

NEUROSIS AND EXPERIMENTAL PSYCHOLOGY*

By

H. GWYNNE JONES, B.Sc.

*Lecturer in Psychology
Institute of Psychiatry (Maudsley Hospital), University of London*

GENETIC factors have been shown to play an important role in the development of neurosis. These factors, however, determine the vulnerability of an individual, the degree of his predisposition for neurotic breakdown, while the available evidence indicates that the actual behavioural disturbance results from the imposition of some form of environmental stress on the individual concerned. The probability that any particular individual will develop a neurosis is partly determined by his genetic constitution and partly by the degree of stress to which he is subjected.

Learning may be defined as the modification of an organism's behaviour resulting from its interaction with a changing environment and, in any learning process, the nature of the behavioural change will be partly determined by the genetic constitution of the organism. Therefore, in a real sense, a neurotic breakdown may be said to be learned, and recent experimental work linking learning theory and personality dynamics is extremely relevant to theories concerning the aetiology of neurosis. An aetiological theory expressed in terms of learning theory would provide a link with the general body of psychological knowledge and the possibility of validation in laboratory situations.

No one has stated an inclusive theory of this type in formal terms but the work of Mowrer (1950), Dollard and Miller (1950), Wolpe (1952) and others clearly indicates the main lines it would follow. These workers agree with Freud in allocating to anxiety a central role in the maintenance of neurosis but, to them, anxiety is conceived of as a conditioned fear reaction, and as such, will include affective and respondent components and will possess aversive drive properties. In its role as an acquired drive, anxiety will energize and, by its reduction, reinforce various aversive instrumental responses of the organism. As a powerful and massive response involving central, skeletal, autonomic and hormonal reaction systems, anxiety will disrupt the ongoing reactions of the organism.

The mediating role of anxiety is best illustrated by a consideration of traumatic avoidance learning in animals (Solomon and Brush, 1956). If an animal, confined in a suitable apparatus, is presented with a neutral stimulus followed by electric shock, a massive pain-fear response involving central, neuro-endocrine and autonomic reactions ensues and the animal makes various aversive skeletal responses, certain of which will, if the apparatus is appropriately constructed, terminate the shock and may therefore be described as escape responses. If, after one or several such trials, the animal is replaced in the apparatus, indications of fear are evident in response to the conditioned stimulus and before the onset of shock. This indicates that the fear-reaction has become conditioned to the previously neutral stimulus: such conditioned fear is described as anxiety. Furthermore, the previous instrumental aversive

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responses are now made to the conditioned stimulus and escape from shock, gradually or suddenly, becomes avoidance of shock. Avoidance responses developed in this way, unlike the more usual instrumental responses of learning experiments, may be maintained throughout hundreds of extinction trials without the re-administration of shock. According to the mediation hypothesis this derives from the fact that reinforcement does in fact occur owing to a reduction in anxiety by escape from the conditioned stimulus.

To explain the failure of extinction of the conditioned anxiety response itself Solomon and Wynne (1954) have adduced two additional principles. The first, the principle of *anxiety conservation*, postulates that, by an early avoidance reaction, the conditioned stimulus is removed before the long latency anxiety response recruits to its full amplitude. If the avoidance response latency lengthens, anxiety develops fully, reinforcement of the instrumental response occurs and the latency again decreases. Secondly, they postulate that severe trauma causes irreversible physiological changes which bring about a *partial irreversibility* of conditioned anxiety responses to such traumata. This principle seems less satisfactory than the former and more economic explanations may be possible.

The animals in traumatic avoidance learning experiments do not usually develop behaviour which could be described as *experimental neurosis*. This is to be expected because the escape and avoidance responses are successful and the conditioned anxiety is playing an adaptive mediating role. Wolpe (1952) and others have shown that, when animals are subjected to traumatic shock from which they are unable to escape, marked behavioural disturbances occur, which may be claimed to merit the title "neurotic" in that they are unadaptive and persistent through a considerable period of time outside the experimental situation. These represent various persistent autonomic and skeletal responses which originally occurred in response to the shock and which markedly increase when stimuli associated with the shock situation are presented to the animal. Mowrer and Viek (1948), by means of an ingenious experiment, have shown that such abnormal responses in animals are not a function of the increased duration of shock when avoidance or escape is impossible but rather of the fact that no effective avoidance response may be established on the basis of anxiety reduction.

Physical pain of traumatic dimensions may be used as an extreme and prototypal example of environmental stress and, hence, the type of traumatic learning described may serve as a paradigm of the dynamics of anxiety mediated learning. In human development, of course, a large number of other aversive situations occur and many of these will derive from the socialization process, wherein individuals undergo a training in which socially unacceptable aspects of their behaviour, which are often strongly motivated, are punished by parents and the formal agents of society. The conflicts between powerful but incompatible response tendencies involved in such situations may be important in the generation of stress.

From such situations conditioned anxiety may well develop in a manner similar to that described for traumatic learning, and neurotic disturbance may ensue. Childhood may be a particularly vulnerable period in that it is a period of intense socialization, the undeveloped nervous system is more reactive and plastic, the possibilities of effective instrumental avoidance are less and anxiety may become attached to a wider range of conditioned stimuli owing to lack of learned perceptual discriminations and the absence of refined discrimination

through language development. This is not to say that a neurosis may not, however, develop at any period of life when new stresses appear.

On the basis of this theory the behavioural disturbance described as neurotic may be analysed into two types of response: the anxiety response itself which will have visceral, skeletal and central nervous components and various instrumental responses by which the conditioned stimuli are removed and hence the anxiety reduced. Both are learned behavioural responses and, as such, are symptoms of the neurosis: their division may parallel the Freudian distinction between the underlying neurosis and its symptoms.

With respect to the conditioned stimuli involved, these may derive from three sources: the punishing agent itself, for example the parent, when disturbances in relation to individuals in authority may result; the incidental environmental stimuli at the time of stress, when disturbances of the nature of phobias may be expected; the stimuli involved in the individual's own behaviour at the time of stress as, for example, when a neurotic subject fears that his actions may cause others harm. The latter type of conditioned stimulus is the least likely to be avoided successfully as it is, in a sense, self generated. As such, it may give rise to a type of neurosis particularly difficult to treat. This type of conditioned stimulation is the only one considered in their analyses by the most influential theorizers in this field: Dollard and Miller (1950) consider that, in these circumstances, the neurotic solution is to inhibit the offending behaviour, whereas Mowrer (1950) believes that the illicit response occurs but the consequences are avoided by various devices. In reaching these conclusions these writers fail to note that either adjustment, or maladjustment, is possible and rely on their apparently conflicting clinical experience. Whichever solution does in fact occur in the particular situation may be due to the circumstances of original reinforcement, that is according as to which of several responses made was effective in reducing anxiety. Alternatively, and more probably in the light of recent work, innate individual differences may largely determine the nature of the response.

Whatever the original conditioned stimuli, by the well-established process of stimulus generalization a range of stimuli will later evoke the neurotic behaviour, if these present themselves with considerable frequency the disturbance may well become chronic. Frequently the eliciting stimuli on various specific occasions may appear to an observer to be entirely dissimilar and extremely unlikely to occur on any single generalization continuum. This may well result from secondary generalization. Thus, if an animal, via the mediation of anxiety, has learned to avoid a black circle, it will, by generalization, also avoid a white circle. The avoidance of the white circle will itself be reinforced by anxiety reduction and, by a second generalization, a white square will now be avoided, though this stimulus has neither its squareness nor its whiteness in common with the original conditioned stimulus. Verbal links may also, in human beings, produce similar effects.

Many of these processes may be, in a sense, unconscious in that a number of experiments have shown that a response may be conditioned to a stimulus or class of stimuli of which the subject is consciously unaware. A dangerous topic of conversation may be avoided just as a signal of danger is avoided and this may also apply to symbolic responses or "thoughts", thus bringing the phenomenon of "repression" within the same conceptual scheme. From this point of view, however, the unconscious does not acquire any special "dynamic" attributes.

Individual differences will greatly affect the course of events in any individual case. Thus Lacey *et al.* (1953) have shown that individuals display a reliable pattern of autonomic responses to any particular experimental stress situation and that this pattern varies from situation to situation and from person to person. Such differences would clearly be important in symptom formation. Individual differences of a psychological character, particularly those related to learning, and their relationship to neurotic symptomatology have been discussed in a recent paper by Eysenck (1955).

In terms of this type of theory, neuroses are behavioural abnormalities which include ideational response components but do not derive from some psychic entity lying behind the symptomatic manifestations. If this analysis is valid all treatment must be symptomatic: if all symptoms are removed so is the neurosis. It is true that, if only instrumental acts mediated by anxiety are removed, the aversive drive tendencies will remain and, from the theory, one would predict that new instrumental acts would be reinforced and become habitual. This may be the foundation of the clinical belief in symptom substitution. In these instances the elimination of the anxiety responses themselves is also necessary. Some instrumental acts are themselves, however, the stimuli from which the anxiety responses derive. In writer's cramp, for example, the origin of the tremor may have been the result of a transient emotional disturbance. The disturbed writing behaviour would, however, lead to embarrassment and stress and, therefore, generate increased anxiety which would become conditioned to the various stimuli associated with preparation for writing. Liversedge and Sylvester (1955) have described a method by which this condition was symptomatically treated in a group of patients with no evidence of symptom substitution. The same is true of certain other well-defined symptom entities such as nocturnal enuresis when treated symptomatically.

As to techniques of treatment, as modification of behaviour is the aim, the generalizations of learning theory should provide the necessary guidance. Indeed, from one point of view, treatment may be considered as a problem in eliminating specific behaviour as presented and without reference to the causes and circumstances of their development and, where there is a circumscribed symptomatic entity with clear-cut stimuli defined by the situation as in the examples quoted of writer's cramp and enuresis, this approach may be adequate. In other instances, however, various remote stimuli are of such importance that a knowledge of the history of the condition is important. In terms of the present type of theory the diagnostic evaluation of a patient will need to refer to such things as his degree of neuroticism, his position on the extraversion/introversion continuum, the nature and amount of stress to which he had been subjected, the conditioned stimuli which evoke the abnormal reactions and his characteristic emotional and instrumental responses to those stimuli and the stress situation itself.

Various experimental circumstances result in the decrement or elimination of responses. Each may provide an analogous therapeutic situation.

Punishment: Thorndike postulated a negative law of effect as well as a positive, and punishment is frequently used in everyday life to control disapproved behaviour. The work of Estes (1944) and others indicates, however, that punishment merely produces a temporary interference with ongoing behaviour and does not reduce the probability of its evocation on future occasions. In this connection we need to distinguish between punishment and "escape from punishment", a rewarding situation often confused with punishment. Even if effective, punishment would be an undesirable technique for

dealing with responses mediated by anxiety, as the punishment itself would produce further stress and anxiety, which would summate with that already present.

Removal of unconditioned and conditioned stimuli: In the absence of the relevant stimuli, potential responses are not evoked and, in the long term, a process of forgetting or decay of habit strength may occur. This is precisely the rationale of Meyerian treatment by environmental manipulation, illustrated by the extensive social and educational modification carried out in child guidance clinics.

Satiation: Massed evocation of a response without reinforcement results in extinction of that response. After an interval, the response reappears owing to the phenomenon of reminiscence. Repeated massed extinction trials ultimately eliminate the response. This technique was adapted to the treatment of tics by Dunlap (1932), but his work has been largely ignored. Recently the writer has collaborated with Yates (1957) in attempting to eliminate a set of multiple tics in a young woman by this method. These tics are allied to respiratory movements and appear to have started following traumatic experiences while undergoing anaesthesia. During treatment sessions the patient voluntarily reproduces the tics as accurately as possible, and over prolonged periods of massed practice. Predictions on the basis of learning theory have been verified in this situation, but it has required considerable experimentation to establish the optimal conditions for the development of conditioned inhibition. At the present time the patient's voluntary responses have been much affected by inhibition, and there is a concomitant decline in her involuntary tics and a general improvement in her clinical condition. The questions still remain as to whether her tics will entirely disappear before or when conditioned inhibition of the voluntary responses is complete, and whether their disappearance, if it occurs, will still leave her with anxiety symptoms.

The modification of expectations: Contemporary learning theories take into account the mediation of responses by goal expectancies built up from experience of the reinforcing situations. When expectations are not fulfilled, as when the reinforcement situation is altered, new expectancies are developed and new instrumental behaviour mediated. Thus it might be thought that if the neurotic individual was forced or persuaded to remain in feared situations or to carry out feared acts, he would discover that the feared consequences no longer occurred. He would, however, meet the painful consequences of the unchecked arousal of anxiety, a response which, as previously described, is extremely difficult to extinguish. When traumatically trained animals are forced to reality test in this way, little modification of avoidance responses occurs. This is consistent with the fact that a patient with a severe phobia or obsession is quite well aware that his anxieties are unrealistic.

The strengthening of incompatible reactions: If one response, incompatible with another, is conditioned to the same stimulus as the latter, and the new connection progressively strengthened, the probability of evocation of the old response is progressively decreased, and will ultimately reach zero. This is the most promising method of response decrement for clinical application because emotional responses incompatible with anxiety are available in addition to incompatible instrumental responses.

One form of incompatible response is the opposite of the one to be eliminated. Actual inhibition of a muscular response is an example of this and is the principle underlying the well-known conditioning treatment of enuresis (Mowrer and Mowrer, 1938; Davidson and Douglass, 1950). The enuretic

responds by urinating to the stimulus of a full bladder. During treatment the same stimulus, the full bladder, is linked with a waking stimulus, a bell operated electrically at the commencement of urination. Urination responses are spontaneously inhibited on waking, and this inhibition, by a conditioning process, ultimately occurs spontaneously without waking and without sounding the bell.

Other incompatible responses involve essentially different activities from the treated one, but in so far as the same response systems are involved the two responses cannot occur simultaneously. This is usually the case when emotional responses are modified. When, however, a strong anxiety mediated response is involved it is extremely difficult to initiate and sustain alternative behaviour. Even if this were possible, intense conflicts would ensue which might themselves be the source of additional anxiety. It is in these instances that use needs to be made of the generalization continuum in order to reduce the response potential of the undesirable response. At the same time stimulation and motivation associated with the alternative response is enhanced. In these circumstances the alternative reaction becomes prepotent and, owing to its own generalization gradient, the process can be repeated nearer the centre of activity of the response to be treated. By moving along the generalization gradient in this way, the alternative response ultimately becomes prepotent in all circumstances.

This technique has an experimental foundation in Wolpe's (1952) animal experiments, and is essentially the method advocated by Jersild and Holmes (1935) for treating children's fears. Thus a child, afraid of dogs, is given a puppy. The puppy is sufficiently unlike a grown dog to elicit the fear to a small degree only. The puppy's antics create pleasurable responses, and as the puppy grows into a dog this attitude spreads to all dogs. This was the rationale for the treatment of a case described fully elsewhere (Jones, 1956). A patient's abnormal frequency of micturition was treated symptomatically by a conditioned inhibition technique. This symptom disappeared, but the prospect of venturing into the street continued to evoke a strong anxiety reaction, in line with the theory advanced in this paper. These emotional symptoms responded to a graded re-education programme devised in terms of the generalization principle.

Another example, illustrating the separate treatment of somatic and emotional symptoms, concerns a male patient who exhibited a marked tremor, associated with anxiety, and particularly evident when the patient had to write in front of others, especially his superiors at work, where he was a pay clerk. The tremor also occurred when holding a cup or glass in public, and in other similar situations. At the time the patient was first seen, the tremor was almost chronic. As the main symptom was somewhat akin to writer's cramp, the conditioning treatment described by Liversedge and Sylvester (1955) was applied. This includes practice in inserting a stylus into the progressively smaller holes of a steadiness tester. Contact of the stylus with the edge of the hole completes a circuit which applies shock to the patient's free hand. At the beginning of treatment the tremor was very marked, and the patient was unable to place the stylus in the largest hole of the tester. A regular learning curve was produced, and at the end of this phase the patient's skill with this apparatus was well above that of an untrained normal person. There was also a general improvement in his condition.

Even so, on those occasions when he had to sign documents in the office of his superior his anxiety was intense and the tremor reappeared. The generalization technique was employed with considerable success. Each day the patient carried out a task involving writing behaviour in public, but where the social consequences of failure were not serious and withdrawal to privacy was

possible. Thus, for example, he might take a cheque to pay into his bank account and deliberately fail to endorse it. When the cashier pointed this out and requested his signature, the patient would be prepared and could, if overwhelmed with anxiety, retire to a writing booth. This case has been followed up for over a year without relapse.

Herzberg (1941, 1945) reports good results on a large group of patients with a technique involving graduated everyday tasks of a similar nature, but real life situations may not be necessary in all cases, at least in the early stages of treatment. Psychodrama may well be adapted to this theoretical formulation, and has been used in treating a child patient with an aggressive disorder. This type of psychodrama does not, however, like psychotherapeutically orientated psychodrama, involve the "acting out" of existing attitudes and responses, but their suppression by alternative incompatible responses from the earliest stages. Graded situations of this type may also be suggested in hypnotic states, a technique used by Wolpe (1954).

In chronic and widely generalized conditions, it may be extremely difficult to find a situation in which the anxiety response is sufficiently weak to be superseded. This is when hospitalization and drug treatment may be important. Thus Meyer (1957) rapidly and successfully treated a severely phobic and anxious patient on these lines, once she had settled in the hospital ward and felt relatively secure there, despite the fact that, at first, any emergence from the ward induced severe anxiety and psychosomatic symptoms.

Removal of "manipulanda": Another possible method of response decrement, essentially similar to the last, is to eliminate from the stimulus situation those aspects necessary for the performance of the undesired response, while the remainder of the stimulation remains intact. Thus, if a rat spends much time in a Skinner box, from which the bar is removed, earlier bar pressing responses will be eliminated (Hurwitz, 1955). Similarly, if the tremorous patient previously described was able to spend a considerable period each day with his employer, but without being required to write, a later demand for his signature might produce no marked effect.

Throughout the discussion of treatment the effects of individual differences, in terms of learning parameters, have been ignored. These may frequently be of importance. One patient (Meyer, 1957) was practically unconditionable in a laboratory test. Excitatory drugs were therefore used during the training period and then withdrawn, as, once learning had occurred, there was no reason to believe that his retention would be impaired. This procedure is justified in terms of animal experiments. Fairly obvious and rather mechanical applications of therapeutic principles have been stressed, but verbal interactions between therapist and patient may also be manipulated along these lines. The concept of the transference situation might well fit into this conceptual framework: the therapist will presumably lie somewhere on the stimulus generalization continuum derived from, say, the patient's father, and will, therefore, elicit responses learned in relation with the father. In so far as these are modified, the new responses generalize back to the father-son relationship. The present theory would, however, tend to indicate more active treatment than is usual in psychotherapy, and would focus attention on the fostering of new responses rather than on the "understanding" of old responses.

Finally it needs to be stated that, though the apparently successful treatment of a few cases has been described, there are at least two cases, treated on similar lines, which were not successful. It is not claimed that the remainder necessarily improved as a result of treatment, nor that retraining techniques are

clearly better than psychotherapeutic procedures. What is claimed is the possibility of devising treatments derived from the findings of general psychology. Large-scale controlled studies involving such treatments would be necessary to establish their efficacy. The reported results of workers like Wolpe and Herzberg encourage optimism as to the results of such an investigation.

SUMMARY

Neurotic behaviour is considered in the light of the concepts and findings of experimental psychology, and the possibility of an aetiological theory in these terms is examined. The implications of such a theory for the treatment of neurotic patients are indicated and examples of treatment from this point of view are quoted from clinical practice and the literature.

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