

PSYCHO-PHYSIOLOGICAL DIFFERENCES IN CONDUCT DISORDERS

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The paper concerns Rampton male patients between 60 and 100 I.Q. who have been markedly antisocial, or repeatedly antisocial. The men discussed are not psychotic and do not suffer from a brain lesion nor C.N.S. dysfunction. These latter patients in Rampton are, in fact, being studied by other workers and the nature and function of the hospital as a whole has been outlined in a recent report (20). The overall problem is contained in the accepted fact that some patients are stable in Rampton, and some are not, and some of these men relapse when they leave Rampton, and some do not. As they all have similar family histories and return to similar environments, the basic assumption of the research approach is that the differences in stability reflect fairly constant differences in psycho-physiological structure. The problem resolves itself into determining these psycho-physiological differences. If one can do this one can predict accurately and give a lead for therapy to explore.

The area we chose to concentrate upon is that covered by the terms "affect," "emotion," "anxiety," "stress," etc. This was for several reasons but mainly because post-war studies in many fields indicated very little relationship, except in a symptomatic sense, between cognitive and conative factors, such as I.Q. and any major aspect of social or psychiatric disability, except brain injury. Approaching the problem of stability via the affective aspect offered two main advantages. On the one hand large numbers of clinical reports draw attention to the significance of this factor in the make-up of delinquent and psychopathic people, and secondly, there is a vast reservoir of sound experimental data and know-how on the psychology and physiology of stress, particularly in the reports of laboratories concerned with skills, road research, battle stress, aviation psychology, space flight, psycho-pharmacology and animals.

The results of our attempts (20-29, and references), can now be summarized in the form of a proposition, an analysis of which forms the content of this paper. The proposition is as follows:—

"The basis of continued psychopathic instability is a faulty reaction to stress, the nature of which is associated with the form that the psychopathic instability takes."

Faulty reaction to stress may show in one of two ways. Either the individual as a whole, or part of his nervous system will react insufficiently, or the reaction is too great. Stability implies effective, or moderate reactivity to stress situations.

In analysing this proposition we can look at three aspects:—

1. The validity of the proposition in the social-psychiatric sense.
2. The psychology, physiology and biochemistry of this concept of stress, which is central to the proposition, and
3. The technology—how to determine a person's reaction to stress situations.

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Stability and Instability

To derive some basic data on the subject of stability and instability, some years ago we followed up all male patients who were transferred during a ten-year period. We were mainly concerned with relapse and of the 587 patients removed about one third were either returned to the Hospital or were dealt with by the penal system. The main findings from this study can be summarized as follows:—

1. The anti-social behaviour of patients who relapsed was considerably less serious than the behaviour of the same men before they came to Rampton.
2. The conduct disorders were mainly acquisitive.
3. Relapse, if it occurred, did so fairly soon after leaving, although in a few cases first relapse occurred several years afterwards.
4. Age on admission bore no relationship with Relapse nor Success.
5. Age on transfer and length of stay correlated positively with one another and with Success, but partial correlation analyses suggested that length of stay is the significant factor and not so much the age that a person attains.
6. The following factors were associated significantly with Relapse:— (a) return to a previous environment as against return to a new environment, (b) removal direct home or to a hostel, as against removal to another hospital in the first instance, and (c) a previous history of larceny.
7. A previous history of sexual offences or violence was associated with Success. Homosexuality, arson and damage were forms of behaviour which were not associated with Success nor Relapse.
8. With all these significant factors held constant, certain forms of Hospital instability were also found to be associated with Relapse, namely frequent aggression and absconding, and to some extent damage.

Taken as a whole, these various statistical data suggest three things. Firstly, relapse is a positive phenomenon, a potentiality that is within the individual; secondly, any attempt to find the correlates of instability must also be able to differentiate forms of instability, and thirdly, instability is not a concept with a specific meaning in relation to a specific environment—a person who is unstable in one environment is likely to be unstable in another.

Stress Research

The proposition described psychopathic behaviour as a reaction to stress, and the follow-up data provided a few features of what we mean by psychopathic instability, and which must be encompassed by a stress explanation. The psychology, physiology, and biochemistry of stress is a complex subject with a large experimental literature not widely known (2). For this reason, it may be helpful to glance at some of the main features before we consider the application of the derived concepts in the field of psychopathy.

Stress is usually regarded as being a condition of physiological or experiential disturbance brought about by a disruption of the state of the organism. Stimuli conditions which generally produce a state of stress are termed stressors: reactions to a stressor, at the behavioural or autonomic levels, are termed responses.

It is now widely recognized that there are two types of stressor which may be conceived by an experiencer as one single condition. The two types of stressor we have called Specific and Generalized. Specific stressors are those concerned with

pain, fear, and startle. Generalized stressors are those requiring some drive or motivation condition in the subject which is interfered with. In animal experiments frustration in this way is usually obtained by interference with, or blocking primary drive activity, such as sex or hunger (15, 17). In human subjects, generalized stressors in the laboratory usually involve interference with a secondary drive such as achievement, self-esteem, etc., by some sort of assault on ego defences (11).

It now seems likely that the demonstration of these two types of stressor is of fundamental importance to psycho-pathology, particularly as some evidence suggests that it is the reaction to specific stressors which correlates with social behaviour, not reaction to generalized stressors, and furthermore there is only a limited degree of correlation between these two stressors. In other words, it seems there are two types of anxiety, which appear alike to the experiencer (4). One is Harm Anxiety, and the other is Ego Involvement Anxiety. The latter is that usually assessed by clinical interviews, questionnaires, projective tests, introspection, etc., and may bear but little relationship with real life situations in which harm anxiety is the operative factor. Harm anxiety, in formal terms, is the generalized fear response, when fear is defined as an innate stimulus producing response to pain, which also functions as a learnable drive. In so far as the learning of responses to pain is concerned, there are two types of situation:—

- a) trauma escape learning, where the behaviour learned terminates the trauma, and
- b) traumatic avoidance learning, where the behaviour when learned **prevents** the trauma from occurring.

Before we move to consider the Response aspect of stress research, there is another generally accepted experimental finding, which is at variance with much clinical, particularly Freudian theory. Stress research indicates that anxiety cannot be attached to a specific or special type of stressor for any individual. Once subjected to massive trauma in any situation, the individual tends to react highly to all (harm) stressors and not simply to those resembling the original. In formal terms this law or principle of partial irreversibility indicates that once aroused the physiological anxiety reaction may decrease during experimental extinction but will never be completely eliminated, remaining permanently at some fixed level above zero (19). One can refer here to Selye's description of the three stages of the General Adaptation Syndrome in general medicine (18) which implies permanent change in the output of ACTH and adrenaline in particular, and to Gellhorn's acceptance of permanently lowered thresholds for A.N.S. discharge (10). Malmö (16) suggests that this weakened inhibition of stress occurs in a manner similar to the way in which the after discharge of the cerebral cortex can be abolished in the reticular formation and the brain stem (4). It is possible, of course, that the process of inhibition of stress is a chemical transmission, (7)—a point of importance in relation to chemotherapy.

Responses to Stressors can be measured at either the Overt Behavioural level or the Physiological level. The methods are numerous but I will mention those aspects we use or have used at Rampton, or are familiar with. Depending upon several factors, anxiety or stress can function as drive or as a disruption in the learning situation. Consequently, stress can be determined by variation in learning, or by the degree of deterioration in performance with a motor or perceptual skill. Reaction times and also perceptual organization as measured by means of reversible figures, etc., are affected by stress. Other Overt Behavioural measures of stress are the extent the subject regresses or shows stereotyped behaviour under mild frustration, his fatigue and persistence scores, and the point at which he perceives a change from warmth to a slight prick sensation with a radiant heat dolorimeter. At this stage, our conclusion is that while these Overt Behavioural and Generalized

Stressor techniques provide insight into the mechanism of stress activated behaviour, the physiological measures correlate more highly with real life criteria.

Physiological reaction to stress can be measured without difficulty by means of techniques concerned with the activity of the autonomic nervous system, mainly sympathetic, either by electrical changes, measures of cardiovascular activity, and biochemical assays. There are various techniques, all of which are completely undisturbing to a patient, and are both simple and relatively speedy to administer. First of all, however, a few words concerning the main problems presented by the physiology of stress. The traditional expositions by Cannon (5) concerning the role of the autonomic nervous system in response to stressors can no longer be accepted in their original form. It appears that the autonomic system does not operate as a whole with equivalent increments and decrements in responsiveness in the different functions, although the A.N.S. does function as a whole in the sense that all innervated structures are activated to some extent. These findings led to the formulation of the notion of Symptom Specificity in the field of psychosomatic medicine to explain why one person will have headaches under stress, and another show digestive disorders, whilst a third may have cardiac trouble. Symptom Specificity has now been extended to the principle of Relative Response Specificity following the work of Lacey and his associates (12, 13). Formally the principle of relative response specificity now reads . . . "For a given set of autonomic functions subjects tend to respond with an idiosyncratic pattern of autonomic activation in which maximal activation is shown by the same physiological function, whatever the stress," and further "the entire pattern of hierarchy of response is reproducible over different stressor episodes, and that continuous quantitative variation among subjects exists in the degree to which they exhibit stereotypy (i.e. reproducibility) of their pattern of response." In less formal words this means that to some extent each one of us has his own idiosyncratic autonomic way of responding to a stressor, i.e., in one person there may be a relatively high systolic pressure increase, but lower pulse rate change, and say, little temperature and skin conductance change, but in another person there may be relatively little systolic pressure and pulse changes but a marked increase in skin conductivity. Whatever the pattern for an individual, however, it is suggested that this pattern occurs for that person in response to all stressors, and individuals can be rated according to quantitative differences.

For practical research purposes this is extremely important. It means that single or double channel measurement is insufficient, and furthermore when several autonomic channels are applied a mathematical formula is necessary before one can equate a change in blood pressure with a change in temperature, for example. It may be that these problems can be overcome by concentrating not upon the degree of responsiveness to stress but by assessing the extent to which the response can be conditioned.

Apart from the issues concerned with response specificity, one must also consider the types of physiological reaction which appear to correspond to some extent with different emotional states, particularly anger and fear.

It seems likely, for example, that in anger there is relatively high hypothalamic excitation, parasympathetic ascendancy for the A.N.S., noradrenaline secretion by the adrenals, lowered pulse rate, lowered respiration rate and mild increases in systolic and diastolic pressures. In fear on the other hand it seems there is low hypothalamic excitation, sympathetic ascendancy for the A.N.S., adrenaline secretion, raised pulse rate, raised respiration rate and marked increases in systolic pressure. Until the data for our research with aggressive patients are analysed, we prefer to regard these differences with reserve.

We now come to the explanations of why people differ in their reactivity to stress. All contemporary explanations use a concept of inhibition, with or without a chemical transmission rationale. Eysenck, of course, has proposed that differences in the inhibitory factor in the formation of conditioned reflexes is the basis of his introversion-extraversion dimension (8). My preference is that facility to inhibit stress makes some people prone to form well-established traumatic avoidance learned patterns of behaviour (the emotionally unresponsive psychopath) and inability to inhibit stress to show as agitated escape resembling patterns of behaviour (the "neurotic" psychopath).

Psycho-physiological Differences in Rampton Patients

Any laboratory study of stress reactivity must be prepared to face three sets of problems more or less simultaneously. The first problem is to design and adapt techniques so that they are applicable to the particular subjects being studied, and the facilities of the laboratories. Tests applied to Air Force personnel (1) or University students will probably be incomprehensible, without modification, if applied to low I.Q. people. Techniques must be completely innocuous, of course, and furthermore, appear to be so to the patient, and must also be within the capabilities of the department. The second problem is that one is frequently faced with the task of determining things concerning stress itself, without reference to the applied aspect. The final problem is that of the applied study—the rephrasing of questions in a manner that permits experimentation and scientific enquiry.

In this section I will try to summarize a few of the various factors which have emerged.

1. The first, and most important conclusion, is that this sort of research is practicable, meaningful, and extremely fertile, in the sense that each completed study opens up new problems.
2. Early work on fatigue rates and persistence indicated that:—
 - (a) Patients rated unstable fatigued more easily than did those rated stable.
 - (b) Fatigue rates varied according to the type of conduct disorder, with abscond and larceny subjects being most easily fatigued, and sexual offenders least easily fatigued, and
 - (c) Fatigue correlated with the degree of anxiety arousal as assessed by galvanic skin changes to a startle stimulus such as a sudden noise.
3. With the radiant heat dolorimeter, unstable patients were found to perceive a change from warmth to a slight prick either much earlier or much later than did patients rated Stable, or Normals. We determined that for Normals the prick point with this apparatus correlates extremely highly with resting skin temperature (the warmer the skin the earlier the prick-point); and skin temperature probably reflects vasodilation and constriction, although this has been questioned (3). Hence, by taking resting skin temperatures one can determine accurately the stimulus intensity necessary for the subject to report a prick perception. However, although this was found to be valid for Stable patients and Normals, some Unstable patients tended to report the sensation either before they should have done so, physiologically speaking, or long after they should have done so. I am satisfied as a result of retests that this is not a factor of misrepresentation

or misunderstanding on the part of the patients in question, but indicates a very important attitudinal factor, a higher order inhibitory factor, which tends to intensify what is already a pathologically weak or pathologically strong inhibitory factor for stressors.

4. The galvanic skin response can be readily aroused by simple startle stimuli such as a touch on the closed eyelid with a piece of cotton wool. The response is simply a momentary fall in the electrical resistance of the skin as measured with a valve galvanometer. This response does not occur to an innocuous stimulus, such as a quiet buzzer, but if the two stimuli (buzzer and eyetouch) are presented simultaneously for a few trials, the response will then occur to the buzzer stimulus alone. We have suggested that the extent to which this conditioning occurs in a given subject is a direct result of the degree of anxiety or stress arousal present in the subject and score the degree of conditioning on a scale from 0-11. There is a high degree of stability about this score and the vast majority of subjects do not change when tested repeatedly over a period of up to eighteen months. A few, however, swing from one end of the scale to the other.

This is conditioning score, which is of course a direct autonomic measure, correlates highly with prick perception point and also differentiates Stable from Unstable patients with a high degree of confidence. This score correlates more highly and more consistently with all real life criteria, than any other **single** index, we have assessed so far. Again, Unstable patients are those who condition poorly (or not at all) at the one extreme, or who condition extremely speedily, at the other extreme. Stable patients are those who give moderate conditioning scores.

5. In a study of "frustration" instigated stress (i.e., a designed ego involvement stressor) several interesting features appeared. The subject was faced with two Morse switches for him to press in response to a signal light appearing every five seconds. Pressing the correct key lit a reward light, pressing the wrong key sounded a buzzer. The task was to learn the sequence which would give the reward light each time, e.g., right switch, left switch, or right, right, left, or right, right, left, left. All responses were recorded on a polygraph and after learning three progressively more difficult sequences, the subject moved to the fourth sequence which, unknown to him, was insoluble—i.e., reward light and buzzer occurred randomly. In this situation one of several behavioural phenomena appear (15). The subject can give up trying, but none did; he can keep trying new hypotheses; he can become "fixated" or "stereotyped" and keep pressing the same switch; or he can "regress" and apply as a solution one of the earlier learned sequences. "Stereotypy" and "Regression" are the two phenomena I would like to mention owing to their analogy with real life behaviour, and their relationship to the autonomic function of skin temperature fall—the stress response.

In the first place both Patients and Normals show on average a similar skin temperature fall during frustration, but whereas for Normals the temperature speedily returns to the previous level during a post frustration task, for Patients it continues to fall. In other words, we have a similarity with the neurotic who does not differ greatly from the normal in physiological reaction, but differs in his ability to disperse this distress by motor activity (29). Position "stereotypy" was found to be more common for Normals than Patients, but "regression" much more pronounced and

frequent for patients. "Stereotypy" occurred in conjunction with a skin temperature fall; "regression" in the absence of autonomic change. Patients with low conditioning scores tended to regress more markedly, as did Patients rated Unstable. It seems, therefore, that "Regression" is the phenomenon of Instability, but "Regression" is not so much a reaction to activated stress, but a means of preventing physiological stress from occurring. One is reminded of the sort of patient who reacts to relatively mild social stressors by repeating a previous pattern of behaviour, and later says that he was not **grossly** disturbed by the precipitating situation, i.e., just "browned off"—not distressed.

The difference between the aggressive sex offender and the passive (relatively harmless) sex offender is one of considerable practical importance. A decision as to which category a person belongs is one that is frequently very difficult to make. For this reason we have concentrated a little upon the objective, physiological differences between these two groups. In previous reports, I have written of differences in the Rorschach records of these people, and more recently of their galvanic skin changes when answering a word association test containing neutral and sex words. As a tentative conclusion one can suggest that sex cues constitute a stressor for the passive group, but sex cues activate sex arousal in the aggressive group. Similar conclusions could be reached from an American study of the day to night (urine) excretion ratios of the 17-ketosteroids (a "stress" hormonal measure) for similar groups (9). The problem to be resolved, however, apart from a confirmatory experiment, is whether the relatively high ratio for aggressive sex offenders is a characteristic of this group or whether it is a common characteristic of aggressive people as a whole. We are now nearing the end of a similar hormonal study. A preliminary glance at the figures suggests that there are 17-ketosteroid differences in day to night excretion ratios between the two groups of sex offenders, but the difference is also present between aggressive and inadequate patients who are not sex offenders. I have mentioned this incomplete study, as an example of the inter-relationship of psychology, physiology and biochemistry in this field, and the details will be reported in due course.

Ultimately, the test by which the laboratory data will stand or fall is the degree of demonstrable association with real life criteria, and in particular the extent to which they enable one to predict future events accurately and devise therapies. For this reason, we try to complete each study with some sort of assessment of predictive validity, and have argued that this is essential for virtually all psychological and psychiatric studies at present. Ability to predict events accurately, is by far the best test of a scientific theory. It is probably simpler to consider one test alone, for this paper, and take the conditioning score for the galvanic skin response. Three years ago in a follow-up of 45 transferred patients, the conditioning scores of all but one of the 19 Relapsed patients were below 7, i.e., low scores, compared with 16 out of the 26 Apparently Successful. More recently, we examined the scores of another group of 83 transferred patients, again with the indication that poor conditionability, i.e., high stress inhibition, corresponds with a tendency to Relapse (24). The other form of instability, high reactivity, is not such a good predictor of relapse possibly because emotionally labile patients of this type tend not to be selected for transfer, on clinical grounds. Moderate reactivity is a very good indicator of Apparent Success.

Stress reactivity is obviously a constitutional factor, but whether it has a genetic basis or otherwise one cannot say at present. In an analysis of patients with clear-cut psychological trauma in their histories, compared with those without such

trauma, there was a slight, insignificant trend towards higher reactivity for the trauma group.

I have concentrated upon the relationship of laboratory stress with social stress, in a wide sense, but in conclusion it is worth noting that these laboratory studies also give insight into the way social stressors act and also the skills and types of skill limitations which our patients are faced with in the industrial situation and the likely effects of industrial stressors.

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