



Anger : a descriptive analysis of the definition, dynamics, physiology, maladaptive characteristics and educational applications  
by Ted Hugo Murray

A thesis submitted in partial fulfillment of the requirements for the degree of DOCTOR OF EDUCATION  
Montana State University  
© Copyright by Ted Hugo Murray (1975)

**Abstract:**

Anger is a subject which is seldom discussed independently of other topics. Because of this there appears to exist no work which would enable helping professionals to understand and deal specifically with anger related problems. The purpose of this study is to define the basic dynamics of anger and to suggest a method by which educationally oriented helping professionals may deal with the emotion.

Anger is defined as experiential emotional state which is characterized by a physiological arousal state. The arousal state is accompanied by cognitive desires to inflict harm (verbal or physical) on another person or object. Anger is seen as having six different causes which, the author defines as six different types of anger. The types of anger are: (1) Instinctive anger: A biological adaptive anger which stems from a well defined threat to one's property, life, or family; (2) Frustration anger: Anger which is the result of the frustration of an organism's goal oriented response; (3) Classically conditioned anger: Anger which is learned as a result of the classical conditioning process; (4) Operantly conditioned anger: Anger which is learned as a result of the organisms being reinforced for displays of anger; (5) Phenomenological anger: That anger which stems from a threat to the organization and maintenance of the phenomenal self; and (6) Existential anger: That anger which, arises as a result of the nonfulfillment of man's need to have his existence and worth in the world recognized by that world.

Anger is examined as a maladaptive response in human interaction and functioning. Any behavior which prevents or interferes with the actualization of a person's potential as a human being is defined as maladaptive. Anger is seen as a primarily defensive reaction to a stress producing stimulus. The defensive nature of anger is viewed as maladaptive in the following respects: (a) the defensive nature of anger blocks communication; (b) it prevents conflict resolution; (c) it promotes destructive relationships; and (d) it establishes a potential for violence.

Anger is also viewed as maladaptive in that the response does not deal with the factors which precipitate it. Rather, it focuses on eliminating the originator of the stimulus, thus creating a situation in which the anger will occur each time the stimulus is present.

A methodology is suggested to aid the reader in coping with his anger and the anger of peers, clients, and students. The methodology for dealing with anger utilizes a descriptive process designed to bring about awareness of an individual's functioning in relation to anger.

ANGER: A DESCRIPTIVE ANALYSIS OF THE DEFINITION,  
DYNAMICS, PHYSIOLOGY, MALADAPTIVE CHARACTERISTICS  
AND EDUCATIONAL APPLICATIONS

by

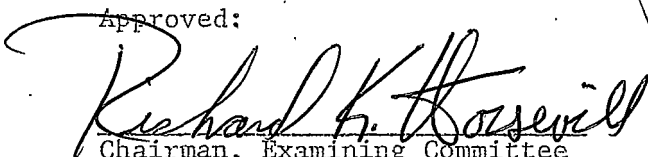
TED HUGO MURRAY

A thesis submitted in partial fulfillment  
of the requirements for the degree


of

DOCTOR OF EDUCATION

Approved:

  
Chairman, Examining Committee

  
Head, Major Department

  
Graduate Dean

MONTANA STATE UNIVERSITY  
Bozeman, Montana

July, 1975

## ACKNOWLEDGMENT

The author wishes to acknowledge several individuals whose gracious assistance made the completion of this paper possible. A special thanks to Dr. Frank Seitz, Dr. Douglas Herbster, Dr. George Rice, and Dr. Arnold Craig whose service on the author's committee is greatly appreciated. The author especially wishes to extend his gratitude to Dr. Richard Horswill and Dr. George Hossack for their time, encouragement, guidance, and suggestions. Finally, a very special thanks to the author's wife, Marilyn Murray, whose love and faith made the whole experience growth producing.

## TABLE OF CONTENTS

	Page
LIST OF FIGURES . . . . .	viii
ABSTRACT. . . . .	ix
 Chapter	
1. INTRODUCTION . . . . .	1
Statement of the Problem . . . . .	4
Need for the Study . . . . .	5
General Questions to be Considered . . . . .	6
General Procedure for the Study. . . . .	7
Limitations and Delimitations. . . . .	9
Definition of Terms. . . . .	10
Summary. . . . .	11
2. THE PHYSIOLOGY AND GENERAL DYNAMICS OF ANGER . . . . .	12
THE PHYSIOLOGY OF ANGER. . . . .	13
Outward Physical Changes . . . . .	15
The Internal Organ Responses . . . . .	18
Function of Adrenalin and Nor-adrenalin. . . . .	23
Role of the Central Nervous System . . . . .	32
The Physiological Nature of Anger. . . . .	39
GENERAL CHARACTERISTICS OF ANGER . . . . .	43
Function of the Anger Response . . . . .	43
General Dynamics of the Anger Response . . . . .	44
The Relationship Between Anger and Aggression. . . . .	45

Chapter	Page
Relationship Between Anger and Related Terms . . . . .	46
Summary. . . . .	47
3. INSTINCTIVE AND LEARNED TYPES OF ANGER . . . . .	49
The Psychoanalytic Theory of Aggression and Anger. . .	51
Modern Biological Instinctivists . . . . .	57
ANGER AS A LEARNED RESPONSE. . . . .	68
Anger as a Response to Frustration . . . . .	69
Anger as a Classically Conditioned Response. . . . .	73
Anger as an Operantly Conditioned Response . . . . .	78
Summary. . . . .	81
4. PHENOMENOLOGICAL AND EXISTENTIAL ANGER . . . . .	82
Phenomenology Defined. . . . .	83
Perceptual Field Defined . . . . .	85
Perceptual Field and Differentiation . . . . .	88
Perceptual Field and Awareness . . . . .	90
Perceptual Field and Behavior. . . . .	91
Phenomenological Anger . . . . .	95
Existentialism Defined . . . . .	100
Human Subjectivity . . . . .	105
The Human Paradox--Absolute Worth Versus Nonbeing. . .	107
Existential Anxiety. . . . .	109
The Need for Self-Affirmation. . . . .	111

Chapter	Page
Existential Anger. . . . .	112
Summary. . . . .	116
5. ANGER AS A MALADAPTIVE RESPONSE IN HUMAN INTERACTION AND FUNCTIONING. . . . .	117
Maladaptive Defined. . . . .	119
GENERAL MALADAPTIVE CHARACTERISTICS OF ANGER . . . . .	120
The Defensive Nature of Anger. . . . .	121
The Causative Factors of Anger . . . . .	128
MALADAPTIVE CHARACTERISTICS OF THE SIX ANGER TYPES . . . . .	131
Instinctive Anger. . . . .	131
Frustration Anger. . . . .	133
Classically Conditioned Anger. . . . .	135
Operantly Conditioned Anger. . . . .	136
Phenomenological Anger . . . . .	139
Existential Anger. . . . .	140
Summary. . . . .	142
6. A METHODOLOGY FOR DEALING WITH ANGER . . . . .	144
General Methodology. . . . .	145
The Descriptive Process. . . . .	148
General Functioning Questions. . . . .	150
Anger Cause Questions. . . . .	162
Response Analysis. . . . .	162

Chapter	Page
APPLICATIONS OF THE DESCRIPTIVE PROCESS. . . . .	177
Dealing With Anger in Oneself. . . . .	177
Dealing With Anger in Others . . . . .	178
Summary. . . . .	184
7. SUMMARY AND RECOMMENDATIONS. . . . .	185
Summary. . . . .	185
Recommendations. . . . .	190
LITERATURE CITED . . . . .	194

LIST OF FIGURES

Figure	Page
1. Gradations of Anger . . . . .	47
2. Classical Conditioning of Albert. . . . .	75
3. Classical Conditioning of Anger . . . . .	77



## ABSTRACT

Anger is a subject which is seldom discussed independently of other topics. Because of this there appears to exist no work which would enable helping professionals to understand and deal specifically with anger related problems. The purpose of this study is to define the basic dynamics of anger and to suggest a method by which educationally oriented helping professionals may deal with the emotion.

Anger is defined as experiential emotional state which is characterized by a physiological arousal state. The arousal state is accompanied by cognitive desires to inflict harm (verbal or physical) on another person or object. Anger is seen as having six different causes which the author defines as six different types of anger. The types of anger are: (1) Instinctive anger: A biological adaptive anger which stems from a well defined threat to one's property, life, or family; (2) Frustration anger: Anger which is the result of the frustration of an organism's goal oriented response; (3) Classically conditioned anger: Anger which is learned as a result of the classical conditioning process; (4) Operantly conditioned anger: Anger which is learned as a result of the organisms being reinforced for displays of anger; (5) Phenomenological anger: That anger which stems from a threat to the organization and maintenance of the phenomenal self; and (6) Existential anger: That anger which arises as a result of the nonfulfillment of man's need to have his existence and worth in the world recognized by that world.

Anger is examined as a maladaptive response in human interaction and functioning. Any behavior which prevents or interferes with the actualization of a person's potential as a human being is defined as maladaptive. Anger is seen as a primarily defensive reaction to a stress producing stimulus. The defensive nature of anger is viewed as maladaptive in the following respects: (a) the defensive nature of anger blocks communication; (b) it prevents conflict resolution; (c) it promotes destructive relationships; and (d) it establishes a potential for violence.

Anger is also viewed as maladaptive in that the response does not deal with the factors which precipitate it. Rather, it focuses on eliminating the originator of the stimulus, thus creating a situation in which the anger will occur each time the stimulus is present.

A methodology is suggested to aid the reader in coping with his anger and the anger of peers, clients, and students. The methodology for dealing with anger utilizes a descriptive process designed to bring about awareness of an individual's functioning in relation to anger.

## Chapter 1

### INTRODUCTION

There exist emotional experiences for which each person has his own unique understanding, gained through a complex blending of human experience and human potential. This unique blending lends a certain flavor to each individual's experience of the world around him. Thus, each person's perception of the world is different. What moves one person to heights of passion may have no effect upon another. While similar events may cause differing emotional reactions in people, there exists a commonality of experience in terms of the emotions felt by the vast majority of mankind. Although emotions experienced by individuals may be very similar, the antecedents of these emotions reflect each person's experiences and genetic potentials.

When viewed in such terms, the communication of emotional experiences becomes an exceedingly difficult task. Not only does one have to be aware of what an emotion is, one also has to be aware of the frame of reference from which it is being communicated. Too frequently human interactions regarding emotional states are not communicated in this manner. Rather, it is taken for granted that when a person says, "I'm angry," another understands the unique meaning that this has for the individual. It may be possible that the two individuals involved in the conversation may have entirely different meanings attached to the term anger.

Stearns (1972) comments on the reasons for the absence of definitive definitions of emotions:

One reason is, of course, that these phenomena are neither incapacitating nor life-threatening and are, therefore, not under the social pressure of research demands. Another reason may be their self-evidence as an unquestionable occurrence in everyone's daily life (vii).

In essence, there exist emotional phenomena which have a definitive impact on people's day-to-day living. These emotions have psychological and physiological influences far beyond what one would expect from such a self-evident phenomena.

This paper purports to examine one of these emotions, anger, in relation to its impact on human psychological, educational, and physiological functioning.

The subject of anger suffers from all of the maladies discussed above. It is ill-defined. It is treated as a self-evident phenomenon, which has few implications for further study. Little research exists in the literature which deals primarily with the subject. Yet, much of the time spent by people in the helping professions is spent in dealing with anger. Rothenberg (1971:86) pointed out how the clinicians deal with anger:

In depression we look for evidence of anger behind the saddened aspect; in hysteria we experience angry seductiveness; in homosexuality and sexual disorders we see angry dependency; in marital problems we unearth distorted patterns of communication, particularly involving anger. We interpret the presence of anger, we confront anger, we draw anger, we tranquilize anger, and we help the working through of anger.

Madow (1972:86) identified seven physical illnesses in which anger plays a major role. He also commented on the role of anger in emotional well being: "As extensive as are the effects of anger on our physical being, their influence on our emotional lives, and therefore our lives generally, is even more pervading."

The role of anger in aggression is another ill-defined aspect of the subject. Kaufman (1965:355) discussed the relationship between anger and aggression:

The observation that aggression is usually accompanied by anger makes all the more necessary a thorough study of possible causative, rather than correlational phenomena. It is usually taken for granted that anger at least precedes aggression and, most likely, causes or at least facilitates it.

As indicated, anger is a phenomenon which has ramifications for individual functioning, interpersonal communication, and control of aggression.

Increasingly, professionals in the helping professions are being asked to aid in the resolution of the problems which have an anger related basis. In a very broad sense, the educational system of today is the focus of efforts to educate people about coping with anger. Many of the helping professionals work directly for, or in consulting roles with, the educational system. The focus of the helping professionals in the public schools is a natural consequence of education's desire to aid each student in becoming a fully functioning member of society.

Anger and how to cope with it is a consistent problem that permeates our entire educational system from a superintendent's relations with his school board to a teacher's relations with their students. Anger or the behavior which it precipitates is seldom understood, and rarely dealt with effectively. It is a national tragedy that the people employed in the most sensitive positions in our society--the education of our youth--are by and large ignorant of one of the most important variables in human learning--emotional functioning. No attempt is being made to criticize the educational system--only to point out a great inadequacy in the training of the personnel who deal with the youth of America. Very few teacher training programs emphasize the aspect of interpersonal relations and communications. In order to deal effectively with anger, it is important to understand the definition and dynamics of the emotion.

#### Statement of the Problem

The problem of this study was to: (a) examine the dynamics of the emotion of anger; (b) define anger; (c) demonstrate how anger, thus defined, is a maladaptive response in human interaction and functioning; and (d) demonstrate how anger can be understood and controlled in such a manner as to enhance human functioning rather than degrade it.

### Need for the Study

The emotion of anger is one of the least written about, least understood facets of human emotional functioning. Rothenberg (1971: 453) summarized the situation:

Almost invariably, anger has not been considered an independent topic worthy of direct investigation but has been subsumed under a general category such as aggression, emotion, or affect. Such categorization has not only deprived anger of its rightful importance in the understanding of human behavior, but it has also led to a morass of confused definitions, misconceptions, and simplistic theories. Little consideration has been given to the reasons for lumping anger together with aggression, for example, and systematic distinctions are seldom made between anger and other affects or emotions. Consequently, a clear picture of the anger phenomenon itself has not emerged.

In the light of this recent statement, the need for a study such as this becomes more evident. The confusing situation which surrounds the emotion of anger in terms of its definition, its dynamics and its functions needs to be clarified.

Kaufman (1965) indicated that anger plays an important role in aggression. Madow (1972) indicated that anger plays a role in the etiology of several physical illnesses. Stearns (1971) indicated that anger is a complex phenomenon which influences the entire human organism. Rothenberg (1971) maintained that anger plays an important role in various mental disorders.

In all these cases, anger is discussed in relation to some previously established field of study. Anger is seldom discussed in its own right, and because of this there exists no work which would

enable professionals to understand anger in such a manner as to deal with it in relation to the physical and mental problems associated with it. It is the author's contention that an examination of the dynamics and functions of the anger response will render anger more capable of being dealt with in relation to some of the physical and mental problems it is associated with.

General Questions to be  
Considered

These questions are general in nature and are answered throughout the paper. The specific chapters in which each question is answered is indicated at the end of each question.

1. What is anger? (Chapters 2, 3, 4, 5, and 6)
2. What are the different types of anger? (Chapters 3 and 4)
3. What are the dynamics of these different types of anger?  
(Chapters 3 and 4)
4. What function or functions does the emotion of anger have?  
(Chapters 2, 5, and 6)
5. Are these functions adaptive or maladaptive? (Chapter 5)
6. Is anger a learned or innate emotion? (Chapter 2)
7. What is the relationship between anger and aggression?  
(Chapter 2)
8. What is the relationship of anger to the following concepts:  
(a) hostility, (b) resentment, (c) rage, (d) fury, and (e) bitterness?

(Chapter 2)

9. What is the relationship between anger and existential anxiety? (Chapter 4)

10. What is the relationship between anger and frustration? (Chapter 4)

11. What part does cognitive input play in controlling and understanding anger? (Chapter 6)

12. What part does self-awareness play in controlling and understanding anger? (Chapter 6)

13. What steps can be taken by an individual to deal with his own anger? (Chapter 6)

14. What steps can the helping person take to deal with anger in his students, clients, and peers? (Chapter 6)

#### General Procedure for the Study

Chapter 2 examines the physiological changes that take place in the body during the anger response. The body's physiological response to anger is also examined in light of the question of whether anger is a learned or innate response. In addition, the latter portion of Chapter 2 examines the following topics: (a) functions of the anger response; (b) general dynamics of the anger response; (c) relationship between anger and aggression; and (d) relationship between anger and hostility, resentment, rage, fury, and bitterness.

Chapter 3 describes two types of anger--instinctive anger and



learned anger. Instinctive anger is examined from the point of view that it is a component of the so-called aggressive instinct. The anger response is discussed in relation to several popular theories of aggression which consider aggression as an instinct. The researcher has identified three types of learned anger: (a) anger as a response to frustration; (b) anger as a classically conditioned response; and (c) anger as an operantly conditioned response. Each of these learned types of anger is described and its dynamics examined in the latter part of Chapter 3.

Chapter 4 considers two additional types of anger--phenomenological anger and existential anger. Phenomenological anger is seen as a response to the environment caused by an individual's distorted perceptions of reality. Existential anger is viewed as an individual's response to the confronting of his meaning in the world.

Chapter 5, the author's conceptual contribution, purports to show how the types of anger described in Chapters 3 and 4 are maladaptive in some manner. From this presentation a method of dealing with these various angers is derived and presented in Chapter 6. This includes dealing with anger in one's self, as well as dealing with it in students, clients, and peers. Chapter 7 includes a summary of the paper and recommendations for further research.

### Limitations and Delimitations

This study was limited to a presentation of the author's conceptualization of the dynamics of the anger response. It was recognized that the presentation would have been stronger with an experimental validation of the conceptualization; however, it was not within the scope of this paper to do so. Recommendations for further research are discussed in Chapter 7.

The literature reviewed for the phenomenological portion of Chapter 4 was limited to a type of phenomenology defined by Combs and Snygg (1959). The purpose of this section was not to resolve differences inherent in the phenomenological movement, but rather to define certain phenomenological concerns which were essential to a definition of phenomenological anger. The author felt that the phenomenology of Combs and Snygg (1959) spoke more directly to those concerns than any of the other phenomenological works.

In some instances the six types of anger described in this study may not occur independent of one another. Any given display of anger may have its basis in any or all of the six anger types. Because of time and space limitations, the author has chosen to treat each of the six types of anger as independent phenomenon.

The literature reviewed for the study was limited to books and journals available at the Montana State University Library and through the Montana State University Interlibrary Loan Program.

Definition of Terms

Because of the nature of this study, the majority of definitions were given concurrently with the use of ambiguous terms. A few of the more frequently used terms are defined here.

Anger. An experiential emotional state which is characterized by a physiological arousal state. The arousal state is accompanied by cognitive desires to inflict harm (verbal or physical) on another person or object.

Agonistic. Contesting or combative behavior.

Emotion. Physiological response to a stimulus situation.

Feeling. Cognitive interpretation of a physiological response created by a stimulus situation.

Innate. That which belongs to something as part of its nature or constitution.

Instinctive response. An inborn tendency to behave in a way characteristic of a species.

Learned response. A behavior which is acquired as a result of an organism's interaction with its environment.

Maladaptive behavior. Any behavior on the part of a person

which prevents or interferes with the actualization of his potential as a human being.

### Summary

The focus of this study is on the development of an integrated conceptual understanding of the functions and dynamics of the emotion of anger. Chapter 2 describes the physiology and general dynamics of anger. Chapters 3 and 4 delineate six different types of anger to include the dynamics and functions of each type.

Chapter 5 examines anger as a maladaptive response in human interaction and Chapter 6 suggests some possible methods of coping with anger in one's self, students, clients, and peers. A final chapter summarizes and presents suggestions for further research.

The writer hopes to clarify some of the confusion surrounding the subject of anger. The focus is not on rectifying present disagreements but rather on presenting an alternative view of anger, which focuses on anger as a primary subject rather than as an adjunct of theories of emotion, affect, or aggression. It is hoped that this clarification applied to the educational field will aid helping professionals with problems which occur as a result of the misuse of the anger response.

## Chapter 2

### THE PHYSIOLOGY AND GENERAL DYNAMICS OF ANGER

For the average individual, anger is a part of his everyday functioning, and for some it is a problem. On the surface anger seems to be a relatively simple expression of dislike or disgust for an object or person. In reality, it is a complex phenomenon, which has a physiological as well as an environmental basis. The purpose of Chapter 2 is to examine these two facets of the anger response.

A person knows he is angry when he becomes aware of certain bodily sensations. These sensations seem to differentiate between anger and other emotions, as well as between varying intensities of anger. These sensations and how they are produced is the focus of the initial portion of Chapter 2. The purpose of this section is to describe the physiological changes that take place in the body during the anger response. These changes are also examined in light of the question of whether or not anger is a learned or innate response.

These physiological changes play a prominent role in the second major topic of Chapter 2--the general dynamics of the anger response. The term anger is an extremely ambiguous one. Anger is an emotion and thus is experienced in a subjective manner. There seem to be no commonalities inherent in the emotion which are applicable to all people.

What moves one person to anger may have no effect upon another. The one thing which seems to be common to all experiences of anger is a

state of physiological arousal. Individual differences come into play here also. While one person may call this physiological arousal anger, another may call it resentment and still another may call it hostility. Anger seems to have differing antecedents for each person, as well as differing experiential qualities for each person.

In an attempt to clarify some of this ambiguity, and to convey to the reader a common starting point from which he may examine the remainder of this paper, the author has chosen to explain anger and its dynamics in a rather novel manner. This explanation is for the most part the author's conceptualization and follows logically from the physiology research discussed in this chapter. This general discussion of the dynamics of the anger response is the second and final topic of Chapter 2.

#### THE PHYSIOLOGY OF ANGER

"Hot under the collar . . . livid with rage . . . white with anger." The origins of these descriptive statements stem from the physiological changes which people undergo when they experience the emotion of anger. The study of these physiological changes and the mechanisms which underlie them was given a great deal of impetus during the late nineteenth century by the writings of William James (1968). Prior to this time, the study of emotions and emotional functioning had generally been confined to a philosophical and theological realm.

James (1968:19) brought the study of emotional functioning into a scientific realm by defining an emotion in a physiological sense. He stated:

Our natural way of thinking about these standard emotions is that the mental perception of some fact excites the mental affection called the emotion, and that this latter state of mind gives rise to the bodily expression. My thesis on the contrary is that the bodily changes follow directly the perception of the exciting fact, and that our feeling of the same changes as they occur is the emotion.

James' writings, along with those of Charles Darwin (1896), sowed the seeds of a controversy which is still unresolved today. This controversy centers around the physiological changes which an organism undergoes during the experiencing of an emotion, with the basic question being: are the emotions learned or are they innate? If emotions are learned, then the organism would undergo a nonspecific physiological change to which various affective meanings could be attached. If, on the other hand, emotions are innate, then definitive physiological mechanisms which serve to differentiate between various emotions should be discernible.

The literature reviewed in this chapter has provided the empirical foundation for the development of many theoretical conceptualizations which purport to explain man's aggressive behavior. An exposure to this topic, however rudimentary, is essential to the understanding of the emotion of anger and its place in human behavior. Knowledge of physiological functioning provides the reader with a

framework from which an examination of theoretical propositions is possible.

The subject of the physiology of anger is a complex one and has a range which extends from the simple subjective experience of a description of the outward physical manifestations of anger to the complex mechanisms of the brain and central nervous system.

Early experimenters, such as Darwin, described the physical manifestations of anger, rage, and various other emotions and attempted to show that culture had little influence on the manner in which emotions were displayed. As laboratory techniques improved, the response of the internal organs came under scrutiny, and attempts were made to differentiate emotions on this basis. Present-day research focuses on neurological substrates of emotional behavior in an attempt to delineate definitive parts of the brain involved in emotional behavior.

The research seems to be divided into four relatively distinct areas: (a) outward physical changes; (b) internal organ manifestations; the role of adrenalin and nor-adrenalin; and (d) the role of the central nervous system. Each of these areas is examined in this portion of Chapter 2. An examination of the question of whether or not anger is an innate or learned emotion concludes the section.

#### Outward Physical Changes

Expressions such as "livid with rage" have been used for centuries to describe the physiological manifestations of the emotion



of anger. Charles Darwin in his now classic work On the Expression of Emotions in Man and Animals (1896) made a systematic attempt to describe these physical manifestations. Darwin's contention was that emotions were part of man's instinctual nature--sort of a remnant of pre-historic times when man's survival was dependent on his ability to react instinctively to his environment. Darwin reasoned that if this were true then man's method of expression of his emotions should be similar in certain respects to that of animals lower on the evolutionary chain. In support of this hypothesis, Darwin did find many similarities of emotional expression across a wide range of animals, including man. He also found similarities across many different cultures, all of which led him to postulate that emotions were an innate part of man's behavior.

Darwin's descriptions are still very accurate and give a very systematic detailed account of the outward physical changes which take place during the anger response. Darwin described the rage response as follows:

The face reddens or becomes purple, the veins on the forehead and neck are distended. The reddening of the skin has been observed with the copper-colored Indians of South America, and even as it is said on the white cicatrices left by old wounds on negroes . . . . The eyes are always bright . . . . They are sometimes bloodshot, and are said to protrude from their sockets--the result of the head being gorged with blood, as shown by the veins being distended. The pupils are always contracted in rage. The lips are commonly retracted, the grimacing or clenched teeth being exposed. The retractions of the lips and uncovering of the teeth during paroxysms of rage, as if to bite the offender, is so remarkable, considering how seldom the teeth are used by men in

fighting. The upper lip may be seen to be raised, especially at the corners, so that the huge canine teeth are exhibited (1896: 240).

Darwin also described what he called a moderate anger response:

Under moderate anger the action of the heart is a little increased, the color heightened, and the eyes become bright. The respiration is likewise a little hurried and as all the muscles serving for this function act in association, the wings of the nostrils are somewhat raised to allow of a free indraught of air; and this is a highly characteristic sign of indignation. The mouth is commonly compressed, and there is almost always a frown on the brow. Instead of the frantic gestures of extreme rage, an indignant man unconsciously throws himself into an attitude ready for attacking or striking his enemy, who he will perhaps scan from head to foot in defiance. He carries his head erect with his chest well expanded, and the feet firmly planted on the ground. He holds his arms in various positions, with one or both elbows squared, or with the arms rigidly suspended by his sides (1896:246).

Cannon (1929:243) cited the following characteristics as descriptive of the rage response:

In its extreme form the signs of rage include the crouching body, the moist or frowning brow, the firm lips, the clenched or grinding teeth, the growled threats or imprecations, and the tightened fists or the seized weapon ready for the attack.

The works of Cannon and Darwin have become classics, and today remain the most often quoted references for descriptions of the rage and anger responses. These descriptions of the physical responses which the human organism undergoes while experiencing the emotion of anger were the beginnings of a new scientific field of investigation called psychophysiology. The originator of this new science was Cannon. His now classic research Bodily Changes in Pain, Hunger, Fear and Rage (1929), which discussed the physiological mechanisms of anger, fear,

and pain instigated a whole new era of scientific investigation. He moved the investigation of the body's physical responses in emotion from subjective descriptions to measurable quantifiable data. In the following sections, the immensity of Cannon's contributions becomes readily apparent.

### The Internal Organ Responses

Since the question of whether emotions are learned or innate is a central one in this review of literature, it follows that investigators must prove either that there are different physiological mechanisms for the various emotions, or that there is but one general nonspecific one. For this reason research must be conducted which compares the different emotions. Most of the studies reviewed in this section are of this type. The emotions most often compared are fear and anger, with the reason being that these are the easiest to identify and bring about in a laboratory situation.

Cannon (1929:225) described the internal physical reaction when the body experiences anger, pain, or fear:

Cessation of processes in the alimentary canal (thus freeing the energy supply for other parts); the shifting of blood from the abdominal organs to the organs immediately essential to muscular exertion; the increased vigor of contraction of the heart; the discharge of extra blood corpuscles from the spleen; the deeper respiration; the dilation of the bronchioles; the quick abolition of the effects of muscular fatigue; the mobilizing of sugar in the circulation.

Cannon viewed these changes as being brought about by the action

of the sympathetic nervous system. Another description of the bodies' internal functioning indicates the extent to which he believed the body was activated during periods of intense emotional excitement.

The visceral changes wrought by sympathetic stimulation may be listed as follows: acceleration of the heart, contraction of arterioles, dilation of bronchioles, increase of blood sugar, inhibition of activity of the digestive glands, inhibition of gastro-intestinal peristalsis, sweating, discharge of adrenalin, widening of the pupils, and erection of hairs (1929:351).

It is interesting to note that Cannon made no differentiation between the emotional reactions induced by pain, fear, and anger, indicating instead a broad nonspecific physiological reaction to any emotional stimulus. Wolf and Wolff (1942) dealt with a patient who had a gastric fistula. A fistula is a hole in the stomach which enables a physician to view the workings of the stomach in a direct manner. The man was a janitor where the authors worked and consequently they had an opportunity to study their patient over a long period of time in a somewhat natural setting. They found that when he was angry his stomach showed accelerated acid secretion, increased contraction, and increased blood flow. In addition, the stomach became red and enlarged.

A prolonged period of anger increased the severity of the symptoms. During reactions such as this, the stomach wall became very sensitive and was easily perforated. Wolf and Wolff conjectured that the anger response may be the beginning of a peptic ulcer in the human organism.

Wolf and Wolff also observed that during a fear response the stomach lining became pale and the level of acid secretion decreased. This finding would lend some credence to the proposition that emotions are physiologically different.

Another bit of evidence to support the hypothesis that anger and fear have a different physiological basis was provided by Kemp (1953) who reported that in rage the heart developed slower, stronger, and larger contractions than in fear, thus sustaining a greater volume of blood at higher pressure.

Oken (1960) conducted a study concerned with the psychophysiology of anger, anxiety, and depression. He utilized the measures of systolic blood pressure, pulse pressure, and heart rate in an attempt to differentiate between the three affective states. Oken concluded that the three states were different and that the anger state produced the greatest rise in the measures being utilized.

In the same study, Oken attempted to validate the theoretical proposition that hypertension is the result of repressed anger. On the basis of previously gathered data, Oken divided his original experimental group into an anger expressor group and an anger suppressor group. Between these two groups there was no difference in heart rate. The expressor group had a higher systolic blood pressure and a lower diastolic blood pressure than did the suppressor group. These results are best understood in relation to Oken's definition of the two types

of blood pressure.

Physiologically, in the absence of heart rate changes, diastolic blood pressure is primarily a function of peripheral resistance, while systolic blood pressure is more closely related to cardiac output (1960:454).

This would mean that the expressor group is pumping more blood with less resistance to that blood being pumped, which would seem to indicate within the organism itself a greater ability to express itself, both physically and emotionally.

Taylor (1967) conducted a study with self-labeled undercontrollers and overcontrollers of the anger reaction. He attempted to determine if physiological arousal varied directly as a function of aggressive provocation. He utilized basal skin conductance as an index of physiological arousal because of its association with a general level of tension inherent in the human organism.

The data supported Taylor's contention that physiological arousal varies directly as a function of aggressive provocation. He also found:

Basal conductance of the undercontrollers increased more rapidly and reached a higher final level than the basal conductance of the overcontrollers. This finding is contrary to the hypothesis that people who characteristically inhibit their aggression experience greater tension than those who readily express their aggressive feelings (1967:309).

Ax (1953) conducted a study to determine if there were any physiological differences between fear and anger. Forty-three subjects were presented with both a fear stimulus and an anger stimulus. The

following physiological reactions were recorded: (a) heart rate, (b) ballistocardiogram--index of the stroke volume of the heart, (c) respiration rate, (d) face temperature, (e) hand temperature, (f) skin conductance, and (g) integrated muscle potential.

Ax obtained the following differences. In relation to the fear response, the anger response showed a greater rise in diastolic blood pressure, a slower heart rate, and a greater number of changes in skin conductance. In relation to the anger response, the fear response showed a larger increase in sweating, a greater number of muscle tension peaks, and a higher respiration rate.

Ax concluded from the results that there is indeed a definite physiological difference between fear and anger. Ax also found that the response to the anger stimulus indicated a greater degree of physiological integration than did the fear response. He postulated that this might relate in some way to the evolutionary theory of the struggle for survival. An organism about to attack (anger response) needs a great deal of internal organization, while one paralyzed by fear has an almost complete lack of effective integration.

As can be seen from the literature reviewed thus far, definitive physiological changes do take place under the conditions of the various research situations described. It is very tempting to declare that emotions can be differentiated on a physiological basis; however, the factor of individual differences has yet to be reckoned with. The

findings of these studies are based upon statistically significant results which deal with averages for a population. The author feels that it is important to keep in mind that there were subjects in these research studies who did not perform in the hypothesized manner. The statistical findings could be interpreted as indicative of the innateness of man's emotional behavior. However, the fact that some people did not react as hypothesized could indicate that perhaps the reaction is a culturally learned mechanism, which not everyone learns in the same manner. The ambiguity surrounding this question becomes more apparent as more complex physiological issues are dealt with in the following sections.

#### Function of Adrenalin and Nor-adrenalin

Cannon (1929:343) believed that the physiological mechanism which was activated in fear and anger was the same for both emotions.

He stated:

There is, indeed, obvious reason why the visceral changes in fear and rage should not be different, but rather, why they should be alike . . . these emotions accompany organic preparations for action, and just because the conditions which evoke them are likely to result in flight or conflict (either one requiring perhaps the utmost struggle), the bodily needs in either response are precisely the same.

Cannon's focus in his research was on the activities of the sympathetic nervous system. Essentially this is the part of the autonomic nervous system which operates during periods of stress and



allows the body to mobilize its defenses for "fight or flight." Cannon thought that this "fight or flight" mobilization was the result of the stimulation of the adrenal gland by the sympathetic nervous system which resulted in the release of adrenalin. Cannon goes on to say: "Adrenalin is capable of producing many of the bodily changes which are characteristically manifested in emotional and painful experiences (1929:49)."

Funkenstein (1955:74) summarized Cannon's theory:

Cannon found that when an animal was confronted with a situation which evoked pain, rage or fear, it responded with a set of physiological reactions which prepared it to meet the threat with "fight or flight." These reactions, said Cannon, were mobilized by the secretion of adrenalin. When the cortex of the brain perceived the threat it sent a stimulus down the sympathetic branch of the autonomic nervous system to the adrenal glands and they secreted the hormone.

Essentially Cannon worked with responses to fear and anger and then generalized the physiological mechanism across the entire range of emotions. This is the legacy with which present day psychophysicologists have been working. The question of whether or not emotions can be differentiated on a physiological basis is an essential consideration of any theoretical treatise on emotional functioning. The research presented here focuses on the role of adrenalin, and nor-adrenalin, in the mediation of emotional responses. The basic question is, can emotions be differentiated on a physiological basis?

Ax (1953) in a study reported earlier concluded that anger and fear were different physiological reactions. Ax compared the results

of his study with those of previous studies, describing the effects of injections of epinephrine (adrenalin) and nor-epinephrine (nor-adrenalin). The physiological reactions produced by a fear stimulus are similar to those produced by an injection of epinephrine and an injection of nor-epinephrine produces a response similar to an anger reaction.

Funkenstein (1955) continued the work of Ax in an experiment designed to determine the difference in physiological reactions between injections of adrenalin and nor-adrenalin. Funkenstein examined his findings in relation to the psychoanalytic concept that depression is anger turned inward. While never really stating the fact, he also seems to equate depression with fear. The results of his experiments suggest "that anger directed outward was associated with secretion of nor-adrenalin, while depression and anxiety were associated with secretion of adrenalin (1955:77)."

Funkenstein concluded that "the physiology was specific for the emotion and not the person (1955:77)." Funkenstein is essentially saying that there is a different physiological mechanism which operates for anger and fear and that these differences are due primarily according to which chemical is secreted by the adrenal medulla--adrenalin or nor-adrenalin. Funkenstein goes on to speculate on the releaser mechanisms which operate in the brain in relation to anger and fear. "Anger and fear may activate different areas in the

hypothalamus, leading to production of nor-adrenalin in the first case and adrenalin in the second (1955:78)."

He returns to his psychoanalytic formulation and makes the following observations:

This entire series of experiments yielded data which can be understood in the frame of reference of psychoanalytic observations. According to theory, anger directed outward is characteristic of an earlier stage of childhood than is anger directed toward self or anxiety (conflicts over hostility). The latter two emotions are the result of the acculturation of the child. If the physiological development of the child parallels its psychological development then we should expect to find that the ratio of nor-adrenalin to adrenalin is higher in infants than in older children. Bernt Hokfelt and G. B. West established that this is indeed the case: at an early age the adrenal medulla has more nor-adrenalin, but later adrenalin becomes dominant (Funkenstein, 1955:80).

Ax (1960:172) reviewed his study conducted in 1953 plus several other studies to further his contention that emotions have different physiological bases. He summarized the findings of these other studies in the following statement:

A number of recent biochemical studies suggest that the response to fear is an epinephrine-like response and that the response to anger resembles a combined response to epinephrine and nor-epinephrine.

Ax traced the history of psychophysiology from Cannon's discovery of the function of adrenalin to the discovery of the function of nor-adrenalin. He reasoned that if science has discovered two biochemical substances which seem to mediate emotional functioning it is possible that there are many more. He stated:

Undoubtedly there are many varieties of biochemical substances sufficient to mediate any number of subtle emotions. As experimental techniques become more sensitive, they will disclose these substances. Biochemical equivalents are often suggested by an intuitive description of feeling nuances and by a pattern of physiological reaction to variations in emotions (1960:172).

Schachter's findings for the most part confirmed those of Ax and Funkenstein with one exception. Schachter found that "the degree of epinephrine-like effect or nor-epinephrine-like effect varies with the psychological intensity of anger (1957:24)." He further clarified this: "High and low intensities of anger tend to be associated with epinephrine-like effects, where as moderate intensities of anger are associated with nor-epinephrine-like effects (1957:25)." Findings of this nature seem to indicate that individual subject differences and situational factors play a large part in the body's physiological reactions to emotion provoking stimulus.

Arnold (1960b:220) commented on the role of adrenalin, the fight or flight controversy:

Adrenalin and sympathetic stimulation do not improve muscular performance. Rather, they reduce efficiency by increasing lactic acid formation and by interfering with glucose and oxygen utilization. Sudden fear may bring a sudden urge to flee and so provide a powerful spur to action. When this urge leads to successful escape and the danger is past, the effects of sympathetic stimulation quickly subside. But when escape is impossible and fear becomes chronic, the physical and psychological effects of fear soon incapacitate a man for serious work. Mental work becomes impossible because attention is centered on the threatening danger. The central effect of fear makes it difficult to remember, imagine or decide on action. Physical work becomes increasingly laborious because the cumulative effect of sympathetic stimulation seriously reduces muscular efficiency.

Arnold (1960b:224) also clarifies the role of nor-adrenalin in emotional functioning:

Nor-adrenalin, like adrenalin, induces the release of glucose from the liver: but unlike adrenalin, it leaves muscle glycogen untouched. This would mean that nor-adrenalin secretion increases blood sugar available to the muscles without breaking down the muscle glycogen, and so promotes muscular strength. This would explain why anger gives us the feeling of being stronger than usual, in contrast to fear which makes us feel weak.

Arnold definitely feels that the differentiation between fear and anger lies in the secretion of adrenalin and nor-adrenalin. She stated, "Anger appears to be associated with nor-adrenalin secretion with rises in blood pressure and with cholinergic vasodilation (1960b:220)." She further identified with this position with the following statement:

That aggression (hence anger) and nor-adrenalin secretion go together is shown by the fact that animals that prey upon each other, and attack and fight a great deal, have mostly nor-adrenalin in their adrenal medulla (1960b:224).

Funkenstein (1955) also reported this finding, indicating that animals considered to be hunters, such as the lion, have a predominance of nor-adrenalin while social animals, such as the baboon, or animals who rely on flight as a primary means of defense have a predominance of adrenalin.

While the applicability of animal studies to humans is questionable, these findings seem to indicate that nor-adrenalin is associated with aggressive behavior. This assumption is further reinforced by the findings reported below.

Stanley-Jones (1970:35) reports a differentiation of depressed patients versus paranoid patients based on the concentrations of adrenalin and nor-adrenalin in their system.

Patients who are depressed and fearful show an excessive secretion of adrenalin even in the absence of external stress. Paranoids, whose outlook on life is dominated by hostility, have an excess of nor-adrenalin.

Arnold firmly aligned herself with those who feel that there are definitive physiological mechanisms underlying emotion with the following statement: "For each emotion, there is a distinct pattern that remains more or less constant and is recognized as characteristic for that emotion (1960a:179)."

She did indicate that the physiological differentiation between fear and anger may not be quite as well defined as she had indicated.

Extreme anger will lead to incoordination. The urge to violent attack does not favor finely coordinated action. Also, there is a point at which something inimical may be judged as so threatening that it will arouse desperation rather than anger. Or the expression of anger itself may produce fear: the other person may retaliate, or the attack may destroy something a man may not care to lose. If fear is aroused in addition to anger, it will intensify sympathetic excitation and may change the outward symptoms (1960b:225).

To this point, the research presented has indicated that there are different physiological mechanisms underlying the different emotions, and that the emotion of anger is associated with the secretion of nor-adrenalin by the adrenal medulla.

Schacter and Singer (1962:379) questioned this assumption: "Whether or not there are physiological distinctions among the various

emotional states must be considered an open question." They theorized that in labeling emotions there is an interplay between cognitive factors and physiological arousal. Their experiment, which consisted of the injection of epinephrine and the creation of various manipulative situations in which subjects were given models of emotional behavior, definitely supported the hypothesis that cognitive factors are major determiners of emotional labels, and that in fact subjects under the arousal condition (injection of epinephrine) labeled the state both anger and euphoria, in different portions of the experiment.

This would seem to indicate that, "Emotional states may, indeed, be generally characterized by a high level of sympathetic activation with few if any physiological distinguishers among the many emotional states (Schacter and Singer, 1962:397)." This means that the bodies reaction to an emotional situation is essentially the same for all emotions, and that cognitive factors determine what label a person will place on the arousal state.

Kaufman (1970) supported Schacter and Singer's position. He maintained that individuals undergo a learning process in terms of differentiating various types of emotional behavior in which a connection is made between visceral changes and cognitive perceptions of various events. He stated:

Visceral feedback is necessary to establish emotional behavior but not to maintain it. Moreover, these visceral events need not be highly differentiated; they simply need to be present, in a

































































































































































































































































































































































































