

**PATTERNS OF PHYSIOLOGICAL RESPONSE AS
RELATED TO A MEASURE OF EGO DEFENSIVENESS**

DISSERTATION

ANTHONY CHRISTOPHER DOWNS

PATTERNS OF PHYSIOLOGICAL RESPONSE
AS RELATED TO A MEASURE OF EGO DEFENSIVENESS

An Abstract
Presented to
the Graduate Council of
Austin Peay State University

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts in Psychology

by
Anthony Christopher Downs

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ABSTRACT

Thirty eight college students served as subjects in a correlational study of patterns of physiological response as related to ego defensiveness. All subjects listened and responded to the items comprising the Defensive Positive Scale (DPS) of the Tennessee Self Concept Scale (TSCS). Increasing scores on the preceding measure indicate high defensive distortion for defense of ego. The subjects' HR and GSR were recorded during the procedure. The HR and GSR responses to the 29 items from the DPS were evaluated as follows: coping when GSR increased and HR decreased, inhibitory when GSR decreased and HR increased. All other response patterns were considered to be uncertain. A significant correlation (.41) between number of inhibitory responses and scores from the DPS was determined. Additionally, a further significant correlation (-.33) between coping responses and DPS scores was determined. It was concluded that a relationship existed between certain patterns of physiological response and ego defensiveness as evaluated by the DPS of the TSCS.

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To the Graduate Council:

I am submitting herewith a thesis written by Anthony Christopher Downs entitled "Patterns of Physiological Response as Related to a Measure of Ego Defensiveness." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Arts, with a major in Psychology.

Garland E. Blair
Major Professor

We have read this thesis and
recommend its acceptance:

Stephen F. Davis
Minor Professor
or
Second Committee Member

William D. Cunningham
Third Committee Member

Accepted for the Council:

Wayne E. Stamp
Dean of the Graduate School

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CHAPTER I

INTRODUCTION

It has been widely acknowledged that certain physiological states and emotions are to some extent related. Indeed, Krech, Crutchfield, and Livson (1970, p. 591) states that "Emotional responses are an integration of skeletal, autonomic, and glandular responses. The prominence of visceral responses in aroused emotional states has led to widespread use of such visceral measures as blood pressure, heart rate, sweat gland response, and respiration as indexes of emotional behavior." Among the above measures of physiological response perhaps the most widely used are those of skin conductance and heart rate.

Thompson, Lindsley, and Ecson (1966) indicate that as early as 1888 the electrical conductance of the skin, as modified by the action of the sweat glands, was found to be affected by the presentation of different types of sensory stimuli. Then changes were found to occur when a subject was experiencing emotional stress. As a result, concurrent with the improvement in instrumentation, these minute changes in skin conductance came to be known as the galvanic skin response or GSR. GSR, because of the relative ease of obtaining this measure and its high reactivity to varying emotional states, has become an important measure of emotionality. It is most useful as an index of emotionality when employed with a naive subject who is not aware of the GSR changes taking place. If the subject is aware of these changes, it is possible that he may inhibit them,

leading to responses deceptive to the experimenter. Another difficulty is that changes in the GSR may accompany any sensory stimuli or concentrated mental activity. Therefore, GSR changes cannot be thought of as being purely the result of differing emotional states.

Similarly, heart rate (HR) has been found to differ in accordance with varying emotional states. The exact historical antecedents of this finding cannot be determined with any degree of accuracy, though it is possible that the concept descends to us through medical tradition from the civilization of ancient Greece (Kroch, et al., 1970). However, much the same difficulties apply to this measure as apply to the GSR. An experienced subject can exercise some degree of control and the HR is again sensitive to sensory stimuli and effects of concentrated mental activity. Still HR is a widely used measure because the instrumentation is not too complex, and it yields easily quantifiable data instead of the analog output from the GSR.

Physiological measures, such as those just discussed, have been used in a number of areas of psychological research. Social psychology uses these measures to study the relationship between emotion and prejudice (Cooper and Pollock, 1959). Perceptual psychology has utilized physiological measures in investigating form and pattern perception (Koeppler, 1969). Clinical psychology has made extensive use of GSR and HR in the study of normal and abnormal personality traits (Kroch, et al., 1970). Essentially, both GSR and HR have been extensively employed in situations where a measure of physiological functioning was wanted or some method whereby the direct subjective report of emotional states could be avoided. Actually, the use of physiological measures is far broader than what is

represented above; however, cataloging all the uses of physiological measures is beyond the scope of this paper and the above are intended as a representative sample.

Unfortunately, despite the wide use of physiological measures, little is understood about their actual relationship with emotional states. Usually it is possible to state that a certain physiological response correlates with some emotional event. However, at present it is impossible to state whether some physiological measure or combination of measures mean hate or love, coping or inhibitory behavior, etc. This state of ignorance is quite surprising because it continually hampers the interpretation of physiological responses in various emotion inducing situations.

This paper will examine some of the research which attempts to relate certain patterns of physiological response to ego defenses and defensive behaviors. Additionally, the study to be reported will attempt to add clarification to this area.

Waters (1970) found that by using GSR, HR, and electromyogram (GMG) measures, defensive responses could be identified as being followed by significantly greater reduction of the physiological measures employed than non-defensive responses. Thus, he concluded that "defensive responses are escape responses to aversive stimuli, followed by (not necessarily reinforced by) a reduction of adrenosympathetic arousal (not necessarily negative affect) exceeding that following non-defensive responding."

However, Simal and Herr (1970) using Byrne's Represser-Sensitizer Scale and measured autonomic responses concluded that defensiveness is not necessarily registered at the autonomic level. Behavioral differences

attributed to defensiveness appeared to them to be more cognitive in nature than physiological.

Both of these conclusions cannot be accepted. On the whole, the conclusions of Simal and Herr (1970) appear to be the most unlikely. If defensiveness can be defined as an emotional state or as having components of emotional involvement, then it or its components must register at the autonomic level or psychology must re-examine the numerous correlations between emotions and physiological states. Waters' (1970) conclusions can be criticized in that he equates defensive responses and escape responses. This direct comparison was probably not warranted. It would seem to be an invalid comparison to equate psychological ego defense with a physical escape response. Even with his conclusion in doubt, Waters (1970) does make one important point, namely that he found a relatively consistent pattern of physiological response that enabled him to determine, with some degree of accuracy, whether or not a particular response was defensive.

The findings of Neva and Hicks (1970) failed to support Waters' (1970) point. Their study did not indicate a meaningful relationship between scores on the Manifest Anxiety Scale and the physiological measures of GSR and HR. So far, the evidence is contradictory; Waters (1970) found fairly consistent patterns of response; Neva, et al. (1970) did not.

Archer, et al. (1972) found what they labeled inhibitory and coping physiological responses in subjects involved in counseling situations. The physiological measures that Archer, et al. (1972) employed were eccrine sweat rate and HR. In this situation eccrine sweat rate and GSR

can be regarded as synonymous and GSR will be used in this discussion. According to Archer, et al. (1972) inhibitory responses were reflected in lowered GSR and increased HR. Descriptively, these inhibitory responses involved: lack of openness (in the Rogerian sense) and clear expression of feelings, suppression of personal involvement. Archer, et al. (1972) state that "the subject was attempting to deny from his awareness some vague feelings he was actually having or else became cautious and controlled." These responses are interpreted by the writer as being ego defensive. Coping responses were reflected by increased GSR and lowered HR. Descriptively, coping responses reflected openness, clear expression of feelings, and willingness to express them. This pattern of response can be characterized as coping or non-defensive. It should be emphasized that Archer, et al. (1972) did not find these inhibitory and coping responses in all of their subjects. Indeed, some subjects did not exhibit these response patterns at all. Further, those subjects that did exhibit these patterns of physiological response did not consistently exhibit them. The Archer, et al. (1972) study offers some support for Waters' (1970) conclusion, but considering the data reported by Neva, et al. (1970) no consistent pattern seems to emerge.

Ray and Thompson (1974) found that low sex guilt coeds, as determined by the Mosher Scale, exhibited, as a group, the coping response proposed by Archer, et al. (1972). Additionally, the high sex guilt group tended to exhibit what appeared to be an inhibitory response pattern. Unfortunately, this finding was nonsignificant.

Waters (1970), Archer, et al. (1972), and Ray, et al. (1974) have reported finding reasonably consistent physiological patterns. Waters

(1970) stated his pattern was a significant decrease on all measures employed for a defensive response. On the other hand, Archer, et al. (1972) found reasonably consistent defensive responses to consist of lowered GSR and increased HR. The Archer, et al. (1972) data is marginally supported by Ray, et al. (1974). Therefore, if these results are accepted, an ego defense is supposedly typified by two different physiological response patterns. This discrepancy in results, of course, might be due to the differing experimental procedures, purposes, or simply chance. (But, the findings of Waters (1970), Archer, et al. (1972), Ray, et al. (1974) are contradicted by Simal, et al. (1970) and Neva, et al. (1970) who found no patterns of physiological response at all.) As yet there is insufficient evidence to reach a decision.

In order to gain additional information, a procedure was designed which would indicate if some relationship existed between a measure of personality defensiveness (The Defensive Positive Scale of the Tennessee Self Concept Scale) and patterns of physiological response involving GSR and HR. If indeed such a relationship exists, a significant correlation coefficient should be generated between scores on the Defensive Positive Scale (increasing scores indicate increasing ego defensiveness) and the number of coping or inhibitory physiological responses as defined by Archer, et al. (1972).

CHAPTER II

METHOD

Subjects:

The subjects were 41 undergraduate college students (18 females, 23 males) enrolled at Austin Peay State University. The subjects received class credit for participating in the study.

Apparatus:

Both the subject being tested and the experimental equipment were housed in one room. The subject was seated at a desk facing a bare wall. A response box was within easy reach of his right hand. A partition prevented the subject from viewing the experimenter or the equipment. The subject's GSR was measured by finger tip electrodes attached to the left hand. The electrodes were, in turn, connected to a GSR Biosensor whose output was conducted through a transformer and full wave rectifier to one channel of a directly coupled (Offner Model MR) six channel chart recorder. The paper speed of the chart recorder was set at .25 cm/sec. HR was measured by a wrist electrode attached to an Alphasensor. The output of the Alphasensor was transformed and rectified, and interfaced with another channel on the chart recorder.

A Lloyd's cassette tape player was utilized to play the stimuli tape. The output of the player was conducted through an audio operated switch (VOX) and external amplifier to earphones worn by both the subject and experimenter. Plus output of the VOX was connected to one channel of the

chart recorder to provide a signal indicating when the subject was receiving the stimuli.

Subject responses were recorded on a third channel of the chart recorder via the five-choice response box located in front of the subject. Depression of each switch provided an unique input to the recorder channel. Chassis grounding was provided by two earlobe electrodes.

Stimuli:

The stimuli were 34 numbered, tape-recorded statements from the Tennessee Self Concept Scale. The statements had been alternately recorded by the experimenter and a female assistant. The first five statements were provided so that the subject would have practice before starting the 29 statements that comprised the Defensive Positive Scale. The subject was instructed to respond to each statement by depressing one of five choices on the response box. The choices were: (1) completely false, (2) mostly false, (3) partly false and partly true, (4) mostly true, (5) completely true. A listing of items used appears in Appendix A.

Procedure:

The subject was seated in front of the table carrying the response box and asked to remove electrically interfering personal jewelry such as watches, earrings, and rings. Then the various electrodes and earphones were attached concurrently with an explanation of their purpose. The subject was then requested to keep his left hand and arm as still as possible and perform all manipulations with his right hand. The subject was then given a sheet of typed instructions to read (See Appendix B) while the experimenter adjusted the equipment. The tape was then started after the subject had signified that he was ready.

The subject then listened to the tape selecting a response after each statement until all 34 had been completed. At this point the subject was disconnected and debriefed concerning the general purposes of the experiment. Before leaving he was requested to refrain from informing fellow students about the procedure and purposes.

CHAPTER III

RESULTS

The DPS of the TSCS was scored in accordance with the directions listed on the scoring form. A significantly high score on this scale indicates a positive self description stemming from defensive distortion while a significantly low score indicates that the person is lacking in the usual defenses for maintaining self esteem (Fitts, 1965).

An arbitrary interval of ten seconds of chart time after the response of the subject was selected for use in scoring GSR and HR. Both were categorized into three categories for all items. These categories were: (1) increase, (2) no change, (3) decrease. A coping response was defined as increasing GSR combined with decreasing HR. An inhibitory response was the inverse of the coping response. All other response combinations were defined as uncertain. All three categories were counted and compared with the DPS score.

A Pearson Product Moment r was computed for the 38 scorable protocols. The resulting correlations are shown in Table 1.

Table 1

Title Correlations Between Physiological Responses and DPS Scores

$r = .41$	Between DPS scores and number of inhibitory responses.
$r = -.33$	Between DPS scores and number of coping responses.
$r = .08$	Between DPS scores and number of uncertain responses.

The significance tests performed on the correlations indicated that correlations between DPS scores and number of inhibitory responses ($f < .05$, 36 df) and number of coping responses were significant. The third correlation was not significant.

CHAPTER IV

DISCUSSION

Examination of the 38 scorable protocols reveals patterns of inhibitory and coping responses similar to those described by Archer, et al. (1972). As regards the described coping and inhibitory patterns, it is evident these response patterns have some sort of relation to the DPS. However, it cannot be said that this scale measures defensiveness only. Therefore, it can only be concluded that certain patterns of physiological response have a low, but significant level of correlation with scores derived from the DPS of the TSCS.

It is possible to speculate that the DPS includes factors other than those relevant to the patterns of physiological response indicated. It is also possible to suggest that subjects were reacting to other stimuli in the environment besides the select stimulus items, but in either case, the extent is unknown.

As regards previous findings in this area, the foregoing procedure tends to support the findings of Archer, et al. (1972) and to a lesser extent those of Ray, et al. (1974). However, the key word is support, since none of the contentions advanced in the other papers can be regarded as either proved or disproved by the results of this study. Consequently, the results of this study should be regarded as indicative and lead to further studies on this topic.

Among some suggestions for further study is that this procedure be replicated using DPS items for vocal presentation and the rest of the TSCS items in a written form. This would enable the investigator to determine whether any of the other scale scores generated by the TSCS have greater correlations with various physiological response patterns. Another suggestion would involve using items from various scales of the MMPI to determine whether greater correlation coefficients are possible.

Since it is possible the patterns of physiological response examined in this study are learned responses, a cross cultural study might be useful to determine whether or not these particular physiological response patterns are present in other cultures. If in fact they are learned responses common to this culture, the failure to detect them in some subjects could be attributed to the fact they were unlearned. But, if the preceding is true, what about the inverse? Why were they learned in the first place?

Bluntly stated, by using all available information it is impossible, as yet, to determine the exact stimuli eliciting the various patterns of response. It is, likewise, impossible to determine whether or not these particular patterns of response are, in fact, learned or unlearned. If they are, in fact, learned, why are they learned? All the information available is either contradictory or indecisive as regard patterns of physiological response.

In conclusion, this paper has attempted to determine whether certain patterns of physiological response are indicative of certain emotional states on the part of the subjects. The evidence allows no certain conclusions. In support are some observations and certain low level, but

significant, correlations. In opposition are again some observations and correlations that were not significant. The present study has provided some support for the contention that these physiological responses do, in fact, correlate with a measure of personality, defensiveness, but are not conclusive proof. In short, this particular area of study in psychology has an abundance of questions and very few answers. It should be a fertile, if not frustrating, field of investigation in the future.

APPENDIX A

ITEMS UTILIZED FROM TENNESSEE SELF CONCEPT SCALE

1. I have a healthy body.
2. I am losing my mind.
3. Once in a while I think of things too bad to talk about.
4. I am satisfied with my family relationships.
5. I try to change when I know I'm doing things that are wrong.
6. I am a calm and easy going person.
7. I am a friendly person.
8. I am a hateful person.
9. I am popular with women.
10. Sometimes, when I am not feeling well, I am cross.
11. I like my looks just the way they are.
12. I would like to change some parts of my body.
13. I am satisfied with my relationship to God.
14. I am satisfied to be just what I am.
15. I am just as nice as I should be.
16. I understand my family as well as I should.
17. I try to please others, but I don't overdo it.
18. I do not like everyone I know.
19. I am neither too tall nor too short.
20. I am as religious as I want to be.
21. I treat my parents as well as I should. (Use past tense if parents are not living.)

22. I am satisfied with the way I treat other people.
23. I gossip a little at times.
24. At times I feel like swearing.
25. I can always take care of myself in any situation.
26. I take the blame for things without getting mad.
27. I give in to my parents. (Use past tense if parents are not living.)
28. I try to understand the other fellow's point of view.
29. I get along well with other people.
30. I would rather win than lose in a game.
31. I solve my problems quite easily.
32. I do my share of work at home.
33. I see good points in all the people I meet.
34. Once in a while I put off until tomorrow what I ought to do today.

APPENDIX B

SUBJECT'S INSTRUCTIONS

The statements you are about to hear are to help you describe yourself as you see yourself. Please respond to them as if you were describing yourself to yourself. Do not omit any statement. Indicate your response on the response box in front of you.

Responses

1	2	3	4	5
Completely False	Mostly False	Partly True and Partly False	Mostly True	Completely True

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