers. Motion pictures illustrating a message on automobile safety were used to arouse emotions. Threat level was manipulated by the size of the projected image. Low threat messages were illustrated with small pictures from which the subjects were seated at a distance of 20 feet. The high threat message was illustrated by a larger image from which the subjects were seated at a distance of 12 feet.

The inhibition threat message was illustrated with scenes of the wreckage and injured. It included ". . . close-ups of mutilated bodies and bloody wounds. The moans of victims also were audible."[20] The anticipation threat message was illustrated by scenes of contrived automobile collisions in which dummies were the passengers.

The messages resulted in different emotions being reported. Changes in intensity of both treatments produced increased expression

---

[19]Leventhal and Trembly, "Negative Emotions," op. cit., p. 154.

[20]Ibid., p. 156.

of intentions to take protective measures. The differences observed were attributed by the authors to differential instructional effect resulting from the manipulation of stimulus intensity through changes in the size of the image and not necessarily the kind of threat used.

Leventhal and Trembly did not find the two kinds of fear to be different in their persuasive effect. The failure to do so, however, may have resulted from inadequate operations used for and the method for varying anticipation threat. The authors discuss the possibility that the larger films may have been more effective for instruction as well as more effective for arousing emotional tension. The film showing destruction of dummies in contrived collisions seems to be a milder version of the film showing destruction of real people in real collisions. The message in both cases manipulates the magnitude of negative feelings (inhibition fear) to be expected and not the subjective probability of injury (anticipation fear).

The lack of evidence in this study, therefore, cannot be interpreted as evidence for the lack of different effects on persuasion and the interfering variables, aggression and defensive avoidance. The experimenters found both films to increase anxiety and fear reports and the inhibition threat film to strengthen ". . . reports of disgust, depression, egotism, and aggression."[21] The results tend to support the hypothesis that increased inhibition threat, at least, results in aggression and defensive avoidance. The results contain no evidence about the effects of increased anticipation threat.

---

[21] Ibid., p. 164.

Anxiety

The relationship between the level of anxiety aroused by a threat appeal and persuasion is complex. McGuire identifies multiple factors that mediate the effects of variables such as anxiety on persuasibility.[22] He calls two of these factors, "yielding" and "receptivity."

The probability of opinion change is described as a multiplicative function of the probability of yielding [Pr(Y)], the probability of effective message reception [Pr(R)], and of a residual factor [Pr(K)] which is the probability of other mediating variables such as retention. The relationship is expressed mathematically as:

$$Pr(o) = Pr(Y) \times Pr(R) \times Pr(K) \qquad [a]$$

McGuire suggests that if only the yielding factor is considered, one would expect persuasability to increase monotonically with anxiety. As subjects become more anxious, they become less self-confident and more insecure, and, therefore, more susceptible to social influence. However, anxiety also influences other mediating variables such as receptivity.

As subjects become more anxious, they may become preoccupied with worry about the threat. That worry may interfere with their ability to comprehend and interpret the information presented in the threat appeal. Thus, while increased anxiety might motivate the subject to yield to social influence and accept the recommendations in the threat

---

[22] McGuire, "Personality and Susceptibility," op. cit., pp. 1142-1147.

appeal, increased anxiety might also cause the subject to become preoccupied and inattentive to the information in the appeal.

Depending on the parameters of the function relating anxiety to the probability of yielding and to the probability of effective reception, one might expect the product of equation [a], above, to be a nonmonotonic relationship: the probability of opinion change at first increasing, then, after a point, decreasing as anxiety increases. Such a relationship would explain the confused results of empirical persuasion studies arousing anxiety.

Predictions are further confused because anxiety appears to be associated with other mediating factors. The probability of rejecting the recommendations of a message source perceived to be responsible for arousing the negative feelings of anxiety is one of these. The greater the anxiety aroused, the more probable such hostile rejection would seem.

The net effect of anxiety arousal on the probability of opinion change is, therefore, the product of a number of functions relating mediating factors to anxiety level. Some of these mediating factors vary directly with anxiety; others vary inversely. It is unlikely that opinion change will vary monotonically with anxiety arousal.

Anxiety, of course, may be only one of the variables that influences the response of subjects to threat appeals. Increased attention to the threat message and a fascination with gruesome detail to the exclusion of other information also predict some of the results observed in threat appeal research.

A frequently used explanation of the effects of threat appeal depends upon anxiety. Strong threat is associated with greater anxiety than mild threat. Anxiety is a drive and motivates adoption of recommendations. In another formulation, anxiety results in preoccupation with worry and reduced comprehension of threat appeal recommendations. In still another formulation, the negative feelings associated with anxiety result in rejection of recommendations as an expression of hostility or in defensive avoidance of further information about the threat. Because anxiety is central to many explanations of the observed relationships between the level of threat and opinion change, a measure of anxiety is included in the experiment described here.

Conclusions

If one desires to influence the attitude or behavior of a receiver, one might arouse the receiver by demonstrating that an event associated with negative feelings is very likely unless certain recommended actions are taken. The recommendations, if accepted, would substantially reduce the likelihood that the threatening event would occur. Thus, the greater the arousal of anticipation fear, the more motivated the receiver will be to accept the recommendations.

Of course, acceptance of the recommendations might not reduce the subjective probability of experiencing the threatened event adequately, leaving the receiver with residual emotional tension. Since anticipation fear was aroused, anticipation fear remains. The receiver can be expected to seek further recommendations that, if accepted, will

reduce the probability of experiencing the negative event. The emotional tension will be dissipated in implementation of the recommendations and the search for other behaviors effective in reducing the probability of the occurrence of the negative event (coping behavior).

If one arouses emotional tension by vividly describing the painful or gruesome consequences of the event and then offers recommendations that again promise to reduce the likelihood that the event will occur, and if acceptance of those recommendations is unsuccessful in reducing the subjective probability that the event will occur to near zero, the receiver will be left in a state of residual emotional tension. Since inhibition fear was aroused, inhibition fear will remain. The receiver has learned that the magnitude of affect arousal is usually beyond his control, and he will be more likely to engage in defensive avoidance than in coping.

Similarly, even if the recommendations are such that they reduce the expected magnitude of negative feelings, unless the expected magnitude is reduced to near zero, the residual emotional tension will be likely to motivate defensive avoidance. Defensive avoidance might take the form of aggression towards the source or others, misinterpretation of the arousal message, efforts not to think about the subject and avoidance of further communication on the topic.

Summary

Two kinds of fear seem to have been manipulated in research on threat appeal persuasion. Inhibition fear is aroused by vivid description of the destruction a threatened event will mean for the

receiver's psychological and biological self. Anticipation fear is aroused by descriptions of the likelihood that the threatened event will actually occur. Inhibition fear is the expected magnitude of negative affect if the event occurs. Anticipation fear is the receiver's subjective probability that the event associated with negative feelings will occur.

Experience, it is suggested, has taught that the magnitude of feelings to be experienced in case of an event is largely beyond the control of the individual. Therefore, inhibition fear can effectively be reduced, in general, only through defensive avoidance. On the other hand, experience has taught that the probability that an event will occur can be influenced by personal behavior. Therefore, anticipation fear can be reduced by adopting appropriate coping behavior.

Persuasive strategies that employ inhibition threat, it is hypothesized, will result in increased defensive avoidance as the level of threat is increased. Examples of this outcome are the experiments by Janis and Feshbach and Leventhal and Trembly. Strategies employing anticipation threat, it is hypothesized, will result in increased coping behavior as the level of threat increases. Hewgill and Miller provide an example of that effect.

The study by Leventhal and Trembly attempted to test for some of the predicted effects of the arousal of the two kinds of fear in persuasion. Their results were inconclusive, perhaps because of difficulties with the operationalization of the anticipation threat and manipulations of threat intensity.

CHAPTER III

THE HYPOTHESES AND RESEARCH DESIGN

> Thus, the arousal of "neurotic anxiety" by fear-arousing stimuli may cause subjects to attempt to reduce fear by eliminating thoughts about danger (via repression, denial, aggression, etc.), whereas those subjects in whom "realistic fear" is aroused may take realistic action (e.g., adopt the communicator's recommendations) to eliminate or avoid the danger.[1]

The Hypotheses

Hypothesis One

When anticipation threat is used, subjects exposed to higher levels of threat will evaluate the grizzly bear as more dangerous than will subjects exposed to lower levels of threat. The level of threat will not be related to evaluations of grizzly bear aesthetics.

When inhibition threat is used, subjects exposed to higher levels of threat will evaluate the grizzly bear as more dangerous and less aesthetic than will subjects exposed to lower levels of threat.

Rationale.--On the basis of the literature reviewed in Chapter II, inhibition threat is expected to be associated with aggression. One way in which aggression is expressed is by showing contempt.[2] It would be difficult for a subject feeling contempt for a grizzly bear to continue to think it aesthetic. Such feelings would be inconsistent with one another. Therefore, as inhibition threat is increased,

---

[1] Higbee, "Fifteen Years of Fear Arousal," op. cit., pp. 433-434.

[2] Janis and Feshbach, "Effects of Fear-Arousing," op. cit., pp. 78-92.

aggression towards the grizzly should increase, expressed as contempt, and as a consequence, the subject should evaluate the grizzly bear as less aesthetic.

It is possible to argue that at the higher levels of inhibition threat, subjects will be more likely to deny the existence of the threat. If that occurs, one would expect the grizzly bear to be evaluated as more safe as the level of inhibition threat increases. However, intuitively, subjects aware of the unpleasant consequences that might attend an attack by a grizzly could not avoid reevaluating the bear as more dangerous. Because it is on that basis that stronger threat appeals for bear management communications have been recommended, the positive relationship between the level of threat and evaluations of the grizzly bear as more dangerous is hypothesized.

When anticipation threat is used, coping behavior is predicted. Coping behavior involves those activities that would increase the subject's safety. Reevaluation of grizzly bear aesthetics towards unaesthetic would result in no increase in safety. Therefore, anticipation threat is expected to shift the evaluation on the safety dimension towards dangerous but to leave the evaluation on the aesthetic dimension unchanged.

In summary, when inhibition threat is used, the evaluation of the grizzly bear on the safety dimension will shift towards more dangerous and the evaluation on the aesthetic dimension will shift towards unaesthetic. When anticipation threat is used, only the evaluation on the safety dimension will change, towards more dangerous.

Analysis includes a test of the significance of the relationship between the safety and the aesthetic dimension. It is possible to argue that the subject's image of a grizzly bear is an interconnected set of evaluations that are consistent with one another. If changes are affected in one element of the image (safety), all elements should be influenced.[3] Images, however, are more or less complex, more or less well organized. They include "compartmentalized" elements within which the components are consistently interwoven but between which there is little organization. Components in one element may be inconsistent with components of other elements, but because the elements are not closely tied to one another, no inconsistency will be perceived by the subject and, therefore, no stress for balance will exist.

Because the grizzly bear is an unusual event in the lives of most individuals, it is likely that images of the bear are relatively undeveloped. Elements of the image may be fairly vivid; however, a great deal of information about bears is included in the verbal and non-verbal communications available to the population at large.

With the exception of a review of the unofficial communications about bears available to the visitor of Glacier National Park,[4] no

---

[3]Kenneth E. Boulding, The Image (Ann Arbor: University of Michigan Press, 1956); William A. Scott, "Psychological and Social Correlates of International Images," in International Behavior, a Social-Psychological Analysis, ed. by Herbert C. Kelman (New York: Holt, Rinehart and Winston, 1965), pp. 78-79; Karl W. Deutsch and Richard L. Merritt, "Effects of Events on National and International Images," in International Behavior, A Social-Psychological Analysis, ed. by Herbert C. Kelman (New York: Holt, Rinehart and Winston, 1965).

[4]Susan F. Hodgson, "Unofficial Messages about Bears in the McDonald Valley and West Glacier," Report to the National Park Service, Glacier National Park, Montana (unpublished paper, 1973).

summary of the content of generally available messages about bears has been made to the knowledge of the author. However, it seems from the author's experience, that discussions about bears tend to focus either upon the aesthetics, safety, or biology and natural history of the animal. Most messages, apparently, deal with one of these topics almost to the exclusion of the others.

If that is the case, this message characteristic would encourage compartmentalization of aesthetic and safety dimensions. The subject would tend to think about the safety of bears or the beauty of bears, but not about both at the same time. If the two elements are more or less independent, a shift in the evaluation of grizzly bears safety should not automatically be a source of stress on the subject's evaluation of aesthetics. No significant interaction is expected, therefore.

Hypothesis Two

When inhibition threat is used, the amount of aggression displayed by subjects will vary directly with the level of threat. When anticipation threat is used, no relationship between the level of threat and aggression will be observed.

Rationale.--The reasons for expecting the predicted relationship are discussed thoroughly in Chapter II. Briefly, it was argued that experience teaches that an individual can control to some extent the probability that an event will occur, but has less control over the magnitude of negative affect associated with the possible event. Anticipation threat stresses the probability that an event will occur. Inhibition threat stresses the magnitude of negative feelings (affect) that might result. Individuals avoid negative affect. Coping behavior

can reduce anticipation threat but not inhibition threat. Individuals must resort to defensive avoidance to reduce inhibition threat. One manifestation of defensive avoidance is aggression. Therefore, it is expected that subjects exposed to higher levels of inhibition threat will exhibit aggression, but no effect will be observed for level of anticipation threat.

Hypothesis Three

When anticipation threat is used, the likelihood that a subject will seek further information about grizzly bears will increase with the level of threat. When inhibition threat is used, the likelihood that a subject will seek further information about grizzly bears will decrease as the level of threat increases.

Rationale.--Hypothesis three is related closely to hypothesis two. The arguments above explain why one might expect higher anticipation threat to result in more information seeking. Defensive avoidance again explains why higher levels of inhibition threat are expected to result in less information seeking.

Inhibition threat is expected to result in defensive avoidance. One manifestation of defensive avoidance is repression. Subjects avoid further messages or thoughts about the distressing subject. Thus, higher levels of inhibition threat should be associated with less information seeking.

Operations of the Concepts

Kind of Threat

Inhibition threat is operationalized as a written message describing a single grizzly bear attack in which the gruesome

consequences of the attack are detailed. Pain, death, disfigurement, blood, etc. are mentioned.

Anticipation threat is a written message describing in sequence a number of grizzly bear attacks upon hikers and backpackers. Details of the injuries sustained are few. Victims are described as badly mauled, or killed. No mention is made of pain, disfigurement, or blood.

Inhibition threat emphasizes the gruesome aspects of an attack by a grizzly bear. Anticipation threat emphasizes the probability that the subject will experience an attack.

Level of Threat

For inhibition threat, level was increased by adding progressively "stronger" descriptions of injury to persons by the grizzly bear in the described attack. Descriptive sentences were ranked by a panel of five undergraduates selected to represent the population of subjects used in the experiment. The judges were Michigan State University students enrolled in the televised sections of the wilderness survival course at the same time the subjects of the experiment were enrolled in the live section.

The strongest version of the inhibition threat was composed. Sentences, groups of sentences, and phrases describing the gruesome consequences of the attack were extracted and typed on 3" by 5" cards. The judges were each given a deck of cards containing all the descriptions. They were instructed to rank the descriptions according to how strongly each aroused their feelings.

The low threat message contained the least strong one-third of the descriptions. The medium threat message contained the least strong two-thirds of the descriptions. The strongest threat contained all of the original descriptions.

The level of anticipation threat was manipulated by increasing the number and recency of attacks described. The strongest version of the threat was composed first. The sequence of attacks described dated from 1959 through 1973.

The low threat message contained the description of three grizzly attacks that occurred in the late 1950's and early 1960's. The medium threat message contained the descriptions of six attacks: the three from the low threat message and three more from the late 1960's. The strongest threat contained nine descriptions of attacks: the six used in the milder versions and three from 1973.

Safety and Aesthetics

As part of a survey of attitudes towards grizzly bears and the use of the backcountry in Glacier National Park conducted in 1973, visitors were asked to complete a scale consisting of twenty-four pairs of polar adjectives describing grizzly bears. The adjectives in each of the polar pairs were separated by seven spaces labeled: Very, Somewhat, A Little, Neutral, A Little, Somewhat, and Very. Positive and negative poles were reversed randomly.

The adjectives selected for the scale included words related to the aesthetics and safety of the bear. Examples of the safety descriptors are, Safe-Dangerous and Violent-Peaceful. Examples of the aesthetic descriptors are, Beautiful-Ugly, and Homely-Handsome.

Three hundred twelve usable scales were completed by a random sample of visitors to the Logan Pass Visitor Center in Glacier National Park. A factor analysis of the responses with one, two, and three rotations resulted in the expected two dimensions: safety and aesthetic. An arbitrary minimum factor loading of .69 was selected to reduce the number of items in each dimension scale. The adjective pairs in each dimension are listed in Table 2.

TABLE 2.--Adjective Pairs Comprising the Aesthetic and Safety Dimensions of the Grizzly Bear Image, Glacier National Park Visitors, 1973.

Dimension	Factor Loading	Communality
SAFETY		
Bad Tempered--Pleasant	.6907	.5206
Violent--Peaceful	.6953	.5071
Savage--Meek	.7325	.5486
Tender--Brutal	.6957	.4929
Gentle--Vicious	.7643	.5967
AESTHETIC		
Grotesque--Pretty	.6722	.4819
Beautiful--Ugly	.7027	.5270
Ordinary--Splendid	.6913	.4603
Homely--Handsome	.7371	.5483

Subjects' evaluations of the safety and aesthetics of grizzly bears in the experiment reported here were measured with a modified version of the scales used in Glacier National Park. The paired adjectives described under the safety and aesthetic dimensions in Table 2 were used. However, only six spaces were allowed between adjectives. The neutral space was eliminated to force a response. Pretesting with

a group of university students indicated that many deferred making a judgment when the neutral space permitted them an escape. Even so, one subject refused to respond to one adjective pair because the adjectives were "too anthropomorphic."

Grizzly bear safety scores were measured as the arithmetic mean of the values assigned to each of the five adjective pairs in Table 2 listed under the safety dimension. A high score means the subject considers the grizzly to be "dangerous" as opposed to "safe."

Grizzly bear aesthetic scores were measured as the arithmetic mean of the values assigned to each of the four adjective pairs in Table 2 listed under the aesthetic dimension. A high score means the subject considers the grizzly to be "ugly" as opposed to "beautiful."

Aggression

Two measures of aggression are used. Aggression I was measured by asking subjects to agree or disagree with six statements, three of which suggested restricting either grizzlies or people or punishing the Park Service, and three which suggested voluntary behavior. The index is reproduced in Figure 1. Subjects were scored "1" if they agreed with any of the three aggressive foils and "0" if they disagreed with all aggressive foils.

The second measure of aggression, Aggression II, was modeled upon the Borgadus Social Distance Scale.[5] Subjects were asked to agree or disagree with statements ranging from, "It is all right for grizzly bears to roam free in remote areas of Canada and Alaska," to

[5]Earl R. Babbie, Survey Research Methods (Belmont, California: Wadsworth Publishing Company, Inc., 1973), pp. 270-271.

BELOW ARE SOME SUGGESTIONS MADE BY BACKCOUNTRY USERS IN GLACIER NATIONAL PARK IN A STUDY LAST SUMMER. PLEASE MARK WHETHER YOU AGREE OR DISAGREE WITH EACH ONE. MARK ALL STATEMENTS.

AGREE	DISAGREE	
( )	( )	Grizzlies should be controlled to insure the safety of park users.
( )	( )	People who don't know how to behave in grizzly country should be kept out.
( )	( )	If the Park Service can't protect people and grizzlies, the parks should be taken away from them and run by someone else.
( )	( )	People should be encouraged to learn about how to behave around dangers like bears before they go hiking or backpacking.
( )	( )	The Park Service should provide information about grizzlies.
( )	( )	Some kind of warning system should be devised so people can know when grizzlies are around.

Figure 1.--The index used to measure Aggression I in the experiment.

"It is all right for grizzly bears to roam free around campgrounds and lodges." The scale is reproduced in Figure 2.

A subject's score was the number of the lowest numbered foil marked "Agree." A low score indicates the subject would restrict the grizzly's range very little; a high score indicates the subject would restrict the range of the grizzly more.

Information Seeking

Four measures of information seeking behavior were devised. The first asked the subject to provide name and address on a form if he

BELOW YOU WILL FIND A SENTENCE WITH SIX DIFFERENT ENDINGS. READ EACH SENTENCE CAREFULLY.

THEN, MARK AGREE FOR EACH ENDING THAT DESCRIBES HOW YOU WOULD COMPLETE THE SENTENCE. MARK DISAGREE FOR EACH ENDING THAT YOU WOULD NOT USE TO COMPLETE THE SENTENCE.

IT IS ALL RIGHT FOR GRIZZLY BEARS TO ROAM FREE. . . .

AGREE	DISAGREE	
( )	( )	1. . . . around campgrounds and lodges.
( )	( )	2. . . . along roads and highways.
( )	( )	3. . . . in all of the backcountry.
( )	( )	4. . . . in that part of the backcountry not used by many hikers or backpackers.
( )	( )	5. . . . in remote areas of northern Canada and Alaska.

Figure 2.--The social distance type scale used to measure aggression in the experiment.

wanted more information about grizzly bears. The subject was told there might be a 15 cent charge for the pamphlet. This measure was the last item in the experimental booklet.

The effort required to complete the form and the possible charge were included as hurdles, requiring some threshold of motivation to overcome. Subjects completing the form were scored "1" and those leaving it blank were scored "0".

The second measure (and the third and fourth) were included in the follow-up questionnaire administered one week after the experiment. Subjects were asked to respond "yes" or "no" to the question, "Since

you participated in the experiment last week, have you looked for more information about grizzly bears?" A "yes" was scored "1"; a "no" was scored "0".

The third measure was the question, "Since you participated in the experiment last week, have you thought about how to avoid a grizzly bear attack or what you would do if you were attacked?" The fourth measure was the question, "Since last week, have you discussed the experiment with your classmates? (Don't include the in-class discussion after the experiment.)" Again, a "yes" answer was scored as "1" and a "no" answer was scored as "0".

Together, the measures account for information seeking from the source of the message, other unspecified sources, the individual's own store of information, and the subject's peers. Two other measures combining responses to the above measures were formed. One was the sum of responses to the four items. A high score would indicate many sources were consulted; a low score would indicate few sources were used. The second measure was scored "0" if none of the items was answered, "yes" and "1" if any of the items was answered "yes".

Subjects

College students enrolled in a wilderness survival course offered by the Department of Park and Recreation Resources at Michigan State University during Spring Quarter, 1974, were used as subjects. College students were selected because of availability and the opportunity provided by the classroom for careful control necessary to the experiment. Those enrolled in wilderness survival were selected because of a demonstrated interest in wild land recreation.

The student population, in this case, bears a strong resemblance to the population of backcountry users surveyed in the 1973 survey of Glacier National Park visitors. A comparison is made in Table 3. This resemblance adds to the generalizability of the results. However, the artificial conditions of a laboratory experiment reduce generalizability. Before communication strategies are devised, a field experiment using wild land recreators in a wild land environment should be conducted to test the relationships described here.

However, most of the students used as subjects are wild land recreators. Sixty-five per cent of a sample of wilderness survival students indicated they were hikers or backpackers. The majority of subjects will be among the recreators using wild lands and will be targets for hazard-warning communications. They are, therefore, representatives of a population relevant to land managers, independent of their similarity to the hikers and backpackers of Glacier National Park.

Relevance of the Grizzly Bear Threat

In order for a threat appeal to arouse motivating emotional tension, the threat must be of importance to the subject. It must seem possible that he will experience the event or, at a minimum, the subject must identify with the potential victims. The fact that the subjects have an interest in wilderness sufficient to motivate them to enroll for a course in wilderness survival and that a high percentage are wild land hikers or backpackers suggests an attack by a grizzly bear would seem at least possible to them.

TABLE 3.--A Comparison of Some Characteristics of Glacier National Park Backcountry Users and Students Enrolled in Wilderness Survival.

Characteristics	Respondents Backpacking in Park	Students
Sex	Female: 24.0% Male: 76.0%	Female: 37.5% Male: 62.5%
Age	16 - 25: 26.0% 26 - 35: 52.0% 36 up: 22.0%	16 - 25: 95.0% 26 - 35: 5.0% 36 up: 0.0%
Belong to a Conservation or Environmental organization	Yes: 22.0% No: 78.0%	Yes: 15.0% No: 85.0%
Years of Education	13: 0.0% 14: 4.0% 15: 9.0% 16: 17.0% 17: 13.0% 18+ 35.0%	13: 20.0% 14: 7.5% 15: 20.0% 16: 32.5% 17: 17.5% 18+ 2.5%
Urban-Rural: Background 10 Years of Age to 15 Years of Age	Extreme Rural 0.0% Rural Farm 15.0% Rural Town 19.0% Open Suburban 17.0% Dense Suburban 40.0% Open Urban 2.0% Dense Urban 7.0%	Extreme Rural 2.5% Rural Farm 2.5% Rural Town 12.5% Open Suburban 32.5% Dense Suburban 37.5% Open Urban 7.5% Dense Urban 5.0%
Urban-Rural: Where Subject Would Prefer to Live	Extreme Rural 23.0% Rural Farm 17.0% Rural Town 21.0% Open Suburban 31.0% Dense Suburban 4.0% Open Urban 1.0% Dense Urban 2.0%	Extreme Rural 42.5% Rural Farm 22.5% Rural Town 10.0% Open Suburban 17.5% Dense Suburban 2.5% Open Urban 2.5% Dense Urban 2.5%
Plan to Hike in Northern Rockies Someday Soon	N.A.	15.0%
Are Wild Land Hikers or Backpackers	N.A.	65.0%

In addition, the sorts of dangers one might encounter in the wilderness are discussed in the survival course. The subjects, therefore, might be expected to have a mental set favorable to considering wild land related threats as important.

From a management standpoint, it is desirable to inform wilderness users of the grizzly bear threat during the planning stage of their visit to the national park. By doing so, one avoids the possibility of degrading the recreational experience by frustrating plans for a backcountry experience to which the visitor is committed by long anticipation and the expense of traveling in the area. The wilderness survival students closely approximate other wilderness hikers and backpackers during the planning stages of their experience.

The one element missing might be a commitment to hike in the Northern Rocky Mountains in the near future. To increase that commitment, efforts were made to unobtrusively suggest the region as a hiking and backpacking area during the weeks prior to the experiment. Topographic maps of Glacier National Park and posters were placed in the classroom and references to hiking in the Northern Rockies were incorporated as examples in lectures.

Wilderness survival students may be a self-selected sample of those interested in wild land recreation. Choosing to take a course in survival may demonstrate a propensity to "cope" rather than to "avoid." Certainly, the course material stresses ways of coping with natural threats. Consequently, the subjects used may be more uniformly "copers" than the general population of wild land recreators.

The effect of such a bias, if it exists, will be to make it more difficult to demonstrate differences in the effects of the two kinds of threat, particularly with regard to information seeking. As a result, those significant differences observed are more convincing than they might be otherwise.

On the other hand, if self selection has occurred, the results may be "representative" only of those wilderness users who have a coping style like that of the subjects. There is no information known to the author that describes the coping styles of wilderness users. Consequently, in the absence of such information, the results are cautiously "generalized" to wilderness users as a whole to the extent justifiable in an experiment of this type.

One may conclude that the threat of grizzly bear attack will be as relevant to the subjects as to visitors to Glacier National Park under similar conditions. However, the threat cannot seem as immediate when read in a classroom as it might when read at a trail head just prior to setting out upon a wilderness hike.

The lack of immediacy of threat may have the effect of reducing the magnitudes of response to the threat. Subjects who learn of the threat in the classroom experiment and are persuaded to change or abandon plans for a hike in grizzly country will be less frustrated, for example, than will recreators who abandon or change plans after investing time and money to make the trip to the park. Aggressive responses among recreators when exposed to threats on site may be more pronounced, therefore, than when exposed to threat before commitments

and investments have been made. The relationships observed in the experiment should be verified in a field experiment conducted under conditions similar to those in which the actual hazard-warning communication program will be conducted.

Administration of the Experiment

Six different treatments can be combined from two types of fear appeal and three levels of threat. Subjects were assigned to the six treatments at random.

A test booklet combining a threat message and the battery of tests was assembled for each treatment. The six kinds of booklets were reproduced in equal numbers, 17 of each. The 108 booklets were randomly ordered by thoroughly shuffling a deck of 108 cards marked to represent the booklets, then ordering the booklets to match the shuffled deck. The randomly ordered pile of booklets was systematically distributed to the subjects as they sat in the classroom.

In order to collect information about exposure to further information about the grizzly bear threat, it was necessary to admins-ter a follow-up questionnaire one week from the first testing. To match responses with treatment type, the different booklets had different colored covers. Subjects were asked to remember the color of their booklet. To fix the color in their memories more indelibly, subjects were asked to raise their hand when the name of each color was said. No reason for remembering the color was stated.

One week after the initial experiment, the subjects were asked to complete a questionnaire concerning their behavior towards grizzly

bear communication in the intervening period. They entered the color of the test booklet on the questionnaire. Subjects used their student numbers to identify their responses in the experiment. They also entered their student number on the questionnaire. Thus, it was possible to match observations.

The number of usable, paired experiment and follow-up observations was 78. The attrition was accounted for almost entirely by diminished attendance at the class in which the follow-up was administered.

In the experiment, subjects recorded a portion of their responses directly on a mark sense form. Other responses were made directly in the test booklet and transferred to the mark sense sheet later by a coder. The follow-up answers were marked on the questionnaire. Cards were punched manually from the coded follow-up and mechanically from the mark sense forms.

Subject Welfare

Whenever variables such as fear are manipulated, there is some danger that subjects will experience adverse effects. None of the fear levels certainly are high enough to cause any sort of trauma. However, subtle effects, such as a lasting distaste for grizzly bears or fear of backcountry travel in grizzly country might result. Consequently, it is necessary to debrief the subjects.

Subjects were informed that they were participating in an experiment to evaluate some messages about safety in grizzly country. They were told no details could be provided in advance without the

danger of biasing the results. Upon completion of the experiment, the entire experiment would be described, however. It was made clear that participation was voluntary, but subjects were encouraged to complete the instruments. The only reward offered was the personal satisfaction of another opportunity to contribute to research providing useful information for management of national parks.

One week after completion of the experiment after the follow-up questionnaire, a debriefing session was held. The theory behind the experiment and the procedures and, most importantly, an as accurate as possible assessment of the danger of bear attacks and the efficacy of suggested defenses was presented. Subjects were provided with a summary of National Park Service recommendations for recreators in grizzly country.

CHAPTER IV

ANALYSIS AND RESULTS

> If any criticism is due the administration and ranger staff in this prepared and vigorous campaign of warning about the big bears, it is one of over-reaction. So many warnings were in so many places during the 1968 season that many people were just plain scared away from backcountry travel.[1]

Introduction

The methods of analysis, the results and an interpretation of the results are reported for each hypothesis in order. The chapter is concluded with a summary of the findings. Briefly, the results of the evaluations of the hypotheses are as follows.

1. Scores on the safety index are not significantly related to the level of either anticipation or inhibition threat.

2. Scores on the aesthetic index are not significantly related to the level of anticipation threat but the relationship between the level of inhibition threat and the aesthetic index scores is significant near p=.05.

3. One measure of aggression is significantly related to the kind of threat. However, neither measure of aggression is significantly related to the level of either anticipation or inhibition threat.

4. None of the measures of information seeking is significantly related to the level of either anticipation or inhibition threat.

---

[1] Eldon G. Bowman, "The Grizzly Bear in the National Parks: Part I," American Forests, 75:7 (July, 1969), 57.

A measure of anxiety about grizzly bears was included among the tests. The relationships between the various variables and anxiety are described and the meanings interpreted in the discussions of each hypothesis. However, the major discussion of the meaning of the results and their importance for management and theory is reserved for the last chapter.

Null hypotheses are rejected when the probability of observed relationships is less than or equal to .05 when the null hypothesis is true. Because the research reported here concerns a topic about which theory is not well developed, a more appropriate significance level might have been .1 or even some greater probability.

The appropriate level of significance could be estimated if the willingness of resource managers to accept the chance of adopting recommendations based on relationships thought to exist when they do not could be determined. Such information is not known by the experimenter and, perhaps, is not known by the resource managers themselves. Consequently, the .05 significance level is selected because it is "conventional" in social science research. However, because some readers may have better estimates of the number of times they can afford to be wrong in rejecting the null hypothesis, observed probabilities are reported. The readers, therefore, can reinterpret the results according to their own requirements.

Descriptive Statistics

Anxiety Index

The Zuckerman Affect Adjective Check List index of anxiety[2] has a possible range of 21. Subjects' scores range from 0 to 17. The median score is eight; the mode is nine (see Figure 3).

Anxiety Index Score	Per Cent of Subjects Assigned the Score
0 - 2	XXXXX (5%)
3 - 5	XXXXXXXXXXXXXXX (16%)
6 - 8	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX (33%)
9 - 11	XXXXXXXXXXXXXXXXXXXXXXXXXXXXX (32%)
12 - 14	XXXXXXXXXX (10%)
15 and Greater	XXXX (4%)

Figure 3.--Histogram of scores on the anxiety index for 78 subjects in the experiment, 1974.

Safety Index

The safety index has a possible range from one to six. The minimum score observed is two and the maximum is six. The median score is 4.6 and the mode is 5.0 (see Figure 4).

Aesthetic Index

The aesthetic index also has a range from one to six. The minimum score observed is 1 and the maximum is 4.75. The range of

---

[2]Marvin Zuckerman, "The Development of an Affect Adjective Check List for the Measurement of Anxiety," Journal of Counsulting Psychology, 24:5 (Oct., 1960), 457-462.

Safety Index Score	Per Cent of Subjects Assigned the Score
< 2.0 - 2.0	X (1%)
2.1 - 3.0	XXXXXXXX (8%)
3.1 - 4.0	XXXXXXXXXXXXXXXXXXXXXXXXXXX (28%)
4.1 - 5.0	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX (39%)
5.1 - 6.0	XXXXXXXXXXXXXXXXXXXXXX (24%)

Figure 4.--Histogram of scores on the safety index for 78 subjects in the experiment, 1974.

subjects' scores is 3.75. The median score is 2.5 and the mode is 2.0 (see Figure 5).

Aesthetic Index Score	Per Cent of Subjects Assigned the Score
1.0 - 1.9	XXXXXXXXXXXXXXXXX (26%)
2.0 - 2.9	XXXXXXXXXXXXXXXXXXXXXX (45%)
3.0 - 3.9	XXXXXXXXXXX (24%)
4.0 - 4.9	XXX (5%)

Figure 5.--Histogram of scores on the aesthetic index for 78 subjects in the experiment, 1974.

Aggression

The first measure of aggression, Aggression I, is a dichotomous variable. Subjects are scored either as aggressive or as not aggressive. Eighty-three per cent (83%) of the subjects in the experiment scored as aggressive. The remainder, 17 per cent, scored as not aggressive.

The second measure of aggression, Aggression II, has a possible range from one to six. The minimum score observed is one and the maximum is four. The range of observed scores is three. The median score is two and the mode is three (see Figure 6).

Aggression II Score	Per Cent of Subjects Assigned the Score
1	XXXXXXXXXXXXXXXXXXXXXXXXX (27%)
2	XXXXXXXXXXXXXXXXXXXXXXXXXXXX (31%)
3	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX (36%)
4	XXXXXX (6%)

Figure 6.--Histogram of scores on the Aggression II scale for 78 subjects in the experiment, 1974.

Information Seeking

There are four measures of information-seeking behavior. The first of these is completion at the end of the experiment of a form requesting further information about grizzly bears. Twenty-nine per cent of the subjects completed the form.

In the second measure, subjects are asked, "Since you participated in the experiment last week, have you looked for more information about grizzly bears?" Only three per cent of the subjects reported looking for more information.

In the third measure, subjects are asked, "Since you participated in the experiment last week, have you thought about how to avoid a grizzly bear attack or what you would do if you were attacked?" Of

78 subjects, 65 per cent responded that they had thought about how to avoid or survive an attack; 35 per cent had not.

In the last measure of information seeking, subjects were asked, "Since last week, have you discussed the experiment with your classmates?" Of 78 subjects, 36 per cent had discussed the experiment; 64 per cent had not.

Hypothesis One

When anticipation threat is used, subjects exposed to higher levels of threat will evaluate the grizzly bear as more dangerous than will subjects exposed to lower levels of threat. The level of threat will not be related to evaluations of grizzly bear aesthetics.

When inhibition threat is used, subjects exposed to higher levels of threat will evaluate the grizzly bear as more dangerous and less aesthetic than will subjects exposed to lower levels of threat.

The Test

The set of observations was partitioned into those subjects exposed to the anticipation threat and those exposed to the inhibition threat. The relationships between the level of each kind of threat and the scores on the safety and aesthetics indexes were evaluated with the Kruskal-Wallis test for "analysis of variance" by ranks.[3] The test assumes an ordinal measure of a continuous variable (the safety and aesthetic indexes) and a nominal measure (the level of threat).

---

[3]John Morris, Nonparametric Chi-Square Tests and Analysis of Variance, Technical Report 42 (East Lansing, Michigan: Michigan State University Computer Institute for Social Science Research, June 1, 1966).

Assignment of treatments to subjects is assumed to be at random. The assumptions of the test are met by the data used and by the experimental design.

The Results

When anticipation threat is used, no significant differences in distributions of ranks is observed among the levels of threat for either the safety index scores or the aesthetic index scores. The probability of a value of the statistic (H) equal to or greater than that observed for the safety index is .69. For the aesthetic index, it is .55.

When inhibition threat was used, there was no significant difference among the distribution of ranks for the safety index scores among the three levels of threat. The probability of a value for the statistic (H) equal to or greater than that observed is .88. However, the differences among the distributions of ranks was significant at $p = .06$ for the aesthetic index scores (see Table 4).

Anxiety Arousal

The lack of a significant relationship between the level of threat and the evaluations of the relative safety of the grizzly bear might be explained by a failure of the messages to arouse differential anxiety about grizzlies. To investigate that possibility, the Affect Adjective Check List developed by Zuckerman was incorporated among the measurements.[4] The index is effective in measuring anxiety at a

---

[4]Marvin Zuckerman, "The Development of an Affect Adjective Check List," op. cit.

TABLE 4.--The Average Rank of the Aesthetic Index Scores by Level of Threat Under Anticipation and Inhibition Threat.

Kind of Threat	Level of Threat		
	Strong	Medium	Mild
Anticipation Threat	28.39	23.07	24.59
Inhibition Threat	28.38	18.26	27.47

Anticipation Threat: H = 1.20, df = 2, Sig. = .55
Inhibition Threat: H = 5.74, df = 2, Sig. = .06

point in time as well as generally depending on the wording of the instructions. Subjects were instructed to check the affect adjectives that described, ". . . how you feel now"[5] (see Table 5).

TABLE 5.--The Average Rank of the Anxiety Index Scores by Level of Threat Under Anticipation and Inhibition Threat.

Kind of Threat	Level of Threat		
	Strong	Medium	Mild
Anticipation Threat	25.36	29.50	22.12
Inhibition Threat	29.73	25.21	17.50

Anticipation Threat: H = 2.07, df = 2, Sig. = .36
Inhibition Threat: H = 5.91, df = 2, Sig. = .05

[5] Ibid., p. 462.

The different levels of anticipation threat apparently did not vary significantly in the degree of anxiety they aroused. Under inhibition threat, however, the scores on the anxiety index varied directly with the level of threat. The differences between levels were significant at p = .05 when the relationship was tested with the Kruskal-Wallis test, and at p = .03 when the relationship was tested with the medians test.[6] The results of the medians test are presented in Table 6.

TABLE 6.--The Percentages of Anxiety Scores Above and Below the Median for Each Level of Threat Under Inhibition Threat.

Anxiety Level	Level of Threat		
	Strong	Medium	Mild
Above Median Anxiety	69.23%	52.63%	20.00%
Below Median Anxiety	30.77%	47.37%	80.00%
	100.00%	100.00%	100.00%

Chi Square = 7.21, df = 2, Sig. (two-tailed) = .03

The Kendall rank order correlation coefficient[7] was calculated to test the null hypothesis that no relationship existed between the level of anxiety and the safety and aesthetic index scores. The

[6]Morris, Nonparametric Chi-Square Tests and Analysis of Variance, op. cit.

[7]Computer programs to calculate statistics were all contained in the SPSS-6000 package used by the Computer Laboratory at Michigan State University, May through July, 1974, unless specifically noted.

Kendall method was selected in preference to the Spearman method because there are large numbers of ties within the ranks of the variables.

When all treatments are considered together, the correlation coefficient between the anxiety score and the safety score is .16. That value is significant at $p = .02$. When the relationships are analyzed by kind of threat, the correlation coefficient between the anxiety score and the safety score under inhibition threat is .24, significant at $p = .02$. Under anticipation threat, the correlation coefficient is .26, significant at $p = .007$. Note that N is approximately halved when the relationships are analyzed by kind of threat.

The correlation coefficient between anxiety and aesthetic scores when all treatments are considered together is -.09, not significant at $p \leq .05$ ($p = .12$). Under inhibition threat alone, the correlation coefficient is -.05, again not significant at $p \leq .05$ ($p = .35$). Under anticipation threat, the correlation coefficient is -.03, also not significant at $p \leq .05$ ($p = .38$).

The results clearly indicate a relationship between anxiety and the safety index scores. As anxiety increases, the grizzly bear is evaluated as more dangerous. The correlation coefficient between anxiety and the aesthetic index scores is not significant. The rank order correlation coefficient essentially tests for a monotonic relationship, however, and a nonmonotonic relationship between the level of threat and aesthetic index scores is indicated by the results displayed in Table 4 for inhibition threat. The relationship between the level

of anxiety and the aesthetic index score is displayed in a scatter diagram presented in Figure 7.

Aesthetic Scores and Safety Scores

The aesthetic index scores and the safety index scores were predicted to be unrelated on the assumption that the nature of communications about the grizzly seldom concerned both characteristics. The Kendall rank order correlation coefficient between the two variables is significant, however (tau = .25, Sig. = .001). The hypothesis that no relationship exists between the safety and aesthetic evaluations of the grizzly bear must be rejected. Apparently, safety index scores and aesthetic index scores vary directly.

Interpretation

Neither the level of anticipation threat nor the level of inhibition threat is associated significantly with the safety index score for the grizzly bear. Stronger threat appeals in bear management communications probably will not be associated with reevaluations of the grizzly as more dangerous by the receivers of the messages. One of the arguments used to support the suggestion to use stronger threat, therefore, appears to be without basis.

The relationship observed between the level of inhibition threat and evaluations of the aesthetics of the grizzly bear is nearly significant at p = .05. One can conclude that as the level of inhibition threat increases, the grizzly is at first evaluated as more aesthetic and then as the threat increases from medium to strong, reevaluated as less aesthetic. Although there is a relationship between

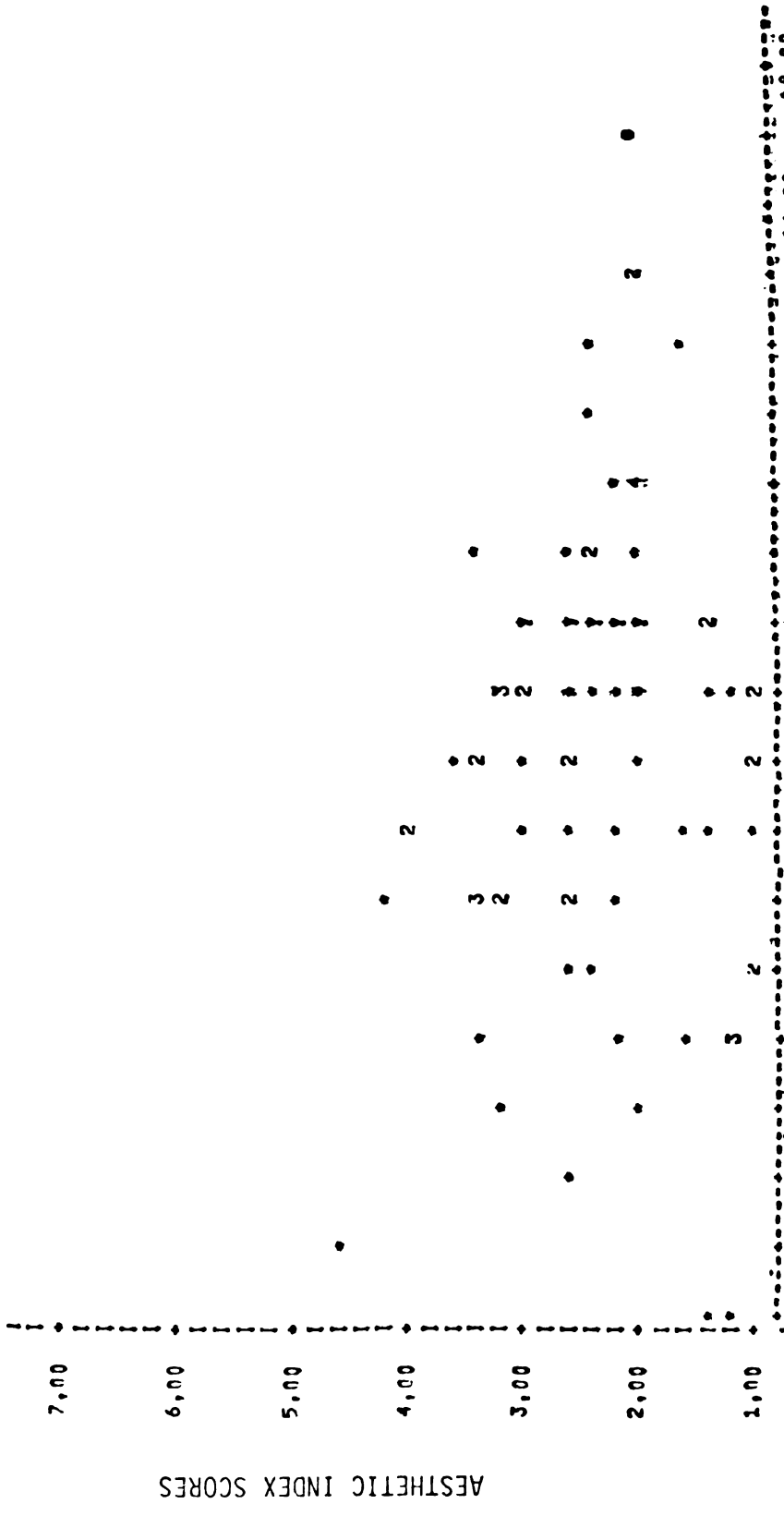


Figure 7.--A scatter diagram relating anxiety scores to scores on the aesthetic index. The distribution illustrates the possibility of a nonmonotonic relationship between the variables.

the level of inhibition threat and the aesthetic index score, increases in the level of threat within the ranges explored is apparently not associated with a reevaluation of the grizzly as less aesthetic. The average rank of the strong threat was about that of the mild threat.

It appears that the use of inhibition threat would not reduce the value of the grizzly bear to the users of the national parks. The increase in the degree to which the grizzly is seen as aesthetic as threat increases from mild to medium is unexpected. The messages used increased in the detail and gruesomeness of the detail of the attack described. There is no increase in the descriptors of the aesthetics of the bear. The evaluation of the bear as more aesthetic might represent some kind of compensation phenomenon or denial. As the threat increases, the subject may "deny" the gruesomeness of the description by describing the bear as more aesthetic.

Hypothesis Two

When inhibition threat is used, the amount of aggression displayed by subjects will vary directly with the level of threat. When anticipation threat is used, no relationship between the level of threat and aggression will be observed.

The Test

Two measures of aggression are used. The first, Aggression I, is a nominal measure in which subjects are classified either as aggressive or not aggressive. The second measure, Aggression II, is an index of six levels. The level of threat is ordinal with three

levels. The relationship between the level of threat and aggression is elaborated by kind of threat.

The chi square test is used to evaluate the relationship between the level of threat and the measures of aggression and between the kinds of threat and aggression. The Kruskal-Wallis test for "analysis of variance" by ranks was used to test the relationship between the measures of aggression and anxiety.[8]

The Results: Aggression I

No significant relationship was observed between the level of threat and Aggression I under either anticipation or inhibition threat. Under anticipation threat, the chi square value is 1.37, significant at $p = .51$ with two degrees of freedom. Under inhibition threat, the chi square value is .54, significant at $p = .76$ with two degrees of freedom.

Aggression I did not differ significantly between kinds of threat. The relationship between the kind of threat and Aggression I is illustrated in Table 7. It is significant at $p = .84$.

Anxiety and Aggression I.--No significant relationship was observed between Aggression I and the level of anxiety ($H = .026$). With one degree of freedom, the relationship is significant at $p = .87$. Therefore, the null hypothesis that no relationship exists cannot be rejected.

---

[8]Morris, Nonparametric Chi-Square Tests and Analysis of Variance, op. cit.

TABLE 7.--A Table of Percentages to Illustrate the Relationship Between the Kind of Threat and Aggression I Scores.

Aggression I	Kind of Threat		Row Total Percentages
	Inhibition	Anticipation	
Yes	85.7%	81.4%	83.3%
No	14.3%	18.6%	16.7%
	100.0%	100.0%	100.0%

Chi Square = .041, df = 1, Sig. = .84

The Results: Aggression II

When the kind of threat is controlled, no significant relationship between the level of threat and Aggression II is observed. Under inhibition threat, the value of chi square is 5.94, significant at $p = .43$, two-tailed test, with six degrees of freedom. Under anticipation threat, the value of chi square is 2.33, significant at $p = .68$, two-tailed test, with four degrees of freedom.

However, the relationship between the kind of threat and the Aggression II scores is significant. Subjects exposed to inhibition threat are significantly more aggressive towards grizzly bears than are subjects exposed to anticipation threat. The value of chi square is 9.06 which is significant at $p = .03$, two-tailed test, with three degrees of freedom. The relationship is illustrated in Table 8.

Anxiety and Aggression II.--The relationship between Anxiety II and the level of anxiety was not significant ($H = 2.93$). With three degrees of freedom, the relationship is significant at $p = .40$. It can

TABLE 8.--A Table of Percentages to Illustrate the Relationship Between the Kind of Threat and Aggression II Scores.

Kind of Threat	Level of Aggression II			
	High	High Medium	Low Medium	Low
Inhibition	100.0%	42.9%	29.2%	52.4%
Anticipation	0.0%	57.1%	70.8%	47.6%
	100.0%	100.0%	100.0%	100.0%

Chi square = 9.06, df = 3, Sig. = .03
Cramer's V = .34

be concluded that the willingness to restrict the range of the grizzly bear probably is not associated with the level of anxiety about the grizzly.

Interpretation

The level of threat apparently does not influence the aggressiveness of the subject towards the grizzly bear under either kind of threat. However, subjects exposed to inhibition threat are more aggressive towards grizzlies than subjects exposed to anticipation threat. The difference cannot be explained by the level of anxiety; the level of anxiety is not significantly related to the measure, Aggression II. The results, therefore, appear to provide convincing evidence for the existence of two kinds of threat. The effects on aggression are in the direction predicted.

Hypothesis Three

When anticipation threat is used, the likelihood that a subject will seek further information about grizzly bears will increase with the level of threat. When inhibition threat is used, the likelihood that a subject will seek further information about grizzly bears will decrease as the level of threat increases.

The Test

The relationship between the level of threat and information-seeking behavior is evaluated with the chi square test, elaborating by the kind of threat. Information-seeking behavior was measured by requests for further grizzly bear information at the experiment and by reports by the subjects of; (a) looking for more grizzly bear information, (b) thinking about what to do to avoid or survive an attack, and (c) talking with classmates about the experiment. The level of threat is measured as it has been throughout the experiment.

The Results

None of the observed relationships is significant at $p = .05$. The significance levels and the chi square values for the relationships between the level of threat and the various measures of information seeking under each of the two kinds of threat are displayed in Table 9.

Information seeking did not vary significantly with the kind of threat. The relationship between requesting further information about grizzly bears immediately following the experiment and the kind of threat is significant at $p = .93$, chi square = .008, two-tailed

TABLE 9.--The Significance Levels and Chi Squares for the Observed Relationships Between the Level of Threat and the Various Measures of Information Seeking Under Each Kind of Threat.

Measures of Information-Seeking-Behavior	With Level of Threat by Kind of Threat	
	Inhibition	Anticipation
Completed request form for pamphlet on grizzly bears.	significance = .65 chi square = .848, df = 2	significance = .22* chi square = 2.95, df = 2
Looked for more information about grizzlies in week following experiment.	significance = .33 chi square = 2.25, df = 2	significance = .38 chi square = 1.91, df = 2
Thought about what to do to avoid or survive an attack during the week following the experiment.	significance = .30** chi square = 2.44, df = 2	significance = .83 chi square = .365, df = 2
Talked with classmates about grizzlies in the week following the experiment.	significance = .83 chi square = .372, df = 2	significance = .83 chi square = .364, df = 2

*Significant at p = .11 with a one-tailed test. The relationship is in the direction predicted.

**Significant at p = .15 with a one-tailed test. The relationship is in the direction predicted.

test with one degree of freedom. The relationship looking for more information during the week following the experiment and the kind of threat is significant at p = .57, chi square = .328, two-tailed test with one degree of freedom. The relationship between talking with classmates about the experiment and the kind of threat is significant at p = .66, chi square = .197, two-tailed test with one degree of freedom. Finally, the relationship between the kind of threat and thinking about how to avoid or survive an attack is significant at p = .21, chi square = 1.57, two-tailed test with one degree of freedom. Because the relationship is in the direction predicted, the appropriate test is one-tailed. With a one-tailed test, the probability of the chi square is halved. The relationship is significant, therefore, at p = .1.

Combined Measures of Information Seeking.--A variable called, "info" was formulated by counting the number of information-seeking activities reported by the subject. A second combined measure was formed by scoring the subject as "1" if any information-seeking behavior was reported and as "0" if no information seeking was reported. The chi square test was used to evaluate the relationship between the combined measures of information seeking and the level of threat under each kind of threat and between the measures and the kind of threat.

None of the relationships evaluated was significant at a probability equal to or less than .05. In addition, neither measure was significantly related to the level of anxiety.

Anxiety and Information Seeking

The level of anxiety is significantly related to one measure of information seeking: thinking about how to avoid or survive an attack. The relationship was significant at $p = .009$, chi square = 6.80, two-tailed test with one degree of freedom. None of the other measures of information seeking was significantly related to anxiety.

Interpretation

Neither the level of anticipation threat nor the level of inhibition threat was associated with any of the measures of information seeking. Should the National Park Service decide to use stronger threat appeals, they probably would not reduce the amount of information-seeking behavior. Neither would they increase it.

Subjects scoring higher on the anxiety index were significantly more likely to report thinking about how to avoid or survive an attack than were subjects who scored lower on that index. Thinking about the attack was initially included as a measure of information seeking. However, inspection of the relationships described in Table 9 suggest it is a different kind of variable. Asking for the pamphlet at the end of the experiment is more significantly related to anticipation threat than to inhibition threat. Thinking about how to avoid or survive an attack, on the other hand, is more significantly related to inhibition threat than to anticipation threat.

Rather than influencing the amount of information seeking that a subject engages in, the kind of threat may influence the kind of information an individual seeks. Inhibition threat may motivate

the subject to rely on his own resources and to practice the defenses he already knows while anticipation threat may motivate the subject to seek other information from other sources. The relationships observed in this experiment are not strong enough to draw any such conclusion here, however.

Summary of Findings

Hypothesis One

No significant relationship between the level of threat and the safety index scores was observed under either the inhibition threat or the anticipation threat. Under anticipation threat, the level of threat was not significantly related to scores on the aesthetic index. However, under inhibition threat, the relationship is significant at $p = .06$. As the level of threat increases, the grizzly is first evaluated as more aesthetic and then as less aesthetic when threat is increased from medium to strong.

Anxiety scores are significantly related to the level of inhibition threat but not to the level of anticipation threat. As the level of inhibition threat is increased, the level of anxiety increases monotonically.

Scores on the safety index vary directly with anxiety scores but scores on the aesthetic index do not. The relationship between anxiety and the aesthetic index score may be nonmonotonic in which case the rank order correlation would not detect the relationship.

Scores on the aesthetic index and scores on the safety index are significantly related and vary directly. When the grizzly bear is seen as more dangerous, it is also seen as less beautiful.

Hypothesis Two

The level of threat is not significantly related to the subject's desire to restrict the range of the grizzly bear under either inhibition or anticipation threat. However, this measure of aggression is significantly related to the kind of threat. Subjects exposed to inhibition threat would restrict the range of grizzly bears more than would subjects exposed to anticipation threat ($p = .03$ [two-tailed], $p = .01$ [one-tailed]). Neither measure of aggression was significantly related to anxiety levels.

Hypothesis Three

No significant relationships were observed between the level of threat and the several measures of information seeking. The most improbable relationship observed was between the level of threat and the completion of a request for more information immediately after the experiment ($p = .11$, one-tailed). The direction was as predicted.

A significant difference was observed between the level of anxiety and the likelihood of thinking about how to avoid or survive an attack. More anxious subjects were more likely to report thinking about how to avoid or survive an attack during the week following the experiment than were less anxious subjects ($p = .009$). The observed significant relationship is opposite that predicted.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

> The most important factor (affecting persuasiveness), however, seems to be the degree to which defensive reactions occur when emotional tension is strongly aroused. . . . The alleged dangers may thus be so horrible to contemplate that the audience, regardless of evidence, refuses to consider them or to take them seriously.[1]

Summary

The Problem

Grizzly bears are a threat to recreators using the wilderness and primitive areas of the Northern Rocky Mountains. The grizzly is a rare species and the destruction of the bear or its confinement in special reserves is undesirable. On the other hand, land managing agencies cannot tolerate even the relatively few grizzly attacks on hikers and campers that occur.

Attacks often appear to be the result of inappropriate behavior by the human victim before or during an encounter. Some of these behavioral mistakes may be the result of the image of the grizzly as only slightly dangerous. Communication that persuades the user that grizzly bears are dangerous may be one way of reducing the probability of attacks.

---

[1]Arthur R. Cohen, Attitude Change and Social Influence (New York: Basic Books, Inc., 1964), pp. 17-18.

The Management Question

Intuitively, one can be persuaded that grizzly bears are dangerous if one is exposed to strong threat describing the gruesome consequences of an attack. Research on threat appeals has resulted in contradictory descriptions of relationships between the level of threat and persuasion, however. There is evidence that high threat may be associated with aggression and defensive avoidance which interfere with persuasion, but some researchers have reported a direct relationship between threat and persuasion.

The management questions which inspired the project of which the dissertation is a part are: "Should stronger threats be used in messages warning of the hazards of grizzly bears?" "Will stronger threat result in perception of the grizzly as more dangerous?" "Will stronger threat result in the bear being less valued aesthetically?" "Will stronger threat result in aggression towards the agency, the bear, or other people?" "Will stronger threat interfere with exposure to further information about grizzlies?"

The Hypotheses

Three hypotheses relating the level of threat to evaluation of the safety and aesthetics of grizzlies, aggression, and information-seeking behavior are evaluated. Two kinds of threat are manipulated: anticipation threat and inhibition threat.

Anticipation threat is manipulated by modifying the subjective probability that a threatened event will occur. Inhibition threat is manipulated by modifying the descriptions of the magnitude of the gruesome, undesirable consequences of the threatened event.

Hypothesis One.--When anticipation threat is used, subjects exposed to higher levels of threat will evaluate the grizzly bear as more dangerous than will subjects exposed to lower levels of threat. The level of threat will not be related to evaluations of grizzly bear aesthetics.

When inhibition threat is used, subjects exposed to higher levels of threat will evaluate the girzzly bear as more dangerous and less aesthetic than will subjects exposed to lower levels of threat.

Hypothesis Two.--When inhibition threat is used, the amount of aggression displayed by subjects will vary directly with the level of threat. When anticipation threat is used, no relationship between the level of threat and aggression will be observed.

Hypothesis Three.--When anticipation threat is used, the likelihood that a subject will seek further information about grizzly bears will increase with the level of threat. When inhibition threat is used, the likelihood that a subject will seek further information about grizzly bears will decrease as the level of threat increases.

The Results

1. Scores on the safety index are not significantly related to the level of either anticipation or inhibition threat.

2. Scores on the aesthetic index are not significantly related to the level of anticipation threat but the relationship between the level of inhibition threat and the aesthetic index scores is significant near $p = .05$. As threat increases, the bear is evaluated as more aesthetic and then, at the highest level, as less aesthetic.

3. Anxiety scores are significantly and directly related to the level of anticipation threat. Scores on the safety index vary directly with anxiety scores, but scores on the aesthetic index do not.

4. One measure of aggression is significantly related to the kind of threat. However, neither measure of aggression is significantly related to the level of either anticipation or inhibition threat. Inhibition threat is associated with more aggression than is anticipation threat.

5. Neither measure of aggression is significantly related to the level of anxiety.

6. None of the measures of information seeking is significantly related to the level of either anticipation or inhibition threat.

7. Subjects reporting higher levels of anxiety are significantly more likely to report thinking about how to avoid or survive an attack than are subjects reporting lower levels of anxiety.

Conclusions

1. Stronger threat appeals for bear management communications cannot be recommended on the basis of the results of the experiment reported here. There is no evidence that stronger levels of threat will result in a reevaluation of the grizzly bear as more dangerous. On the other hand, there is evidence that the use of explicit, gruesome detail about the results of a grizzly bear attack may be associated with increased aggression towards the grizzly.

Probably, nothing is gained by employing stronger threat. If aggression towards the grizzly is aroused, the proposals to eliminate the grizzly from the national parks or to severely restrict their range may find greater acceptance among the public. If that public attitude is translated into political action, the National Park Service may find the discharge of the responsibilities assigned them more difficult. Instead of advancing the program of the National Park Service, the use of stronger threat may, in fact, frustrate it.

2. The use of stronger threat in the lower levels, at least, will not result in reevaluations of the grizzly as less aesthetic. In fact, there appears to be a compensation effect. As the level of inhibition threat increases, the evaluations of the aesthetics of the grizzly bear improved. When the level of inhibition threat was

increased even further, however, the grizzly was seen as less aesthetic again. Nevertheless, the scores on the aesthetic index were generally below the mean of the scale for all levels of threat, indicating that the grizzly was evaluated as more aesthetic than unaesthetic regardless of the level of threat.

3. The significant difference observed between inhibition threat and anticipation threat with regard to the measure of aggression towards grizzlies supports the hypothesis that there are two kinds of threat appeal. The two kinds of threat aroused different levels of anxiety, but the level of anxiety did not explain aggression towards the grizzly. Therefore, one can conclude that inhibition threat, emphasizing the gruesome and unpleasant consequences of an event, is associated with more aggression than is anticipation threat, emphasizing the probability that an attack will occur.

Aggression was not observed to vary significantly with the level of either kind of threat. Most threat messages employed in fear appeal research have employed both kinds of threat to some degree. Perhaps the apparently conflicting findings concerning the effects of the level of threat on persuasion can be resolved by considering the interaction between inhibition threat and anticipation threat.

4. Although there is a significant, direct relationship between the level of inhibition threat and the level of anxiety and a significant direct relationship between anxiety and evaluations of the grizzly bear as more dangerous, the level of threat is not significantly related to evaluations of the safety of the grizzly. This apparently illogical combination of relationships is explained by the

fact that none of the variable pairs is highly correlated. Only part of the variability of the anxiety score is explained by the variation of the level of threat or the variation of the safety index score.

This suggests the anxiety about grizzly bears and the judgments about their relative safety are rooted in experiences beyond the bear management messages. In other words, what the visitor learns about the nature of grizzly bears during their visit to the national park may be a very small part of what they know about the bear. The image of the bear may be stable and difficult to modify.

Certainly, people are subjected to a great deal of information about bears. Children grow up from infancy with teddy bears for companions. Smokey Bear urges people to protect the forest and the animals dwelling there from fire. Cartoons feature bears. Children's stories include bears as heroes. Grizzly bears are depicted as pets in beer commercials; zoos and circuses display bears performing comic antics.

One can conclude that the problem of persuading the visitor to the national park that grizzly bears are dangerous is not a straightforward task. An adequate bear warning program will require careful planning and the employment of the most effective persuasive appeals. Message construction and the development of communication tactics requires more than the communication skills ordinarily possessed by natural resource managers if they are to succeed.

Recommendations

Further Research

Perhaps the most important conclusion for persuasion theory research as a result of this research is that there are two kinds of threat appeal with different effects. The evidence is sufficiently compelling to suggest the various messages used in threat appeal research to date be content analyzed to determine the relative degree to which each contains an emphasis on the gruesome consequences of the threatened event as opposed to an emphasis on the probability that the threatened event will occur. It would be relatively straightforward, if time-consuming, to test the hypothesis, suggested by Higbee, that those studies finding a direct relationship between the level of threat and persuasion have a higher percentage of references to the probability of the threat occurring, while the studies finding an inverse relationship have a higher percentage of references to the gruesome consequences of experiencing the threat.

There may be an optimum combination of the two kinds of threat in a persuasive message. An experiment which varies the level of anticipation threat and the level of inhibition threat together would be particularly useful. If the threat seems unlikely, it may be possible for the subject to dismiss it even if the consequences of the threatened event would be very unpleasant. If nothing is said about the probability of the threat in the message, the subject may assign it a low probability. On the other hand, if the threat is described as very probable but nothing is said about the gruesomeness

of the threat, the subject may not believe it to be very unpleasant. A mild threat would be one both unlikely and not very gruesome, while a strong threat would be very likely and very gruesome.

It might be profitable to test a number of the hypotheses advanced in the literature to explain the inverse relationship between the level of threat and persuasion as well as the central relationship itself under this new operation of the level of threat. It should be relatively simple to measure a subject's subjective probability of experiencing the threat. A measure of perceived gruesomeness will be more difficult, but some physiological responses as well as reports of feeling "nausea" and other manifestations of negative affect might be used.

Thinking about how to avoid or survive an attack was observed to be more significantly related to inhibition threat than to anticipation threat, while asking for further information was more significantly related to anticipation threat than to inhibition threat. See Table 9. Although neither of these relationships is significant at $p \leq .05$, thinking about how to avoid or survive an attack is directly and significantly related to the level of anxiety.

When considered in light of earlier findings by Janis and Feshbach[2] and by Janis and Milholland,[3] this relationship suggests a reinterpretation of the defensive avoidance concept. Janis and

---

[2]Janis and Feshbach, "Effects of Fear-Arousing Communications," op. cit., p. 78.

[3]Irving L. Janis and W. Milholland, "The Influence of Threat Appeals on Selective Learning of the Content of Persuasive Communications," Journal of Psychology, 37:1 (January, 1954), pp. 75-80.

Feshbach hypothesized that attempts to avoid thinking about the threat would be associated with high anxiety. The results of this research contradict that hypothesis. High anxiety was more likely to be associated with thinking about how to avoid or survive an attack.

Other research by Janis and Milholland indicates high threat tends to be related with attention to and recall of unfavorable consequences associated with the threat while minimum threat is related to attention to and recall of causes of the threat. No differences are noted in the amount learned.

Taken together, the results of these three studies suggest that rather than motivating the subject to actively avoid further communication and thought about the threatening event, increased anxiety, generated by inhibition threat, results in a preoccupation with the gruesome consequences of the threat sufficiently intense to preclude attention to other information. The importance of this slight adjustment in the definition of "defensive avoidance" is that subjects will not reject further communications, irrespective of their nature. However, the kind of communication to which they will attend probably will deal with the gruesome consequences. Thus, recommendations that instruct one in how to avoid the event (reduce its probability) might be ignored, while recommendations relating to the gruesome consequences might be appealing.

If the intention of the message were to persuade the subject to adopt measures to reduce the probability of experiencing a threat, the proper kind of threat to use would be anticipation threat. If, on the other hand, the intention were to persuade the subject to adopt

some procedure for adapting to or recovering from the gruesome consequences, inhibition threat might be the appropriate kind of threat to use. Research combining kinds of threat with kinds of recommendations is needed.

The association between inhibition threat and aggression and the large percentage of subjects who agreed to aggressive foils in the Aggression I index leads to the hypothesis that the use of strong threat may result in a reevaluation of the agency's credibility by people exposed the messages. One way of expressing hostility is to attack the perceived source of the hostility and one way to do that is to consider the source less trustworthy. The fact that very few wild land recreators encounter grizzly bears would reinforce the feeling that the threats, especially the strongest threats, were deliberate exaggerations.

Research which investigates the effects of the use of strong threat appeals on receiver evaluation of the credibility of the source should be conducted. Given its dubious value in persuasive messages, should strong threat endanger source credibility as well as encourage aggressiveness, there would be good reason to abandon threat appeal generally in favor of other communications tactics.

Bear Hazard Communications

The National Park Service should not use strong threat appeal in bear hazard communication. The use of non-threat motivation should be considered, perhaps in messages to the visitor before he or she arrives at the park.

The problem of persuading the visitor to the national parks to believe that bears are dangerous and to adopt recommended behavior patterns is not easily solved. Visitor images of bears probably are well developed and based on a pervasive myth frequently indirectly reinforced by communications and cultural events.4 The communication environment of the national park is not conducive to persuasion. Finally, visitors are not motivated within the recreation setting to accept persuasion or instruction. Therefore, the National Park Service should support the development of an effective communication program warning of the hazards of bears based on recreation and communication theory and research.

The visit to a national park is a relatively uncommon event in the life of most individuals. Consequently, when a visit is made, the visitor is likely to be unfamiliar with the availability and location of facilities and services and a myriad of other survival needs. The visitor is in need of information and must attend to signs, maps, and recommendations about food, lodging, restrooms and routes. Typically, park regulations and information about bears and other dangers are distributed along with a map of the park and a list of services. The visitor, impatient to get on with his visit, must select what he will attend to. The information about grizzly bears is likely to receive low priority when compared with information on where one can eat and spend the night.

Other stimuli compete for the visitor's attention. National parks have spectacular scenery, intriguing history, and interesting wildlife and geologic phenomena. The list of park regulations and

the bear warning messages must also compete for attention with Old Faithful, Yosemite Falls, the Grand Canyon, and chipmunks.

In addition, the visitor to the park may be motivated to ignore regulations and instructions that emphasize his responsibility either to the park or other people. Catton has concluded, on the basis of a review of research about recreation behavior, that, "One important motivation for camping seems to be the desire to escape the usual necessity for considering the consequences of one's actions. Campgrounds are thought to be environments which permit such abrogation of responsibility." The abrogation of responsibility apparently also leads to a view of the campground as essentially free from risk.[4] Catton also identifies the desire to find out how well one can do on one's own as an important motivation. "The challenge lies not merely in coping physically with the uncertainties posed by the environment, but also in coping with its intellectual problems."[5] A visitor with these motivations perhaps arrives at the park knowing all that he feels he needs to know or wants to know and will not be receptive to efforts to further instruct him.

Above all, people visit national parks to enjoy themselves. Anxiety probably detracts from that enjoyment when aroused above the range within which it constitutes an optimum level of uncertainty. If threat messages about bears arouse excessive anxiety or if the

---

[4]William R. Catton, Jr., "The Recreation Visitor: Motivation, Behavior, Impact," in Recreational Use of Wild Lands, by C. Frank Brockman and Lawrence C. Merriam, Jr. (New York: McGraw Hill, Inc., 1973), pp. 86-87.

[5]Ibid., p. 85.

visitor thinks they will, the messages will be avoided. If the visitor arrives at the park with the intention of backpacking, having made a considerable investment in time, money, and, perhaps, ego, and learns that bears are a threat, he may be unwilling to learn more about the threat for fear that he will be forced to abandon his plans at considerable cost and embarrassment.

The difficulties of communication about threats like bears within the national park seem overwhelming and the probability of success small. Fortunately, the recreation experience extends beyond the confines of the park and encompasses times in which the visitor would be receptive to messages that inform him of the threat of bears and of the proper behaviors while hiking and camping in grizzly country. These periods should be exploited by the Park Service.

The recreation experience has been divided into five parts by Clawson and Knetsch: anticipation, travel to, on-site experiences, travel from, and reflection.[6] During the traveling and on-site phases, the visitor is busy and the demands for his attention are great. They are not good times to try to communicate with the recreator.

The anticipation phase is the planning phase. In the case of a visit to a national park, it may last months or even years.[7] During anticipation, the visitor may seek information about the park he plans

---

[6]Marion Clawson and Jack L. Knetsch, Economics of Outdoor Recreation (Baltimore: The Johns Hopkins Press, 1966), pp. 33-36.

[7]About thirty-five per cent (34.59%) of the visitors to Glacier National Park surveyed in 1973 had planned the visit more than one month.

to visit or about wild land recreation in general. The important point is that during anticipation, the visitor is open to information about the area he expects to visit.

The recollection phase is equally long or longer. The recollection of one visit to a national park may blend with the anticipation of another visit to the same park or to another park. During the recollection portion of the recreation experience, the visitor reviews his experiences. He may talk about them with others, perhaps illustrating the talk with photographs or momentos. Articles and television specials that remind the visitor of the experiences he enjoyed during his vacation should be attractive and be effective vehicles for instructions on how to behave safely as a wild land recreator.

The optimum time and place to communicate with the visitor about how to behave properly in grizzly country is not at the park but at home before or after the vacation. The National Park Service, perhaps in cooperation with other agencies interested in natural resource and environmental education such as the Smithsonian Institution, should sponsor a regularly broadcast series of programs on the national parks and other wild lands into which instruction on the appropriate behavior towards elements of the environment are incorporated.

Grizzly bears are only one of the dangers associated with the use of the national parks. Others include hot springs, other dangerous animals, falls, hypothermia, snow, and very cold waters. It is perhaps safe to say that most visitors to the national parks do not know how to deal with such dangers. In addition, the protection of the resource

demands that the users have some knowledge of the consequences of their actions and how to minimize the negative effects of their presence on the environment they have come to enjoy. The task of administering the parks could be simplified if the visitors came knowing how to behave properly. Most violations of rules established to protect the resources are unintentional.[8] A management communication program that effectively reached the visitor before he came to the park could not only reduce injuries from such hazards as the grizzly bear, but might also assist in the protection of the resource and reduce park management costs by reducing enforcement and maintenance costs.

Information Needs

The effectiveness of the bear management communication program in reducing the number of injuries and deaths caused by encounters with grizzly bears will depend on the effectiveness of the recommended behaviors. If carrying a bell and speaking softly to the bear are not effective in reducing attacks, widespread adoption of the practices will not reduce injuries. Therefore, the National Park Service should pursue a coordinated program of research into the behavior of grizzly bears and particularly the kinds of behaviors that are associated with attacks and the kinds of human behaviors that will cause the grizzly to flee or at least not to charge.

If some effective device or action that protects human beings from attack can be found, the communication task will be much simpler

---

[8]Personal communication with Richard Strange, Chief Ranger, Mammoth Cave National Park, March, 1974.

and the number of incidents more easily reduced. If, on the other hand, the Park Service finds that there is no effective way of reducing attacks, an effective communication strategy to persuade people to change their behavior in grizzly country is unimportant. Other means of protection would be necessary such as escorted parties, protected campsites, and intensive bear surveillance programs.

Summary of Recommendations

1. A content analysis of the threat messages used in fear appeal research should be made to test the hypothesis that those studies in which a positive relationship between the level of threat and persuasion was found manipulated anticipation threat primarily; while those in which a negative relationship was found, manipulated inhibition threat.

2. Some of the research on threat appeal should be replicated with the level of threat redefined as a combination of inhibition and anticipation threat. This work should be preceded by a study in which the interaction between the level of inhibition threat and the level of anticipation threat is tested.

3. The hypothesis that recommendations about how to avoid a threat are more persuasive when anticipation threat is used and that recommendations about how to adapt to or recover from the gruesome consequences of the threat are more persuasive when inhibition threat is used should be evaluated.

4. The effects of using strong threat appeal on the evaluation of source credibility by the receiver of threat messages should be investigated.

5. The National Park Service should develop a program of communications about the parks and the appropriate behaviors there that is communicated to the visitor at home while he is planning the visit to the park. Strong threat appeals probably should be avoided. Non-threat appeals should be evaluated.

6. A program of research into the behavior of the grizzly bear and the bear's response to human behaviors should be pursued with the goal of devising an effective set of behaviors which will prevent grizzly attacks. If no effective set of behaviors can be found, there is no need for a bear management communication program of the kind discussed here. Other management practices such as escorted parties and protected campsites would be more appropriate.

LITERATURE CITED

LITERATURE CITED

Books

Babbie, Earl R. Survey Research Methods. Belmont, California: Wadsworth Publishing Company, Inc., 1973.

Bohrnstedt, George W. "Reliability and Validity Assessment in Attitude Measurement." Attitude Measurement. Edited by Gene F. Summers. U.S.A.: Rand McNally & Company, 1971.

Boulding, Kenneth E. The Image. Ann Arbor: University of Michigan Press, 1956.

Brockman, C. Frank, and Merriam, Lawrence C., Jr. Recreational Use of Wild Lands. New York: McGraw-Hill Book Company, 1973.

Catton, William R., Jr. "The Recreation Visitor: Motivation, Behavior, Impact." Recreational Use of Wild Lands. By C. Frank Brockman and Lawrence C. Merriam, Jr. New York: McGraw-Hill, Inc., 1973.

Clawson, Marion, and Knetsch, Jack L. Economics of Outdoor Recreation. Baltimore: The Johns Hopkins Press, 1966.

Cohen, Arthur R. Attitude Change and Social Influence. New York: Basic Books, Inc., 1964.

Deutsch, Karl W., and Merritt, Richard L. "Effects of Events on the National and International Images." International Behavior, A Social-Psychological Analysis. Edited by Herbert C. Kelman. New York: Holt, Rinehart and Winston, 1965.

Leopold, Aldo. A Sand County Almanac. New York: Oxford University Press, 1949.

McGuire, William J. "Personality and Susceptibility to Social Influence." Handbook of Personality Theory and Research. Edited by Edgar F. Borgatta and William W. Lambert. Chicago: Rand McNally & Company, 1968.

Morris, John. Nonparametric Chi-Square Tests and Analysis of Variance. Technical Report 42. East Lansing, Michigan: Michigan State University Computer Institute for Social Science Research, June 1, 1966.

Scott, William A. "Psychological and Social Correlates of International Images." International Behavior, A Social-Psychological Analysis. Edited by Herbert C. Kelman. New York: Holt, Rinehart and Winston, 1965.

Articles

Bowman, Eldon G. "The Grizzly Bear in the National Parks: Part I." American Forests, 75:7 (July, 1969), 16-18 and 56-58.

Herrero, Stephen. "Human Injury Inflicted by Grizzly Bears." Biological Sciences, 20:21 (November, 1970), 593-598.

Hewgill, Murray A., and Miller, Gerald R. "Source Credibility and Response to Fear-Arousing Communications." Speech Monographs, 32:2 (June, 1965), 95-101.

Higbee, Kenneth L. "Fifteen Years of Fear Arousal: Research on Threat Appeals: 1953-1968." Psychological Bulletin, 72:6 (June, 1969), 426-444.

Janis, Irving L., and Feshback, Seymour. "Effects of Fear-Arousing Communications." Journal of Abnormal and Social Psychology, 48:1 (January, 1953), 78-92.

Janis, Irving L., and Milholland, W. "The Influence of Threat Appeals on Selective Learning of the Content of Persuasive Communications." Journal of Psychology, 37:1 (January, 1954), 75-80.

"Letters to the Editor." Biological Sciences, 19:3 (March, 1969), 201-203.

Leventhal, H., and Trembly, G. "Negative Emotions and Persuasion." Journal of Personality, 36:1 (March, 1968, 154-168.

Moment, Gairdner B. "Bears: The Need for a New Sanity in Wildlife Conservation." Biological Sciences, 18:12 (December, 1968), 1105-1108.

_____. "Bears and Conservation: Realities and Recommendations." Biological Sciences, 19:11 (November, 1969), 1019-1020.

_____. "Man-Grizzly Problems--Past and Present: Implications for Endangered Species." Biological Sciences, 20:11 (November, 1970), 1142-1144.

Zuckerman, Marvin. "The Development of an Affect Adjective Check List for the Measurement of Anxiety." Journal of Consulting Psychology, 24:5 (October, 1960), 457-462.

Public Documents

U.S. Congress. House. National Park Service Act. H.R. 15522, 64th Cong., 1st Sess., 1916.

Unpublished Material

Hodgson, Susan F. "Unofficial Messages about Bears in the McDonald Valley and West Glacier." Report to the National Park Service. Glacier National Park, Montana, 1973.

Interviews

Strange, Richard. Interview. Chief Ranger, Mammoth Cave National Park, Kentucky. March 16, 1974.

APPENDICES

APPENDIX A

ANTICIPATION AND INHIBITION THREAT MESSAGES: HIGH, MEDIUM, AND LOW LEVELS

APPENDIX A1

LOW ANTICIPATION THREAT

GRIZZLY BEAR ATTACK

The threat of an attack is real! Grizzly encounters occurred long before white men explored the Rocky Mountains. Lewis and Clark, hearing tales of the bear, first discounted them as exaggerations by natives too poorly armed to defend themselves. After members of the expedition were attacked, however, they wrote, "I'd as soon fight two indians as one of the bears."

During the early history of Glacier Park, few injuries were caused by grizzly attacks. Attacks resulting in injury and, sometimes in death, have occurred, however.

In June of 1959, John Williams of Ohio and Robert Winters of Michigan were hiking in Glacier when a young grizzly overtook them on the trail. The bear attacked Williams and was still mauling him when Winters, who ran for help, returned with rangers and a rescue party.

In July of 1969, a party of five hikers including two rangers and the 10 year old son of one of the rangers was attacked by a grizzly with a cub. All but one of the party was mauled. The boy, most severely injured, survived in spite of what appeared at the time to be fatal wounds.

In August of 1965, Fred Stinson and his girl friend were hiking near a park lodge. They encountered a grizzly on the trail. The girl fainted and the bear ignored her. Stinson, however, was badly mauled.

While you are hiking in Glacier National Park, you are in grizzly country, just as you are anywhere in the northern Rocky

Mountains. It is important that you remain alert and watch for bears. Know what to do should you suddenly find yourself face to face with a grizzly.

APPENDIX A2

MEDIUM ANTICIPATION THREAT

GRIZZLY BEAR ATTACK

The threat of an attack is real! Grizzly encounters occurred long before white men explored the Rocky Mountains. Lewis and Clark, hearing tales of the bear, first discounted them as exaggerations by natives too poorly armed to defend themselves. After members of the expedition were attacked, however, they wrote, "I'd as soon fight two indians as one of the bears."

During the early history of Glacier Park, few injuries were caused by grizzly attacks. Recently, perhaps in response to increasing back country travel, attacks resulting in injury and, sometimes in death, have been more common.

In June of 1959, John Williams of Ohio and Robert Winters of Michigan were hiking in Glacier when a young grizzly overtook them on the trail. The bear attacked Williams and was still mauling him when Winters, who ran for help, returned with rangers and a rescue party.

In July of 1960, a party of five hikers including two rangers and the 10 year old son of one of the rangers was attacked by a grizzly with a cub. All but one of the party was mauled. The boy, most severely injured, survived in spite of what appeared at the time to be fatal wounds.

In August of 1965, Fred Stinson and his girl friend were hiking near a park lodge. They encountered a grizzly on the trail. The girl fainted and the bear ignored her. Stinson, however, was badly mauled.

In August of 1967, two different parties of backpackers were attacked in their camps on the same night and at widely separated places. The grizzly bears mauled several people. Two girls, one in each party, were killed.

In October of 1967, a male grizzly attacked and mauled Robert Gilmore as he was elk hunting just outside Glacier National Park. Gilmore's life was saved by companions who arrived just in time.

In May of 1968, Robert Hahn, a seasonal park naturalist, was photographing a grizzly and two cubs. The bear, catching sight of him, attacked. The man and the bear rolled down a steep snow bank. Hahn caught hold of a tree as they passed and managed to climb to safety.

While you are hiking in Glacier National Park you are in grizzly country, just as you are anywhere in the northern Rocky Mountains. It is important that you remain alert and watch for bears. Know what to do should you suddenly find yourself face to face with a grizzly.

APPENDIX A3

HIGH ANTICIPATION THREAT

GRIZZLY BEAR ATTACK

The threat of an attack is real! Grizzly encounters occurred long before white men explored the Rocky Mountains. Lewis and Clark, hearing tales of the bear, first discounted them as exaggerations by natives too poorly armed to defend themselves. After members of the expedition were attacked, however, they wrote, "I'd as soon fight two indians as one of the bears."

During the early history of Glacier Park, few injuries were caused by grizzly attacks. Recently, perhaps in response to increasing back country travel, attacks resulting in injury and, sometimes in death, have been more common.

In June of 1959, John Williams of Ohio and Robert Winters of Michigan were hiking in Glacier when a young grizzly overtook them on the trail. The bear attacked Williams and was still mauling him when Winters, who ran for help, returned with rangers and a rescue party.

In July of 1960, a party of five hikers including two rangers and the 10 year old son of one of the rangers was attacked by a grizzly with a cub. All but one of the party was mauled. The boy, most severely injured, survived in spite of what appeared at the time to be fatal wounds.

In August of 1965, Fred Stinson and his girl friend were hiking near a park lodge. They encountered a grizzly on the trail. The girl fainted and the bear ignored her. Stinson, however, was badly mauled.

In August of 1967, two different parties of backpackers were attacked in their camps on the same night and at widely separated places. The grizzly bears mauled several people. Two girls, one in each party, were killed.

In October of 1967, a male grizzly attacked and mauled Robert Gilmore as he was elk hunting just outside Glacier National Park. Gilmore's life was saved by companions who arrived just in time.

In May of 1968, Robert Hahn, a seasonal park naturalist, was photographing a grizzly and two cubs. The bear, catching sight of him, attacked. The man and the bear rolled down a steep snow bank. Hahn caught hold of a tree as they passed and managed to climb to safety.

In June of 1973, a grizzly with cubs attacked two Forest Service employees hiking in Glacier. The men quickly climbed a near-by tree, escaping injury. The bear caught the tennis shoe of one man before he was high enough in the tree. A mauling was averted when the shoe tore away.

Later in 1973, a grizzly first destroyed a camp along the Northfork Road and a few days later chased a party of backpackers into Logging Lake and destroyed their equipment and supplies before leaving the area.

In October, 1973, a man and wife with two small children from Kalispell, Montana, were hiking when they came upon a grizzly and yearling cub. The bear attacked first the man and the child with him, then the woman and the child with her. After injuring the man, the bear abruptly broke off the attack and continued on down the trail.

While you are hiking in Glacier National Park you are in grizzly country, just as you are anywhere in the northern Rocky Mountains. It is important that you remain alert and watch for bears. Know what to do should you suddenly find yourself face to face with a grizzly.

APPENDIX A4

LOW INHIBITION THREAT

GRIZZLY BEAR ATTACK

The threat of an attack while in the back country is real! Not long ago a party of four hikers was returning from a day at Iceberg Lake. They were two school teachers from Michigan, a seasonal ranger John Winston, and his nine year old son who were hiking on his day off. Winston and his son, walking some distance in front of the others, turned a bend in the trail and saw a large grizzly and her cub coming towards them.

They ran back towards the others shouting, "Climb trees! Grizzly!"

The words were hardly out of their mouths when the bear struck, attacking the boy. Winston ran towards the bear. Tim Jackson, one of the teachers, shouted and began to throw rocks. One rock hit the bear on her sensitive nose. She stood up, 7 feet tall on her hind legs; then, she charged. John was knocked down. Jackson started up a tree. Only moments had passed since the attack began. Just before he was out of reach, the bear caught Jackson's foot and began pulling him out of the tree. Suddenly, the laces of his tennis shoes parted and freed him. He climbed quickly out of reach.

The frustrated bear moved to another tree where Ann Lundstrom, the other teacher, was trying to climb. She fell, screamed, and then tried to lie still. Winston threw rocks and for a moment the bear left Ann and charged towards him, but when he retreated, it returned to the girl. Nothing would distract the bear for long.

An hour passed after the sounds of the bear had stopped. Jackson climbed down from his tree and repaired his torn shoe. He ran the four miles to the ranger station for help. Winston found his son in the brush by the trail where the attack had started. He covered him with his jacket. He couldn't stand to look at his son's face. It was expressionless, a mask of blood.

The rescue party found Ann's body quickly. They put her in her sleeping bag and carried it down the mountain as darkness came. The others survived. The boy, at first given little hope, lived and, after many operations, was able to return to a nearly normal life. Plastic surgery was not able to reconstruct his face entirely, however, and he still bears disfiguring scars.

While you are hiking in Glacier National Park you are in grizzly country, just as you are anywhere in the northern Rocky Mountains. It is important that you remain alert and watch for bears. Know what to do should you suddenly find yourself face to face with a grizzly.

APPENDIX A5

MEDIUM INHIBITION THREAT

GRIZZLY BEAR ATTACK

The threat of an attack while in the back country is real! Not long ago a party of four hikers was returning from a day at Iceberg Lake. They were two school teachers from Michigan, a seasonal ranger John Winston, and his nine year old son who were hiking on his day off. Winston and his son, walking some distance in front of the others, turned a bend in the trail and saw a large grizzly and her cub coming towards them.

They ran back towards the others shouting, "Climb trees! Grizzly!"

The words were hardly out of their mouths when the bear struck. It knocked John into the brush with a glancing blow that tore deep gashes in his shoulder. Winston staggered to his feet and ran towards the bear. Tim Jackson, one of the teachers, shouted and began to throw rocks. One rock hit the bear on her sensitive nose. She stood up, 7 feet tall on her hind legs; then she charged. John was knocked down again. Jackson started up a tree. Only moments had passed since the attack began. Just before he was out of reach, the bear caught Jackson's foot and began pulling him out of the tree. Suddenly the laces of his tennis shoes parted and freed him. He climbed quickly out of reach.

The frustrated bear moved to another tree where Ann Lundstrom, the other teacher, was trying to climb higher. The tree was too small and the huge bear clawed her down. She screamed and then tried to lie

still but the bear continued to bite her. The pain was too great. The others shouted for her to lie still. Winston threw rocks and for the moment the bear left Ann and charged towards him, but when he retreated, it returned to the girl. Nothing would distract the bear for long. Soon it dragged Ann out of sight, into some brush.

An hour passed after the sounds of the bear had stopped. Jackson climbed down from his tree and repaired his torn shoe. He ran the four miles to the ranger station for help. Winston found his son in the brush by the trail where the attack had started. He covered him with his jacket.

The boy was alive. His legs were badly chewed but none of the bones had been broken and the arteries fortunately had not been cut when the bear tore away chunks of his flesh. The bleeding could be stopped and Winston concentrated on the legs. He couldn't stand to look at his son's face. It was expressionless, a mask of blood.

The rescue party found Ann's body quickly. She had been clawed and chewed. They put her corpse in her sleeping bag and carried it down the mountain as darkness came. The others survived. The boy, at first given little hope, lived and, after many operations, was able to return to a nearly normal life. Plastic surgery was not able to reconstruct his face entirely, however, and he still bears disfiguring scars.

While you are hiking in Glacier National Park you are in grizzly country just as you are anywhere in the northern Rocky Mountains. It is important that you remain alert and watch for bears. Know what to do should you suddenly find yourself face to face with a grizzly.

APPENDIX A6

HIGH INHIBITION THREAT

GRIZZLY BEAR ATTACK

The threat of an attack while in the back country is real! Not long ago a party of four hikers was returning from a day at Iceberg Lake. They were two school teachers from Michigan, a seasonal ranger John Winston, and his nine year old son who were hiking on his day off. Winston and his son, walking some distance in front of the others, turned a bend in the trail and saw a large grizzly and her cub coming towards them.

They ran back towards the others shouting, "Climb trees! Grizzly!"

The words were hardly out of their mouths when the bear struck. It knocked John into the brush with a glancing blow that tore deep gashes in his shoulder, then pounced on the boy, chewing his legs and thighs. The body of the bear muffled the boy's screams.

Winston staggered to his feet and ran towards the bear. Tim Jackson, one of the teachers, shouted and began to throw rocks. One rock hit the bear on her sensitive nose. She stood up, 7 feet tall on her hind legs; then she charged. John was knocked down again. Jackson started up a tree. Only moments had passed since the attack began. Just before he was out of reach, the bear caught Jackson's foot and began pulling him out of the tree. Suddenly the laces of his tennis shoes parted and freed him. He climbed quickly out of reach.

The frustrated bear moved to another tree where Ann Lundstrom, the other teacher, was trying to climb higher. The tree was too small and the huge bear clawed her down. She screamed and then tried to lie still but the bear continued to bite her. The pain was too great. She struggled to get away and screamed again as the bear began to bite her head. The others shouted for her to lie still. Winston threw rocks and for a moment the bear left Ann and charged towards him, but when he retreated, it returned to the girl. Nothing would distract the bear for long. Soon it dragged Ann out of sight, into some brush. There were no more cries from the girl, only the sounds of the bear biting.

An hour passed after the sounds of the bear had stopped. Jackson climbed down from his tree and repaired his torn shoe. He ran the four miles to the ranger station for help. Winston found his son in the brush by the trail where the attack had started. He covered him with his jacket.

The boy was alive. His legs were badly chewed but none of the bones had been broken and the arteries, fortunately, had not been cut when the bear tore away chunks of his flesh. The bleeding could be stopped and Winston concentrated on the legs. He couldn't stand to look at his son's face. The scalp had been torn loose and he was holding it in place with one hand. His face was expressionless, a mask of blood.

The rescue party found Ann's body quickly. A trail of blood, scraps of skin and clothing led into the brush. She lay on her back, hardly recognizable as a human being. Her stomach was torn away; her

hair was gone. Her body had been clawed and chewed. They put her corpse in her sleeping bag and carried it down the mountain as darkness came.

The others survived. The boy, at first given little hope, lived and, after many operations, was able to return to a nearly normal life. Plastic surgery was not able to reconstruct his face entirely, however, and he still bears disfiguring scars.

While you are hiking in Glacier National Park you are in grizzly country, just as you are anywhere in the northern Rocky Mountains. It is important that you remain alert and watch for bears. Know what to do should you suddenly find yourself face to face with a grizzly.

APPENDIX B

QUESTIONNAIRES USED IN THE EXPERIMENT AT THE TIME OF THE THREAT AND ONE WEEK LATER

APPENDIX B1

COPY OF THE QUESTIONNAIRE USED IN THE EXPERIMENT

AT THE TIME OF THE THREAT

REMEMBER YOUR BOOK COLOR!

INSTRUCTIONS

THE DEPARTMENT OF PARK AND RECREATION RESOURCES IS PREPARING SOME MESSAGES ABOUT GRIZZLY BEARS FOR THE NATIONAL PARK SERVICE. WE NEED YOUR HELP WITH A COUPLE OF PARTS OF THE PROJECT. BECAUSE THIS IS AN EXPERIMENT, WE CAN'T EXPLAIN WHAT WE'RE DOING UNTIL NEXT WEEK. IF WE DID, IT MIGHT INFLUENCE YOUR JUDGMENTS.

THIS BOOKLET CONTAINS (1) SOME BACKGROUND QUESTIONS, (2) A MESSAGE TO BE JUDGED, (3) SOME ADJECTIVES TO BE JUDGED, (4) SOME MISCELLANEOUS OPINION QUESTIONS, AND (5) A MARK SENSE ANSWER SHEET.

IN THE FIRST PART, YOU MARK YOUR ANSWERS DIRECTLY ON THE ANSWER SHEET. MAKE CERTAIN THE MARKS ARE DARK. ERASE ANY STRAY MARKS COMPLETELY. WHEN YOU CHANGE A MARK, BE SURE THE CORRECT RESPONSE IS EXTRA DARKLY MARKED AND THE ERROR COMPLETELY ERASED.

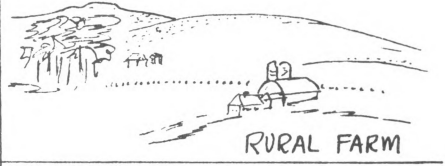
NOTE STUDENT NUMBERS WILL BE USED ONLY TO IDENTIFY CARDS. WE WON'T MATCH RESPONSES TO YOU, PERSONALLY.

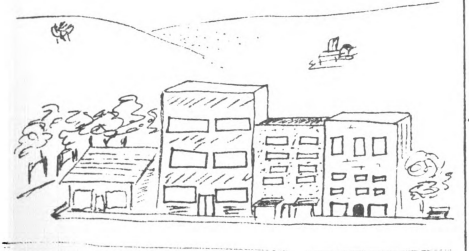
PART I: BACKGROUND INFORMATION

ANSWER SHEET SPACE

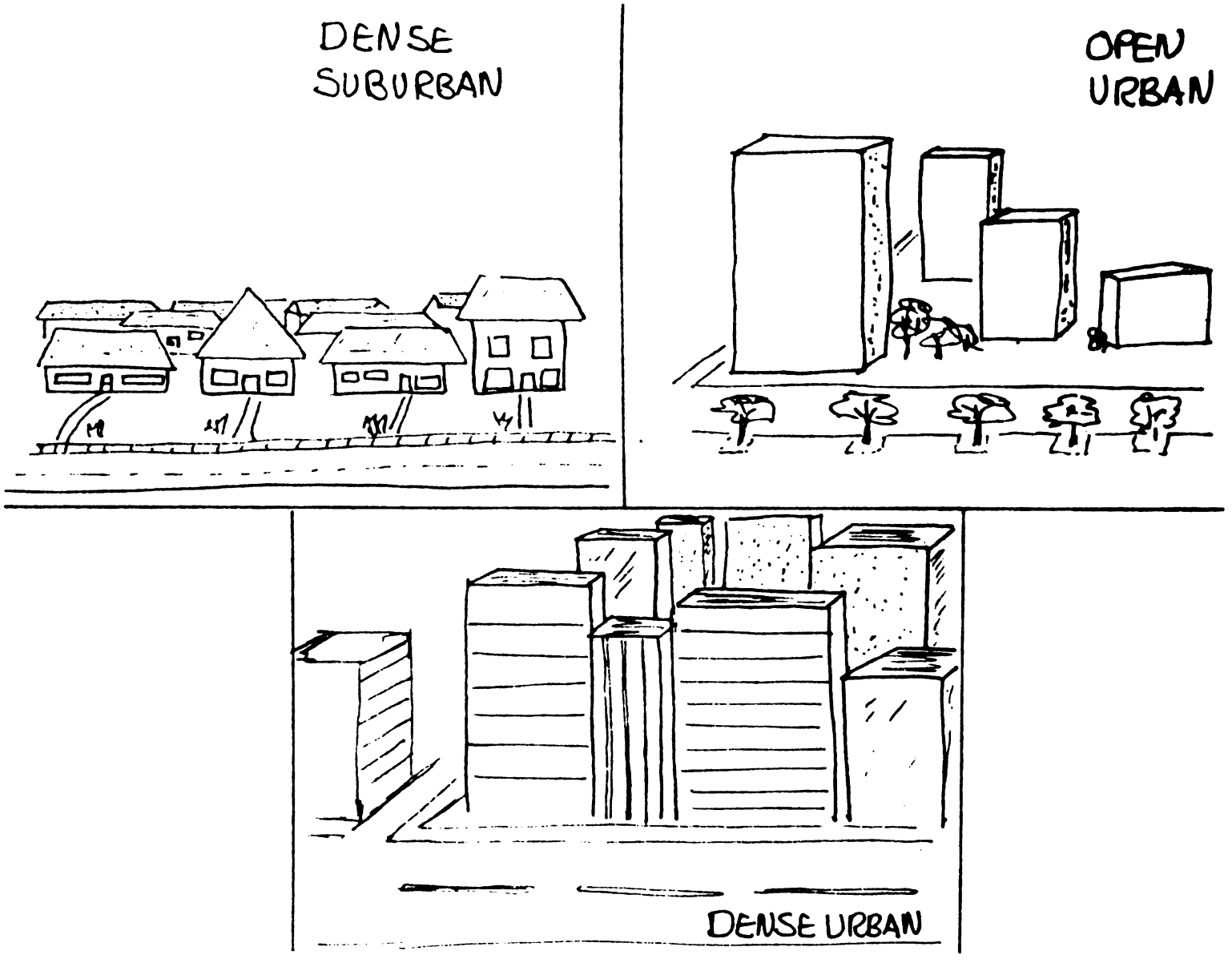
1 - 6	ENTER YOUR STUDENT NUMBER
7	1 = IF YOUR BOOK COVER IS BLUE, GREEN, OR PINK. 2 = IF YOUR BOOK COVER IS YELLOW, BROWN, OR WHITE.
8	1 = IF YOUR BOOK COVER IS BLUE OR YELLOW. 2 = IF YOUR BOOK COVER IS GREEN OR BROWN. 3 = IF YOUR BOOK COVER IS PINK OR WHITE.
9	ARE YOU FEMALE OR MALE? 1 = Female 2 = Male
10	HOW OLD ARE YOU? 1 = 16 - 25 years old 2 = 26 - 35 years old 3 = 36 and older
11	DO YOU BELONG TO ANY ORGANIZATIONS CONSIDERED "CONSERVATION" OR "ENVIRONMENTAL?" 0 = No 1 = Yes
12	HOW MANY YEARS OF EDUCATION WILL YOU HAVE COMPLETED AT THE END OF THIS TERM? 1 = 13 2 = 14 3 = 15 4 = 16 5 = 17 6 = 18 or more ON THE NEXT TWO PAGES ARE SOME SKETCHES OF PLACES WHERE PEOPLE LIVE. USE THEM IN DECIDING YOUR ANSWER TO THE NEXT TWO QUESTIONS.
13	WHICH PLACE IS MOST LIKE WHERE YOU LIVED FROM WHEN YOU WERE 10 YEARS OLD UNTIL YOU WERE 15? IF MORE THAN ONE, CHOOSE THE ONE WHERE YOU LIVED LONGEST. 1 = Extremely Rural 2 = Rural Farm 3 = Rural Town 4 = Open Suburban 5 = Dense Suburban 6 = Open Urban 7 = Dense Urban


EXTREMELY RURAL


RURAL FARM


RURAL TOWN


OPEN SUBURBAN


DENSE
SUBURBAN
OPEN
URBAN
DENSE URBAN

14 WHICH IS MOST LIKE WHERE YOU WOULD CHOOSE TO LIVE IF YOU COULD LIVE ANYWHERE YOU WANT TO?
1 = Extremely Rural
2 = Rural Farm
3 = Rural Town
4 = Open Suburban
5 = Dense Suburban
6 = Open Urban
7 = Dense Urban

15 ARE YOU OR HAVE YOU BEEN A WILD LAND HIKER OR BACKPACKER?
0 = No
1 = Yes

16 HAVE YOU EVER HIKED OR BACKPACKED IN THE NORTHERN ROCKY MOUNTAINS?
0 = No
1 = Yes
:
9 = (Mark 9 if you answered "No" to #15 above.)

17 WHEN DO YOU PLAN TO HIKE OR BACKPACK IN THE NORTHERN ROCKIES?
1 = This year
2 = Next year
3 = Within five years
4 = Not planning to

PART TWO: MESSAGE

READ THE MESSAGE. SOME QUESTIONS ABOUT HOW YOU JUDGE IT FOLLOW.

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

FROM NOW ON

MARK YOUR ANSWERS

IN THE TEST BOOKLET,

NOT ON THE ANSWER SHEET

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

PART 3: MESSAGE JUDGEMENT

BELOW ARE SOME WORDS THAT MIGHT DESCRIBE HOW YOU FEEL NOW. PLEASE PUT AN (X) IN THE BRACKETS NEXT TO THE WORDS THAT DESCRIBE HOW YOU FEEL NOW. DON'T MARK WORDS THAT DO NOT DESCRIBE HOW YOU FEEL.

( ) Afraid	( ) Fearful	( ) Nervous	
( ) Calm	( ) Contented	( ) Joyful	
( ) Desperate	( ) Frightened	( ) Panicky	
( ) Cheerful	( ) Happy	( ) Loving	
( ) Shakey	( ) Tense	( ) Terrified	
( ) Pleasant	( ) Secure	( ) Steady	
( ) Upset	( ) Worrying	( ) Thoughtful	[18-19]

HOW WELL DID THE MESSAGE MEET THESE GOALS?

	VERY	SOMEWHAT	NOT AT ALL	
Well written	( )	( )	( )	
Organized	( )	( )	( )	
Motivating	( )	( )	( )	
Realistic	( )	( )	( )	
Attention holding	( )	( )	( )	[20]

PART 4: ADJECTIVES

BELOW ARE SOME PAIRS OF WORDS THAT BACKPACKERS IN GLACIER NATIONAL PARK THOUGHT DESCRIBED GRIZZLY BEARS. MARK THE SPACE BETWEEN THE WORDS THAT IS CLOSEST TO WHAT YOU THINK GRIZZLY BEARS ARE LIKE.

SAMPLE:

	VERY	SOMEWHAT	A LITTLE	A LITTLE	SOMEWHAT	VERY	
vegetable	( )	( )	( )	( )	(X)	( )	mineral

The person who answered the example thought grizzly bears were "somewhat mineral." [21-23,24-26]

I FEEL THAT GRIZZLY BEARS ARE - - - -

	VERY	SOMEWHAT	A LITTLE	A LITTLE	SOMEWHAT	VERY	
violent	( )	( )	( )	( )	( )	( )	peaceful
unpleasant	( )	( )	( )	( )	( )	( )	pleasant
savage	( )	( )	( )	( )	( )	( )	meek
brutal	( )	( )	( )	( )	( )	( )	tender
vicious	( )	( )	( )	( )	( )	( )	gentle
ordinary	( )	( )	( )	( )	( )	( )	splendid
homely	( )	( )	( )	( )	( )	( )	handsome
ugly	( )	( )	( )	( )	( )	( )	beautiful
grotesque	( )	( )	( )	( )	( )	( )	pretty

PART 5: OPINIONS ABOUT GRIZZLIES

BELOW ARE SOME SUGGESTIONS MADE BY BACKCOUNTRY USERS IN GLACIER NATIONAL PARK IN A STUDY LAST SUMMER. PLEASE MARK WHETHER YOU AGREE OR DISAGREE WITH EACH ONE. MARK ALL STATEMENTS. [27]

AGREE	DISAGREE	
( )	( )	Grizzlies should be controlled to insure the safety of park users.
( )	( )	People who don't know how to behave in grizzly country should be kept out.
( )	( )	If the Park Service can't protect people and grizzlies, the parks should be taken away from them and run by someone else.
( )	( )	People should be encouraged to learn about how to behave around dangers like bears before they go hiking or backpacking.
( )	( )	The Park Service should provide information about grizzlies.
( )	( )	Some kind of warning system should be devised so people can know when grizzlies are around.

BELOW YOU WILL FIND A SENTENCE WITH SIX DIFFERENT ENDINGS. READ EACH SENTENCE CAREFULLY.

THEN MARK AGREE FOR EACH ENDING THAT DESCRIBES HOW YOU WOULD COMPLETE THE SENTENCE. MARK DISAGREE FOR EACH ENDING THAT YOU WOULD NOT USE TO COMPLETE THE SENTENCE. [28]

IT IS ALL RIGHT FOR GRIZZLY BEARS TO ROAM FREE . . .

AGREE	DISAGREE	
( )	( )	1. . . . around campgrounds and lodges.
( )	( )	2. . . . along roads and highways.
( )	( )	3. . . . in all of the backcountry.
( )	( )	4. . . . in that part of the backcountry not used by many hikers or backpackers.
( )	( )	5. . . . in remote areas of northern Canada and Alaska.

REMEMBER YOUR BOOKLET COLOR!

THANK YOU FOR YOUR HELP

(WE'LL EXPLAIN THE PROJECT NEXT WEEK)

PUT YOUR ANSWER SHEET IN YOUR BOOKLET

- -

MORE ABOUT

GRIZZLIES!

If you want more information about grizzly bears, fill in the form below. THERE MAY BE A 15¢ CHARGE FOR THE PAMPHLET. Also, there are some reserve materials in the Natural Resources Reference Room. Ask for the Grizzly Bear Readings.

NAME _____

ADDRESS _____

_____ ZIP _____

TELEPHONE _____

APPENDIX B2

COPY OF THE QUESTIONNAIRE USED IN THE EXPERIMENT
ONE WEEK LATER

FOLLOW-UP
PRR 300

What is your student number? _____ (1-6)

What color was your booklet: blue, yellow, white, green, pink, or brown? _____ (7-8)

Since you participated in the experiment last week, have you looked for more information about grizzly bears? (9)
( ) yes ( ) no

What specifically did you read, etc.? _____

Since you participated in the experiment last week, have you thought about how to avoid a grizzly bear attack or what you would do if you were attacked?
( ) yes ( ) no (10)

Since you participated in the experiment last week, have you--

( ) Re-evaluated your plans to hike or backpack in the Northern Rockies and decided to hike or backpack somewhere else. (11)

( ) Re-evaluated your plans to hike or backpack in the Northern Rockies but decided to go ahead with the plans anyway.

( ) Re-evaluated your plans to hike or backpack in the Northern Rockies and decided to go ahead and hike or backpack but only in areas where grizzly bears are hardly ever found.

( ) Had no plans to hike or backpack in the Northern Rockies.

BELOW ARE SOME WORDS THAT MIGHT DESCRIBE HOW YOU FEEL NOW WHEN YOU THINK ABOUT GRIZZLY BEARS. PLEASE PUT AN (X) IN THE BRACKETS NEXT TO THE WORDS THAT DESCRIBE HOW YOU FEEL NOW. DON'T MARK WORDS THAT DO NOT DESCRIBE HOW YOU FEEL. (12-13)

( ) Afraid	( ) Fearful	( ) Nervous
( ) Calm	( ) Contented	( ) Joyful
( ) Desperate	( ) Frightened	( ) Panicky
( ) Cheerful	( ) Happy	( ) Loving
( ) Shakey	( ) Tense	( ) Terrified
( ) Pleasant	( ) Secure	( ) Steady
( ) Upset	( ) Worrying	( ) Thoughtful

Since last week, have you discussed the experiment with your classmates? (Don't include the in-class discussion after the experiment.) (14)
( ) yes ( ) no

APPENDIX C

MEASURES OF RELIABILITY AND VALIDITY OF INSTRUMENTS USED IN THE EXPERIMENT

APPENDIX C1

SAFETY INDEX

Validity

Adjective pairs were selected as descriptors of "safe" and "dangerous" traits. All five pairs loaded on the same factor as "safe/dangerous" through three factor rotations. The five were selected because they had the highest factor loadings.

TABLE 10.--Factor Loadings and Communalities of Adjective Pairs Used in the Safety Index. Data Collected in 1974 Glacier National Park Survey.

Adjective Pair	Safety Factor Loading	Aesthetic Factor Loading	Communality
Bad Tempered--Pleasant	.6907	-.1866	.5206
Violent--Peaceful	.6953	-.1125	.5071
Savage--Meek	.7325	-.1057	.5486
Brutal--Tender	.6957	-.0913	.4926
Vicious--Gentle	.7643	-.0934	.5967
Dangerous--Safe*	.6274	-.1668	.4733

*Not used as an item in the Safety Index.

Reliability

A variation of the Kuder-Richardson reliability coefficient advised by Cronbach is recommended by George W. Bohrnstedt.[1] The coefficient is called α and is calculated by the formula:

[1]George W. Bohrnstedt, "Reliability and Validity Assessment in Attitude Measurement," in Attitude Measurement, ed. by Gene F. Summers (U.S.A.: Rand McNally & Company, 1971), pp. 80-99.

$$\alpha = \frac{n}{n-1}\left(1 - \frac{\sum_{i=1}^{N} \sigma^2 yi}{\sigma_x 2}\right)$$

Where: n = the number of items in the index

$\sigma^2 yi$ = the variance of the $i^{\underline{th}}$ item

$\sigma^2 x$ = the variance of the sum of the item scores (The Index Score).

The coefficient of reliability α was computed using the results of 312 responses to a Glacier National Park survey.

Reliability (α) = .808

The standard error of measurement for the index can be estimated by the formula:

$$\sigma_E = \sigma_x \sqrt{1-\alpha}$$

In this case, $\sigma_E = 2.217$.

From the standard error of measurement, one can compute confidence intervals for the index. On the basis of the 1974 Glacier National Park data, the 99 per cent confidence interval for the Safety Index is $\pm$5.72, the 95 per cent confidence interval is $\pm$4.35, when the index score is computed as the sum of item scores. Computed thus, the index has a range from five to 35.

The standard deviation for the Safety Index when the score is computed as the sum of item scores is 5.0597. The standard deviations for individual items are as follows:

bad tempered/pleasant	σ = 1.357
violent/peaceful	σ = 1.451
savage/meek	σ = 1.3107
brutal/tender	σ = 1.2539
vicious/gentle	σ = 1.3464

Data used to compute the standard deviations were from 312 responses to the 1973 Glacier National Park Survey. Note that in the Glacier National Park Survey (1973), the index items were scored from one to seven. In the experiment, they were scored from one to six.

APPENDIX C2

AESTHETIC INDEX

Validity

Adjective pairs were selected as descriptors of "beautiful" and "ugly" traits. The adjective pair, "beautiful/ugly" loaded sufficiently highly to be incorporated in the index with four other pairs through three factor rotations. The four pairs were selected because they loaded most highly on the factor.

TABLE 11.--Factor Loadings and Communalities of Adjective Pairs Used in the Aesthetic Index. Data Collected in the 1973 Glacier National Park Survey.

Adjective Pair	Safety Factor Loading	Aesthetic Factor Loading	Communality
Pretty--Grotesque	.0815	-.6722	.4819
Beautiful--Ugly	.1240	-.7027	.5270
Splendid--Ordinary	-.0756	-.6713	.4603
Handsome--Homely	.0278	-.7371	.5483

Reliability

The coefficient of reliability (α) was computed for the Aesthetic Index in the same manner as done for the Safety Index. The coefficient is calculated using 312 responses to the 1973 Glacier National Park survey.

Reliability (α) = .697

The standard error of measurement (σ_E) was computed as in the case of the Safety Index.

$$\sigma_E = 2.46$$

Again, it is possible to calculate confidence intervals for the Aesthetic Index using the standard error of measurement. When the index score is computed as the sum of item scores, the 99 per cent confidence interval is ± 6.35; the 95 per cent confidence interval is ± 4.82. When computed as the sum of item scores, the index has a range from four to 28.

The standard deviation for the Aesthetic Index when the score is computed as the sum of item scores is 4.47. The standard deviations for individual items are as follows:

pretty/grotesque	$\sigma = 1.4937$
beautiful/ugly	$\sigma = 1.4935$
splendid/ordinary	$\sigma = 1.5939$
handsome/homely	$\sigma = 1.5926$

Again, standard deviations were computed from 312 responses to the 1973 Glacier National Park survey. Note, as before, the item scores ranged from one to seven; in the experiment, the "neutral" response was removed and scores ranged from one to six.

APPENDIX C3

AGGRESSION SCALE

Validity

The scale is a "social distance" scale modeled after the Borgadus Social Distance Scale (see Appendix B1). The higher the score on the Aggression Scale, the more the subject wants the range of grizzlies restricted. The scores on the Aggression Scale would be consistent with acceptance of management practices more restrictive towards grizzly bears.

Reliability

A measure of reliability is provided by the experimental results. Only 10 per cent (n=100) of the subjects errored by disagreeing with a foil numbered higher than the lowest numbered foil with which they agreed. In several of these cases, penciled notes on the paper indicated the lowest numbered foil marked "agree" was the appropriate score. For example, one subject "agreed" that grizzlies should be allowed to roam free around campgrounds and lodges, but "disagreed" that they should roam free along roads and highways "because they might be hurt."

APPENDIX C4

ANXIETY INDEX

Validity

The Anxiety Index used in the experiment is taken from Marvin Zuckerman who describes studies to validate and determine the reliability of the index in, "The Development of an Affect Adjective Check list for the Measurement of Anxiety."[1]

Zuckerman found significant differences between anxiety scores on exam days and in nonexam days for college students. Scores on the affect adjective check list correlated significantly with scores on the Manifest Anxiety Scale for a group of pregnant women.

Reliability

Internal reliability was tested using the Kuder-Richardson formula 20. The "today" version of the test used in the experiment has a reliability of .85.

---

[1]Marvin Zuckerman, "The Development of an Affect Adjective Check List for the Measurement of Anxiety," Journal of Counsulting Psychology, 24:5 (Oct., 1960), 457-462.