

CRITICAL REFLECTIONS ON A COGNITIVE-PHYSIOLOGICAL
THEORY OF EMOTION¹

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This paper examines critically, and in some detail, that research which has been directed toward the development of a cognitive-physiological theory of emotion. It is observed that while interest in this area has been manifest for some time, only recently have empirical efforts attempted to explicate the subject in any detail. Such a theory posits that peripheral bodily changes can be viewed as determinants as well as correlates of emotional behavior. Bodily changes are seen to instigate cognitive processes which influence one's subjective and behavioral reactions to emotional stimuli. The research generally confirms the notion that novel information about oneself is not disregarded. Bodily sensations represent information which must be processed like all other sensory inputs. Evaluative needs are postulated to understand these sensations, i.e., a label or explanation is required for their occurrence. Emotional behavior is seen to result to the extent that these sensations are attributed to emotional stimuli.

Introduction

It was the contention of William James that emotions were contingent upon the perceptions of various bodily changes. He argued that, "...bodily changes follow directly the perception of the exciting fact, and...our feeling of the same changes as they occur is the emotion (James, 1890)." As a corollary to this idea, James suggested that different emotions (anger, joy, or whatever) are accompanied by recognizably different bodily states. Critiquing this idea, Cannon (1915) argued that total separation of the viscera from the central nervous system does not alter emotional behavior. He pointed out that the same visceral changes occur in very different emotional states and that such changes are generally too slow to be a source of emotional feeling. These objections called into question a completely peripheral or visceral formulation of emotion.

Cannon's critique, however, addressed itself only to the occurrence of bodily changes rather than to their perception. When evaluating the relevance of bodily changes for emotional experience, however, it would seem essential to distinguish the perception of these changes from their actual occurrence. Studies investigating the relationship between report of bodily change and actual change indicate that this distinction may be justified (Valins, 1970). The following comments, therefore, are directed to both consequences of bodily changes but devote somewhat more consideration to the cognitive dimension. The focus of attention is on the reactions of an individual to the perception of a bodily change.

A Theoretical Statement

Acknowledging that a general pattern of sympathetic discharge is characteristic of emotional states and that there may be some differences in pattern from state to state, Schachter and Singer (1962) suggest that one labels, interprets and identifies this stirred-up state in terms of the characteristics of the precipitating situation and one's apperceptive mass. This suggests that,

...an emotional state may be considered a function of a state of physiological arousal and of a cognition appropriate to this state of arousal. The cognition, in a sense, exerts a steering function. Cognitions arising from the immediate situation as interpreted by past experience provide the framework within which one understands and labels his feelings. It is the cognition which determines whether the state of physiological arousal will be labeled as "anger," "joy," "fear," or whatever (Schachter and Singer, 1962: 380).

For Schachter and Singer then, cognitive factors may be the major determinants of emotional states. The force of this explanation is illustrated in a situation where a person finds himself in a state of physiological arousal for which no appropriate cognitions are available. Schachter argues (1959) that such a state leads to the arousal of "evaluative needs," i.e., pressures would act on the individual in such a state to compel him to understand and label his feelings in terms of his knowledge of the immediate situation.

Schachter and Singer advance the following propositions relative to a cognitive-physiological theory of emotion (1962:382).

1. Given a state of physiological arousal for which an individual has no immediate explanation, he will "label" this state and describe his feelings in terms of the cognitions available to him. To the extent that cognitive factors are potent determiners of emotional states, it could be anticipated that precisely the same state of physiological arousal could be labeled "joy" or "fury" or "jealousy" or any of a great diversity of emotional labels depending on the cognitive aspects of the situation.

2. Given a state of physiological arousal for which an individual has a completely appropriate explanation (e.g., "I feel this way because I have just received an injection of adrenalin") no evaluative needs will arise and the individual is unlikely to label his feelings in terms of the alternative cognitions available...

3. Given the same cognitive circumstances, the individual will react emotionally or describe his feelings as emotions only to the extent that he experiences a state of physiological arousal.

A Noteworthy Aside

Schachter's formulation assumes emotional states to be a function of the interaction of cognitive factors with a state of physiological arousal. While these two facets are no doubt interrelated in most emotion-inducing situations, it is possible to view them somewhat independently of one another. Under these

circumstances we might ask: IS THE STATE OF PHYSIOLOGICAL AROUSAL ALONE SUFFICIENT TO INDUCE AN EMOTION? Maranon (1924) tackled this question by injecting 210 of his patients with the sympathomimetic agent adrenaline and then asked them to introspect. Seventy-one per cent of his S's (subjects) reported physical symptoms with no emotional overtone. Twenty-nine percent responded in an apparently emotional fashion. Of these latter, however, the majority described their feelings in a fashion Maranon labeled "cold" or "as if" emotions, i.e., they made statements such as "I feel as if I were afraid," or "as if I were awaiting a great happiness." Thus, in order to produce this "emotional" reaction, Maranon pointed out that, "One must suggest a memory with strong affective force but not so strong as to produce an emotion in the normal state."

It was Schachter's contention, however, that to produce a genuine emotional reaction to adrenaline, Maranon was forced to provide his S's with an appropriate cognition. In line with cognitive-physiological (C-P) theory, although the individuals underwent the pattern of sympathetic discharge common to strong emotional states, they had, at the same time, a completely appropriate cognition or explanation as to why they felt this way (i.e., because of the injection). This, Schachter feels, is the reason so few of Maranon's subjects reported any emotional experience. For the time being, we shall withhold our response to the above-posed question.

Manipulation of Veridical Bodily Perceptions

Consider for a moment an individual who has no appetite, cannot sleep, and experiences palpitations frequently. He is very obviously aware that his body is reacting in an unusual manner. What does he do with this information? According to C-P theory novel information about ourselves is not disregarded. We think about it and attempt to understand it. Bodily sensations represent information which must be processed. An individual feels a need to understand these sensations in the sense that he requires a label or explanation for their occurrence. As Valins (1970:231) points out, "emotional behavior results to the extent that these sensations are attributed to emotional stimuli. In this way the perception and labeling of physiological changes influence subjective and behavioral reactions to emotional stimuli." If our hypothetical individual were a medical student, he might very well attribute these feelings to love in the presence of an attractive young lady or fear when faced with a medical emergency.

A series of experiments have attempted to manipulate the perception of bodily changes via their actual occurrence. Schachter and Singer (1962), for example, manipulated the perception of bodily changes via actual occurrence by injecting subjects with epinephrine or placebo. They also manipulated a S's need for an explanation of these sensations by correctly informing some epinephrine subjects what they might expect to experience, by misinforming others as to the reactions caused by the drug, and by not informing still other S's of any particular side reactions to the injection. According to C-P theory, uninformed or misinformed S's need an explanation for their bodily sensations and would be most likely to be affected if one were available in the form of an emotional situation. Schachter and Singer's findings bear out these theoretical suggestions. Uninformed and misinformed S's felt and acted more angry in an anger-inducing situation as well as more euphoric in an euphoria-inducing situation than did informed or placebo subjects. Informed and placebo S's displayed an equivalently low level of emotional behavior. Thus, emotional behavior was jointly determined by the perception and labeling of bodily changes.

Earlier research (Latane and Schachter, 1962; Schachter and Wheeler, 1962) had demonstrated the intensity of the resulting emotion to be a function of the level of arousal. Answering the criticism that these results may have been specific to a situation in which there was an artificial and extreme induction of autonomic arousal, Nisbett and Schachter (1966) utilized fearful and painful shocks instead of a pharmacological manipulation to induce bodily changes and perceptions. In this study the level of actual physiological arousal remained relatively the same (or was increased proportionately) for all groups. The authors hypothesized that,

To the extent that we can convince a subject undergoing electric shock that his shock-produced symptoms and arousal state are due, not to the shock, but to some outside agent such as a drug, he should...experience less pain and be willing to tolerate more shock. Such an individual would, of course, regard his arousal as a drug-produced state rather than an indicator of pain or fear (1966:228).

One group of S's was led to attribute these shock-induced bodily sensations (palpitations, tremors, etc.) to a placebo capsule. A second group was allowed to correctly attribute their sensations to the shocks. These subjects received a placebo and were told that it produced sensations which are not likely to accompany the experience of shock. The researchers found that those who attributed their shock-induced sensations to the placebo considered the electric shocks to be considerably less painful and withstood more of them than did subjects who attributed their sensations to the shocks. Subjective and behavioral reactions to electric shock were evidently affected by the perception and labeling of a naturally induced set of bodily sensations. These results indicate that the significance of Schachter's work is not restricted to a situation in which an extreme pharmacological manipulation is employed. Valins (1970:232), in reviewing both of the above studies, concludes, "the cognition, 'That stimulus (emotional) has caused my body to react,' results in a reevaluation of the emotional stimulus and...this reevaluation may be responsible for the effects of the cognition on emotional behavior. Since the stimulus is perceived as more intense, the subject's emotional reaction is heightened accordingly."

Manipulation of Nonveridical Bodily Perceptions

The above experiments involved the manipulation of actual states of physiological arousal. This was done through the use of pharmacological agents of various sorts. It was a major contention of Plutchik and Ax (1967), however, that individual differences exist with respect to reactions to such agents and that the measures of sympathetic arousal utilized (usually heart rate increases) are limited in many ways. Since it is assumed in most studies that emotional behavior is a function of the intensity of physiological arousal, these authors suggest that different levels of arousal may have accounted somewhat for the results obtained. Then, too, asking a subject how angry or euphoric he felt assumes that all individuals can accurately verbalize their emotional reactions. The answer has been sought in terms of the manipulation of cognitive elements only. In this instance it is argued that if physiological state can be held constant while appearing to change with respect to the introduction of various emotional stimuli, the cognitive explanation of emotional behavior will have been empirically verified.

Following this logic, Valins (1966, 1967, 1970) conducted a series of experiments in an attempt to determine the effects of non-veridical cognitive cues concerning internal reactions on the labeling of emotional stimuli. This was accomplished by manipulating the extent to which a subject believed his heart had reacted to slides of seminude females and by observing the effects on his "liking" for the slides. Valins' rationale was as follows:

The research of Schachter and his associates suggests that if a subject were covertly injected with epinephrine and shown a slide of a nude female, he would interpret his internal sensations as due to the nude stimulus and he would label the girl as more attractive than if he had been injected with placebo and he had experienced no internal sensations. If, however, it is the cognitive effect of internal events that influences emotional behavior, then this same influence should be observed when subjects think that they have reacted to a given stimulus, regardless of whether they have indeed reacted. As such, it is hypothesized that the cognition, "That girl has affected my heart rate," will induce S's to consider the girl more attractive or appealing than the cognition, "That girl has not affected my heart rate."

Although the emotional stimuli (nude pictures) were varied, in all of these experiments the S's heard heart-like sounds which were prerecorded. Thus, the experimenter controlled the S's perceptions of the magnitude of his reactions to the different stimuli. One group heard an increase in their heart rates to five slides and no change in their heart rates to five other slides. A second group heard a decrease in response to five of the slides and no change to five others. Two control groups heard the same tape recordings and saw the same slides but knew beforehand that the sounds were tape recorded. The effects of the false heart-rate information were assessed using measures of the S's attraction for the slides.

Results indicated that nudes to which S's heard their heart rates change, whether increased or decreased, were liked significantly more than nudes to which they heard no change in their heart rates. Control subjects showed no preferences. Valins concluded that his data were exactly what one would have expected had heart-rate changes and veridical perceptions of palpitation been pharmacologically induced to some slides but not to others. In this regard he argues that, "the mechanism operating to produce differential liking is presumably the same regardless of the veridicality of the perceptions. Individuals need to evaluate and understand their bodily changes" (1970:234).

The above investigations suggest, then, that it is the cognitive information about internal events and not the internal event itself that contributes to emotion. Valins did not consider, however, that false heart-rate feedback might have had a direct effect on actual heart rate, i.e., a mimic effect, whereby actual internal changes occurred. It is to be noted that Valins never measured the actual heart-rate of his subjects. Rather, he claimed that actual heart rate did not increase based upon the reports of S's that they did not feel their heartbeats or palpitations of any kind during the experiment. Goldstein, et al. (1972) addressed themselves to the question of just which was the crucial component of emotion in Valins' investigation--actual change in heart rate or cognition of heart-rate change?

In order to distinguish between these two possibilities, Valins' experiments were replicated, but with the added feature of monitoring the S's actual heart rate while presenting him with nudes and false heartbeat feedback. In addition, male nudes were interspersed with female nudes to create offensive and inoffensive stimulus situations. The results indicate that when there was a strong mimic effect, as in the inoffensive (female nude) condition, there was a pronounced relationship between heard heart-rate and emotionality (nude ratings)--a "Valins" effect. When there was no mimic effect, as in the offensive (male nude) condition, there was no relationship between heard heart-rate and emotionality, although there was a strong relationship noted between actual heart rate change and emotionality. The authors conclude:

In a nonemotional situation, the subject may use information about his physiological arousal as a purely cognitive cue in formulating discriminative judgments about objects he has observed. In such a situation, a mimic effect may be observed. If so, some correlation between actual physiological arousal and reported emotionality may be observed, but these reports may NOT be related in any causal way to actual physiological arousal. In an emotional situation, physiological arousal serves as much more than a cognitive cue, since, as we have shown, false cognitive cues contradicting one's state of actual physiological arousal are overridden in determining one's reported emotional state. In highly emotional situations, there is no physiological mimic of nonveridical cognitive cues (i.e., false heart rate feedback), and these false cues have little effect on reported emotion, but rather actual physiological arousal determines largely the level of reported emotion (1972:51).

Apparently, then, labels are applied to states of autonomic arousal which then serve as explanations for the stirred-up state of bodily affairs. It is evident, however, that some people react more strongly to emotional stimuli than others (Valins, 1967; Berry and Martin, 1957). Schachter and Latane (1964) and Mandler and Kremen (1958) observe that psychopathic individuals are characterized by "flat affect" while at the same time exhibiting high levels of sympathetic arousal. It was suggested, initially, that the intensity of emotional reactions was a function of autonomic arousal. If this is the case, however, how can the apparent "flat affect" of the psychopathic individual be explained?

Valins, once again, approaches the problem from the cognitive perspective. He hypothesizes that differences in emotionality are related to differences in the utilization of internal cues (i.e., physiological states of arousal). He tested this hypothesis on individuals who were psychometrically classified as emotional and unemotional. Utilizing his standard design, subjects were shown slides of seminude females while hearing bogus heart sounds. Half of each emotionality group heard their "heart rates" increase to some slides and not change to others. The remaining subjects heard the bogus heart rate decrease to some slides and not change to others. He reasoned that if unemotional types ignore their internal sensations or do not utilize them as cues, they should be influenced by the feedback when evaluating the nudes. In comparison to the more emotional S's, the less emotional ones should consider the nudes accompanied by a change in the bogus heart rate as similar in attractiveness to those nudes not so accompanied. His findings tend to bear out these suggestions. On the basis of his results he

concludes that,

Individuals do utilize information concerning their internal reactions, and the degree to which this is done can be predicted by knowing whether an individual is more emotional and/or less emotional. These individual differences highlight the importance of cognitive processes in mediating emotional response. Although physiological reactions may indeed be important determinants of emotion, perhaps more important is whether an individual feels it necessary to have a label or explanation for his internal state (1967:462).

In a subsequent study dealing with food deprivation and obesity, Schachter, et al. (1968) have given further credence to Valins' contention by suggesting that the chronically obese label a far greater set of physiological symptoms as hunger than simply gastric motility. Once again, the key to the question at hand involves the availability of physiological cues and the attendant pressures on the individual to label and/or interpret them accurately. Valins concludes that, "...the psychopathic and the obese individual...seem to have one thing in common: they are both unresponsive to some aspect of their bodily state. The psychopath seems to ignore emotion-related bodily changes and the obese individual seems to ignore hunger-induced bodily changes" (1968:96).

Pragmatic Application

Cognitive-Physiological theory has proven a useful adjunct to phobic therapy. Early work in phobic research utilized Wolpe's (1958) neurophysiological theory of reciprocal inhibition. Wolpe reasoned that deep muscle relaxation provides a neurological response which is incompatible with and which inhibits the physiological correlates of fear. To Wolpe, fear reduction and the extinction of avoidance behavior presumably result from the successful induction of this physiological incompatibility.

Little evidence has been forthcoming regarding the actual effect of deep muscle relaxation on phobic patients. Valins (1970) argues from the C-P perspective that phobias may have cognitive antecedents. He reasons that an individual who was previously autonomically aroused when in an anxiety-provoking situation may have become anxious because of the cognition, "THAT STIMULUS HAS CAUSED MY BODY TO REACT." He suggests that by substituting muscular relaxation for autonomic arousal, desensitization leads to the cognition, "THAT STIMULUS NO LONGER CAUSES MY BODY TO REACT." It is this new cognition that may result in anxiety reduction.

In a series of experiments with snake-phobic subjects (Valins, 1967, 1970) presumably measuring the heart-rate reactions of the experimental S's to slides of snakes and to slides consisting of the word "shock" (followed after seven seconds by an actual shock to the fingertips), subjects heard what they thought were their heart rate reactions. They heard their "heart rates" increase to the shock slides and actual shocks, but heard no change in their "heart rates" to the snake slides. Valins reasoned that since snake stimuli did not affect them internally, these S's should consider any fear that they had of snakes to be unjustified. They should thus manifest more approach behavior when in the presence of a live snake than control subjects. Controls S's were equally frightened of snakes and went through the identical procedure as the experimental S's. This latter group, however, knew

that the sounds they were hearing were tape recorded and that they were not their heart beats.

The hypothesis was supported by the results of a snake-approach test. Experimental S's, whose heart rate reactions "told them" that their fear of snakes was not justified, approached significantly closer to the snake than control S's who were given no information about their heart rate reactions. Further, significantly more of the experimental S's completed the entire approach task than did control S's. According to the author, "the results of these experiments suggest that the false-feedback procedure and the muscle-relaxation procedure used in desensitization therapy may both be effective because they allow S's to believe that a previously frightening stimulus is no longer having a physiological effect" (1967:350). The work of Lang and Lazovik (1963) as well as Lang, et al. (1965) generally supports this conclusion.

Discussion

We are now in a somewhat better position to answer the questions posed early in this work. Reviewing briefly, we note that the relationship between cognitive and physiological aspects of emotional states has been of importance in the literature since the work of William James. It also seems apparent that James was probably over zealous in his early formulations. It appears that similar states of physiological arousal can and do characterize a variety of emotional states.

Schachter's work demonstrates empirically as well as theoretically the case for the interaction of cognitive and physiological determinants of emotional state. By postulating the mechanism of evaluative needs, he completes the linkage between these often-separated dimensions. While the cognition exerts a "steering function" with respect to the interpretation of physiological arousal, subsequent research (Valins, Goldstein, etc.) has demonstrated that no actual arousal need be in evidence for emotional behavior to ensue. In this sense Schachter is incorrect in suggesting that no emotion will be experienced without a degree of physiological arousal being manifest. As has been pointed out, however, we must be prepared to state definitely that no "mimic effect" has occurred in terms of our cognitive manipulations before we can suggest an incorrect assumption on the part of Schachter and others. In general, a state of physiological arousal alone seems insufficient to induce an emotion.

A cognitive-physiological theory, then, posits that peripheral bodily changes can be viewed as determinants as well as correlates of emotional behavior. Bodily changes are seen to instigate cognitive processes which influence one's subjective and behavioral reactions to emotional stimuli. This emphasis on the relevance of cognitive processes for emotional behavior is probably the most important lesson to be learned from this research.

Footnotes

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