ANXIETY: ITS NATURE AND TREATMENT.

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IN the psychological field, the two significant streams of thought are the Pavlovian and the Freudian, the physiological approach of Leningrad and the psycho-analytic approach of Vienna. It will be suggested here that they are not divergent streams as is often thought, but convergent, and that in the impact between them lies the more immediate future of psychology.

This essay is the result of that impact in the mind of the author, and is frankly speculative and provocative rather than definitive. It seeks to present a survey and synthetic philosophy of the problems of anxiety and its treatment in the light of Freudian and Pavlovian trends; it also owes a considerable amount to Kempf.

To save the reader's time, it has been very closely written and is almost a précis. This has necessitated the shorthand of technical jargon. To some extent this has been countered by the chaptering and paragraphing. There is also an apparent dogmatism which certainly does not exist in the author's mind; no one is more conscious of obvious lacunæ and inconsistencies.

PART I.

The Nature of Anxiety.

THE FOUR MOODS.

The psychiatrist—consultant or institutional—is concerned predominantly with four affective states or moods: anxiety, elation, depression and apathy. In this paper I propose to make some speculations as to the nature of anxiety and its relationship to the other affective states. Finally I propose to say something about its treatment, both symptomatic and radical.

Briefly I would suggest that anxiety—in its physical and mental aspects—is a reaction to the unsolved conflict which results from inadequacy of any kind.

Elation is the reaction to solved conflict. As the psychiatrist sees it, the elation is usually a pathological one in which the solution—an hallucinatory or delusional one—is purchased at the cost of sanity.

Depression is the reaction to unsolvable conflict, either temporarily or

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permanently so. The obstacle to a solution may be external, or may lie in the "unconscious" mind.

Apathy is a reaction more difficult to understand and to evaluate. Tentatively I will suggest that apathy follows the completest solution of conflict, the completest gratification of a response. The "apathy" of the psychiatrist is, however, not quite the same thing. I would suggest that this is a reaction in which every minor physiological impulse or desire is gratified the moment it arises, so that little or no tension is allowed to accumulate. The immediate gratification of part impulses prevents tension, and, with it, conflict and anxiety. Such a degree of apathy will, as a rule, be followed by mental deterioration.

We see then that each of these four moods can be considered in terms of conflict.

The Energic Basis of Conflict.

Conflict is the result of a clash of instinctive responses—or groups of instinctive responses—all competing for a "final motor path". Or the clash may be between one response and the total organism, that being of course the sum total of all instinctive responses.

In such a clash certain responses are inevitably unsuccessful, and therefore inhibited; and such an inhibition brings with it a rise of tension.

The Energic Basis of Responses.

I would suggest that the energy for these responses is derived ultimately from the various metabolic and tissue tensions, and more directly from tensions in the unstriped muscle of viscera and blood-vessels, and that these provide the dynamic force which is converted, probably and usually by the autonomic-endocrine system, into the various instinctive responses.

There is no experimental evidence for Kempf's assumption that the autonomic system may be a primary source of energy, and indeed Cannon has recently produced evidence which seems to weaken the assumption. He disconnected the sympathetic or thoracico-lumbar component of the autonomic system from the cerebro-spinal system in cats, or rather from the central basal ganglia, which seem to constitute an autonomic centre in the brain. This he did by removing in sections both sympathetic chains from the superior cervical to the pelvic ganglia. He found that the cats did not die; nor did muscular activity, growth, the œstrous cycle, reproduction, lactation or blood-pressure seem permanently affected. The animals, however, were unable to react adequately to fear, rage, pain, cold or oxygen-hunger. Absence of the thoracico-lumbar component of the autonomic deprived the cat of the ability to react to sudden emergency changes in the environment, but it was still able to react to a slower tempo and in a sheltered milieu.

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It should be noted, however, that Cannon did not disconnect the parasympathetic component of the autonomic. His experiments suggest definitely that the autonomic system is an intermediary between metabolic and visceral tensions and activities on the one hand and the cerebro-spinal system on the other, but though an extremely important one, apparently not indispensable, at any rate so far as its thoracico-lumbar component is concerned.

It seems advisable to modify Kempf's suggestion and to go a little further back for the ultimate source of instinctive energy—to tissue and visceral tensions which influence the autonomic system and are reciprocally influenced by that system.

If we accept the suggestion that visceral, vasomotor and metabolic tensions are the ultimate source of energy, then the autonomic-endocrine link may be considered as a biological reservoir with a thermostat-like action which tends to maintain the sum of metabolic tensions within certain limits, so that it neither rises nor falls beyond these limits. Any undue rise of tension normally activates the cerebro-spinal discharge-system in such a way as to modify the internal and external factors that have determined the primary metabolic tensions; although in certain instances, and especially where the cerebro-spinal system becomes for some reason ineffective, the autonomic-endocrine link may act as its own discharge-system. Whether an undue fall of tension has any action on the cerebro-spinal system or on metabolism—to complete the thermostat analogy—one cannot say.

Although energy is derived ultimately from the metabolic source, there is a reciprocal and reversible reaction between tissue metabolism, autonomic-endocrine tension and cerebro-spinal activities; and the autonomic-endocrine link co-ordinates the slower tempo of metabolism with the faster tempo of the cerebro-spinal system, the immediacy of one with the lag of the other.

The channels through which one system will influence another are frankly problematical, and I cannot profess to discuss them here. Metabolism may influence the autonomic system by influencing unstriped muscle whose muscular tension activates afferent fibres of the autonomic system, or there may be a direct action via the blood-stream on autonomic nervous centres in the pons, as occurs for instance with CO_2 in the regulation of respiration, and possibly with food and sex hungers. The autonomic may, in return, influence metabolism through its motor rami activating unstriped muscle, or through its action on blood-vessels.

The autonomic system may act on the cerebro-spinal in two ways: either directly via the basal ganglia, or possibly indirectly via the vaso-motor system or the blood-stream, in this way influencing the susceptibility of the nerve-cell to stimuli. In the first instance it stimulates or inhibits the cerebro-spinal nervous system; in the second instance it makes it more or less sensitive to stimulation.

That the autonomic system may influence the cerebro-spinal system in the

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first way mentioned is strongly suggested by experimental evidence produced by Hess, which suggests that sleep is a parasympathetic or vagal reflex acting via a centre in the basal ganglia and inhibiting cortical activities.

Karplus and Kreidl had previously suggested that nerve centres for the autonomic system were to be found in the hypothalamus; and later work, including that by Economo on encephalitis lethargica, has tended to confirm this.

Pavlov has also quite recently suggested—as a result of work carried out by his assistants Rikman, Conradi and Soloveychik—that the activity of the cortex is definitely influenced by the excitability of the subcortical centres.

The cerebro-spinal system influences both other systems indirectly by adaptive responses which can be considered as of two types: responses " to " or " away from ", responses of " approach " or of " withdrawal ".

Autonomic tension keeps the cerebro-spinal system taut and ready to respond immediately in these two characteristic adaptive reactions; in the gratification of sexual and other appetites and in " fight " or " flight ". Should the tension become very great because cerebro-spinal activity has been obstructed, and is unable to discharge it in adaptive activities of some kind, then the autonomic system becomes its own discharge-system. Instead of a specific adaptive cerebro-spinal response, there is a diffused, generalized, non-adaptive or not immediately adaptive mass-response, an overflowing of tension from one or more autonomic segments into many. It is with these diffused responses that what are known as emotional responses are most intimately associated, and of these anxiety is one of the first to demand consideration.

One might ask whether metabolism can directly influence the cerebro-spinal system without the intermediacy of the autonomic-endocrine link. Cannon's experiments have suggested that this is possible. It must, however, be remembered that in his experiments the parasympathetic system was left intact, and that where there is a dual control in the human mechanism, one usually finds that either component has considerable powers of compensation, and may be able to carry on the control single-handed.

It is, however, conceivable that a direct action of metabolism on the cerebro-spinal system may occur via the blood-stream, as has been instanced previously in the case of the action of CO_2 on the pons in the regulation of respiration.

The Immediate Results of Conflict.

Where clash and conflict occur there is inevitably, as we have suggested, inhibition of one or more responses, and with it a rising tension in the viscera whose responses are being inhibited.

Conflict spells visceral and metabolic hypertension. Hypertension will at

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a certain point compel its own discharge, and the bound-up energy will flow along one or more of at least three channels.

Most normally, rising tension will activate the cerebro-spinal system on its motor side and allow the energy to discharge itself into the "final motor path"; a response which is specific and effective, and might be called the "direct somatic response". This has its positive and negative aspects; there is stimulation of certain reflexes with a "reciprocal inhibition" of their antagonistic reflexes. Failing this response, two possibilities are left.

Secondly the energy may diffuse longitudinally through the autonomic system; there it may reinforce local cerebro-spinal segments and be discharged on its motor side. This may be termed the "indirect somatic response".

Both of these responses are adaptive, and more or less immediate. There is a third non-adaptive, more mediate response.

A "Bi-dimensional" Theory of Mood.

The third response is a frustrated, non-adaptive, viscero-thalamic one. Visceral hypertension, blocked on the motor side, flows in a cortical direction to constitute a mood, or affective-emotional state, which may be considered empirically to have two components.

First of these is an unspecific affective element. This may be expressed in terms of pleasure and pain, and I am suggesting that it is a function of the tension in organs subserving instinctive activities, and that it is related to the degree of tension, and more especially to its rate of rise and fall. In anxiety the tension is a rising one; in elation the tension is falling; in apathy it is low, and is repeatedly being discharged; in depression it is extremely and continuously high and amounts to a sort of spasm.

The second component is a specific emotional element. This is a function of the particular organ involved, which gives characteristic colouring or "local sign" to the response. The anxiety of gastric or intestinal uneasiness, for example, is not the same as that resultant from sexual tension. The affective element—being related to the degree of tension—may be similar in each; the differentia is the emotional element, which is due to the particular viscus or instinctive mechanism under tension.

Incidentally one may note that in depression the affective component of displeasure is so great that it swamps the more specific emotional component, which is due to a specific organ-tension. That is to say, the first component, which is more or less quantitative, swamps the second, which is more or less qualitative; and so, when instincts are obstructed, the resultant depressions are less easily to be differentiated than the corresponding anxieties.

We may note one or two points. In the first instance we are shirking the all-important link between emotion and thought (the reactions possibly between thalamus and cortex). This link is assumed, and its nature not considered, otherwise the problem would be too difficult.

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One other point. The " bi-dimensional " theory of mood suggests that emotions or moods are the results of changes in tension, and not the causes of such changes; they are not the driving force behind responses, but are the result of some interference with responses; they are the result of obstruction or of relief from obstruction. They are therefore non-adaptive, although they may follow immediately in the wake of adaptive activities or may precede and indirectly help to induce adaptive activities.

The Nature of Anxiety.

To summarize, visceral hypertension, once it rises above a certain threshold, tends to discharge itself in the " direct somatic response ". When this outlet is barred it overflows in at least two other directions. First it may overflow longitudinally into other segments where it will reinforce other autonomic tensions, and may induce other corresponding cerebro-spinal responses. This constitutes the " indirect somatic response ". Secondly, it may flow cortically to form a " viscero-cortical " or " viscero-thalamic " response.

Anxiety then consists of—

(*a*) An indirect somatic response of some kind, plus—

(*b*) A viscero-cortical response or affective-emotional state.

Between (*a*) and (*b*) there is an inverse ratio. Where (*a*) completely replaces (*b*) we get what we may term an anxiety-equivalent. In so far as motor or other reactions discharge energy and provide gratification, (*b*) is decreased as the result of a draining of energy from it, and where such motor responses are sufficient they will constitute a complete anxiety-equivalent.

Different Reactions to Anxiety.

Again it is a clinical, and obvious, fact that different people react in characteristic ways to anxiety. In some it is accompanied by diarrhœa; in others by vomiting, tremor, palpitation, tachycardia, syncope, frequency of micturition, blanching, blushing, asthma, and so on. Why is this so?

It may be that organs (or segments) which are inferior to begin with remain in a more or less chronic condition of mild hypertension because of their comparative inadequacy. They are therefore more sensitive; and energy diffusing from a completely inhibited segment picks them out all the more easily. Or it may be that these responses for some reason or another have been specially associated with early feelings of anxiety, and have so become conditioned to the anxiety response.

Probably both factors are at work. Anxiety—due to inhibition of one segment—will find out the weakest of the other segments, and these by a conditioning process will tend to react habitually.

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The Causes of Anxiety.

In the light of these assumptions anything inducing or increasing tensions that cannot be directly gratified—and must therefore be inhibited—will act as a cause of anxiety.

Anxiety involves two elements, first an inferiority of some kind, innate or acquired, which predisposes to conflict, but does not actually cause it; secondly a situation which emphasizes this inferiority by making demands of the inferior organ. The inferiority is the predisposing condition; the situation, the exciting cause. With a situation of sufficient urgency even a normal organ may be relatively inferior.

These two elements determine the actual visceral tension. Another factor intervenes before anxiety becomes manifest, and that is the anxiety-tolerance of the individual. The inherent make-up of some individuals seems to enable them to tolerate a greater degree of tension before conscious anxiety becomes manifest.

Inferiorities may therefore be innate or acquired, and may be classified for convenience as biological, psychological or social, according to the aspect most in evidence.

Biological inferiorities may be structural or metabolic, hereditary or due to trauma or disease. Psychological inferiorities are usually the result of one's attitude to one's instincts, and that of course is the result of one's training. An abnormal attitude to any instinct will prevent it working in harmony with the other instincts, and the resulting conflict is primarily intrapsychic, secondarily extrapsychic or social. Social inferiorities result generally from wrong or unusual attitudes towards society—again the result of training. Unusual shyness, unusual rebelliousness or unusual originality, for example, are attitudes which almost inevitably ask for conflict.

How Anxiety Expresses Itself.

We have speculated on the nature of anxiety, and have suggested that it derives from the tension of inhibited segmental and metabolic activities which cannot discharge itself directly, but instead discharges into either or both of two indirect paths. We may now consider in further detail how this local tension is converted into more generalized anxiety symptoms.

Inhibition of instinctive responses is of course a normal, continuous and inevitable process in civilized society. Some degree of anxiety and some degree of unsolved conflict is inevitable and indispensable in life, and in the evolutionary process. Only when anxiety is chronic, only when it has repeatedly failed to induce adaptive activities and has set into play certain irreversible psychoneurotic and psychotic reactions can we call it definitely abnormal.

Chronic anxiety is the essential nidus of psychoneurotic and psychotic

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reactions. It is always the beginning, and sometimes the middle and end, of such reactions. It bears, no doubt, some degree of causal relationship to many diseases that are organic, and influences and determines the premorbid functional stage of many of them ; but that cannot be discussed here.

In the course of such reactions the two components of the total anxiety response (*a* and *b*) may change their relative values as we have already suggested. The indirect somatic response may partly or completely replace the affective-emotional response. Anxieties may be replaced by anxiety-equivalents, that is to say by motor or other responses in other segments, or by certain defence mechanisms which involve the entire organism.

Freedom from anxiety is purchased at the cost of a more or less disabling symptom. But usually—and especially in the psychoneuroses—anxiety looms near, and is never absent for long.

The Psychoneuroses.

The psychoneuroses especially can be considered as anxiety-equivalents. Anxiety is here shelved, but not solved, and may return at any moment, except in the anxiety neurosis proper, where anxiety remains unchanged in its pure state.

The psychoses, on the other hand, are more closely associated with the other moods—elation, depression and apathy. By the time a psychosis has set in, anxiety has largely given way to one or other of these moods. Anxiety precedes a psychosis ; it may also be superimposed on it as a secondary phenomenon ; it may complicate the psychosis, but is not its characteristic feature. Whereas the psychoneuroses are anxiety-equivalents, the psychoses may be considered as anxiety sequelæ, and are associated with the moods into which chronic anxiety tends to merge.

Four psychoneurotic reactions can conveniently be considered—the anxiety, the hysterical, the compulsive-obsessional, and the hypochondriacal reactions. Anxiety predominates in the first, and is either continuous or recurrent and paroxysmal. In the hysterical reaction relief from anxiety is purchased at the cost of a symptom which is based on one or more of the physical concomitants of anxiety or on certain primitive defence-patterns. In the compulsive-obsessional reaction, freedom from anxiety is being repeatedly purchased at the cost of the compulsive act. The emotional state is unstable, and alternates between anxiety on the one hand and comparative relief, once the conditioned compulsion has been carried out. In certain cases, when the compulsive act is anti-social, a secondary anxiety may be superimposed. In the hypochondriacal reaction, freedom from acute anxiety is purchased at the cost of a continuous and crippling preoccupation with one or other organ. This is a difficult reaction to understand and explain, and in some respects may be intermediate between the anxiety reaction and the hysterical reaction.

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In the first reaction, anxiety is frank, although not always referred to the stimulus actually causing it. In the other three reactions anxiety is shelved more or less successfully.

The Anxiety Reaction.

Under this heading we may consider at least three possibilities. The first is a generalized reaction of anxiety to almost any nocuous—i.e., tension-raising —stimulus ; the other two are conditioned reactions to specific stimuli.

In the first instance we have the chronic sufferer from anxiety, in whom instinctive tension is continuously high and conflict ever imminent. There is a state of continuous subconflict, and as a result, a lessened anxiety-tolerance, a lessened ability to stand extra tension, a greater sensitivity to small doses of anxiety-producing stimuli. Ultimately in such an individual, biological ruts are formed in whatever apparatus is concerned with anxiety.

This simplest form of anxiety reaction we might term the anxiety neurosis proper. It is suggested that it is due to an irradiation of energy from one or more over-tense and inadequate segments or viscera to the entire organism, and that it is a non-specific reaction which may occur with almost any unpleasant stimulus. This irradiation is often the result of an innate inferiority of some kind with its sense of inadequacy.

A second possibility is where anxiety has become conditioned in the Pavlovian manner to a specific object, or to symbols or situations associated with such an object, such objects, symbols or situations having become the conditioned inhibitors of certain responses. These symbols or situations can, of course, be regarded, as the Gestaltists have pointed out, as configurations of stimuli of varying complexity.

Such anxiety-conditioned objects—or their associated symbols or situations —will be avoided and feared because they precipitate the anxiety attack, and the fear of such objects, symbols or situations constitutes a phobia. The phobia is a defence against intolerable anxiety ; in itself a mild tolerable anxiety, it protects against an acute intolerable anxiety. So long as the object can be avoided, so long is there relief from acute anxiety.

The compulsive-obsessional reaction is a conditioned—occasionally symbolic —device to avoid such an object ; or failing that, to annul its effects. It is a device to reinforce or replace a phobia, but its aim is not usually apparent to the patient. Just as the phobia acts as a defence against an acute anxiety, so the compulsion may be an additional defence against the comparatively mild anxiety of the phobia.

A third possibility may occur as a development of the first, i.e., of the anxiety neurosis proper.

As I have suggested, in different people a different segment or viscus may predominate in the anxiety response, due either to innate inferiority of that segment or to a " conditioning " of that segmental response, or to both.

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In some cases the emphasis will be displaced from the original anxiety-conditioned stimulus to one or other of the somatic symptoms of anxiety—gastric, cardiac or otherwise. The anxiety is referred, not to the stimulus, but to a visceral symptom of anxiety.

And so a vicious circle is set up. Anxiety begets a particular visceral symptom among other motor, sensory or visceral symptoms. This visceral component of anxiety is conditioned to the entire anxiety response and tends to maintain it. The intolerable fear of the original object is replaced by the more easily borne preoccupation with the visceral symptom. And also a considerable amount of the energy which is determining tension and anxiety is released in the accentuation of visceral activity. This reaction is often termed —somewhat inaptly—an anxiety hysteria. As it lacks Janet's " belle indifférence ", an important clinical criterion of hysteria, it is better to include it among the anxiety responses.

From anxiety hysteria energy may diverge in either of two directions. When all the energy determining tension is released in visceral or other activity and there is little or no anxiety, we have a conversion or true hysteria.

In certain individuals we get, along with an emphasis of visceral response, not so much anxiety as preoccupation, or an increase of ideational activity. This, I suggest, constitutes a hypochondriacal response. The relationship between an affective-emotional state like anxiety and ideational activity is a problem too complex to be discussed here. Hypochondria is a definite type of response, and one which may be superimposed on another neurosis, as for instance an anxiety state, or on a psychosis, as for instance a depression.

While in hysteria the anxiety-substitute tends to take the form of a visceral or motor reaction, in hypochondria the anxiety-substitute takes the form of a preoccupation with paræsthesiæ.

Incidentally in the various neurotic responses there is a varying degree of specificity in both stimulus and response. In the anxiety neurosis proper, both stimulus and response are non-specific and generalized; in the phobia the stimulus becomes more specific, the response remains a generalized one. In the obsessional neurosis, stimulus and response are specific. In anxiety hysteria the response has become specific, as also in hypochondria and in hysteria.

The Hysterical Reaction.

In the hysterical reaction relief from anxiety is purchased at the cost of a symptom. There is a complete displacement of interest from the source of anxiety to the symptoms of anxiety, or to certain primitive defence-patterns which—for reasons to be mentioned shortly—we may consider as anxiety-equivalents.

Energy which in the anxiety responses discharges itself only partially and diffusely, here tends to canalize itself definitely along certain paths, visceral,

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motor or sensory. It is a further step along the lines of an anxiety hysteria, made by decreasing the anxiety (or "viscero-thalamic" component) and increasing the visceral (or other "indirect somatic") component.

Clinically, hysteria is usually characterized by—

(*a*) A symptom, motor, visceral or sensory, or a pattern of such "indirect somatic" symptoms.

(*b*) A dissociation of this symptom or symptom-pattern from the rest of the personality, even to the extent of its constituting a separate personality.

(*c*) The "belle indifférence" of Janet, an inevitable result of this dissociation, and an indication of the attitude of the total organism to its dissociated component.

Visceral symptoms occur in the weaker, more irritable, more sensitive organs which accept the canalization. Sensory symptoms may be referred from the visceral tensions, and may contribute to the hyponoic reaction which we are shortly to discuss.

Motor symptoms often become integrated—as Kretschmer points out—into certain primitive defence-patterns, which represent the responses, not of one segment, but of many segments. They are the summation of the more primitive segmental impulses of the individual. Although they temporarily take over control of the organism, one cannot consider them as "total" reactions. They interrupt and supersede higher activities, but do not act with them.

The result is a "dissociation" between the cortical integrating centres and the lower subcortical integrating centres. It is presumably the result of a failure of the cortex to inhibit subcortical activities. One might term this a "molar" dissociation, in contradistinction to the "molecular" dissociation of the personality that one finds in schizophrenia and the schizophrenic dementias.

The defence-patterns that we have mentioned occur when instinctive activity is very acutely threatened; when an important and powerful segmental activity is being inhibited. They are to be seen in animals who are in extreme danger, or when there is interference with sexual consummation. These responses are more primitive than anxiety, and as they occur in situations which would otherwise arouse anxiety, they may be considered as anxiety equivalents.

Kretschmer considers that they express a lower order of will that comes into action when the will itself has been paralysed; and for this mode of response he suggests the term "hypoboulic reaction".

Intimately associated with the motor hypoboulic reaction, Kretschmer suggests that there is a lower order of primitive thinking which dominates the field of consciousness when conscious directed thinking is paralysed, and this he terms the "hyponoic reaction". It has a strong resemblance to Freud's

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hypothetical " unconscious ", for both have access to primitive sources of energy and have one type of thinking in common—what Kretschmer calls " katathymic " thinking, or thinking that clusters or agglutinates round emotional complexes or tendencies. One might even call it " segmental " thinking, from the source of energy that we would suggest. Clinically Kretschmer's hyponoic reaction is exemplified in the hysterical twilight-states, puerilisms and pseudo-dementias.

Kretschmer mentions two types of primitive motor reaction or hypoboulic response. First is the " violent motor reaction ", the reaction of a rat in a trap, which moves violently and unceasingly without any conscious plan. It may ultimately escape by some lucky movement, and that is the ultimate biological purpose of the reaction. Analogous reactions in the human are the varieties of hysteric and hystero-epileptic fits.

Another hypoboulic reaction is the " sham death reflex " of the opossum and other animals. Clinically analogous to this are certain cataleptic or even catatonic states.

The " protopathic " function of the thalamus postulated by Head and Rivers may well bear some relationship to both the hypoboulic and hyponoic reactions, the former being possibly an expression of the influence of uncontrolled and disorderly thalamic function on the corpus striatum, the latter possibly the repercussion of such disorderly thalamic and striatal function on the cortex.

Whatever the mechanism of such reactions, there seems little reason for doubting their existence; and one may reasonably suppose that they may become conditioned to the situation which released them in the first instance.

A word as to the mechanism of their release. Kretschmer suggests that there is a volitional element. Just as the knee-jerk reflex is facilitated and reinforced by a voluntary clenching of the hands, just as the shivering reflex of extreme cold and the tremor following shell-shock can be reinforced and maintained by conscious effort, so the primitive motor response may be encouraged by a diffuse volitional process of some kind, possibly by a semi-conscious impulse.

An alternative is the Pavlovian explanation, which suggests that a failure of inhibition releases subcortical responses otherwise held in check; and Pavlov suggests that this mechanism occurs in hysteria and schizophrenia. Kinnier Wilson further suggests that this failure of inhibition may occur at various points; that it may be high when it occurs in transcortical neurones, or low when it occurs in corticifugal neurones. It is even conceivable—as Kinnier Wilson points out—that the failure of inhibition may be a willed one, i.e., that there is a voluntary de-inhibition resulting in a voluntary de-cerebration, in which case either the Kretschmerian theory of cortical facilitation or the Pavlovian theory of cortical release might be made to account for the fact that the psychoneuroses aim not only at solving the

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internal conflict, but also—and more especially in hysteria—at manipulating the social situation.

The aim of the hysterical reaction is twofold: intrapsychic and extrapsychic, psychological and social. In the first respect it avoids anxiety, in the second it secures gratification of a sort by manipulating the social situation, and indeed may even succeed in removing the situation which provoked the hysteria. Hysteria is, then, an accentuation, for social and psychological purposes, of one physiological component of the anxiety response, or of one type of anxiety-equivalent.

The Hypochondriacal Reaction.

The hypochondriacal reaction has already been discussed, along with anxiety hysteria, and it has been suggested that it is due to a displacement of attention from the intolerable stimulus to an ideational response rather than to the viscero-cortical response as occurs with the anxiety hysterias. Freedom from acute anxiety is purchased at the expense of a continuous and crippling preoccupation with some organ or other.

Hypochondria might well be considered therefore as a psychoneurotic reaction, and like every other psychoneurosis it may be superimposed on a psychotic reaction. We may have a melancholic, an involutional or a paranoidal hypochondria; hypochrondiacal trends are common, too, in dementia præcox.

The hypochondriacal reaction is, like the other psychoneurotic reactions, an anxiety substitute and not a depressive state. It is, of course, found with depression, and notably so in the involutional hypochondrias, but it will be noticed that these differ from the true involutional depressions in that there is none of the retardation of speech and activity characteristic of the pure melancholias.

The Compulsive-Obsessional Reaction.

In this reaction, freedom from anxiety is being repeatedly purchased at the cost of the compulsive act. The compulsive act is a device to reinforce the phobia, its aim being to avoid the anxiety-conditioned object or situation, or failing that to annul its effects. This act may give complete immunity from anxiety, or there may be an alternation between the primary anxiety and comparative relief when the compulsion is carried out.

Again, this relief may be clouded over by some degree of secondary anxiety, which is superimposed when the compulsive act happens to be antisocial or conflicts in some way with social custom. We then have a conflict between the desire and need for the compulsive act on the one hand, and the fear of its results on the other hand.

We may ask what determines the nature of the compulsive act. Fundamentally it seems to be a kind of exorcism against the black magic of the mind,

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derivative possibly from the magic gestures and tricks of early childhood—a purposive ritual to avoid meeting anxiety-conditioned objects or situations.

Such gestures and rituals have developed presumably as a defence against childish conceptions and fantasies; and have remained as conditioned responses long after their initial significance has been forgotten. Their original significance may have been completely conscious, but it is not now so. Often these rituals are symbolic, and determined presumably by "hyponoic" thinking. Clinically one often finds them to be a defence against anal-erotic or masturbatory trends.

Pavlovian theory—dealing as it does with comparatively simple configurations of stimuli and with simple responses—is unable to explain the origin and nature of such symbolisms. Behaviourism may explain the "conditioning" of the symbolic reaction in Pavlovian terms, but it does not explain the symbolism itself. On this level the pursuit is more profitably taken up by psychological and by purely clinical methods.

Neurasthenia.

Along with the psychoneuroses we may consider the term "neurasthenia".

What is most generally termed "neurasthenia" is not so much a purposeful psychoneurotic reaction as a secondary condition. As its essential symptom is an abnormally heightened fatiguability and irritability—both mental and motor—it might be wiser to speak of it as the "fatigue syndrome".

Its causes may be physiogenic or psychogenic. Among the former, organic disease of any kind usually causes a neurasthenic condition before any actual lesion is evident. The fatigue syndrome is then merely a pre-morbid manifestation, an early functional phase of the disorder which must occur with every organic lesion not due to trauma. It is an exhaustion symptom indicating disordered and inadequate reactive powers.

Another common physiogenic cause is general atony, more especially of the cardio-vascular and muscular systems, due to insufficient fresh air or exercise, or to other habitual hygienic indiscretions common among the sedentary or the lazy.

The essential psychogenic cause is persistent or chronic emotional conflict, that is to say, chronic anxiety or even depression. I suggest that it is an exhaustion symptom following in the wake of visceral, segmental or metabolic hypertension, and therefore likely to be associated with the psychoneuroses.

Neurasthenia occurs, then, in chronic anxiety states, both primary and secondary. In the more severe depressions its characteristic fatiguability may be masked by the retardation in speech and activity, which in themselves may be an expression of extreme fatigue, or a defence-mechanism to minimize the effects of fatigue or both.

In the milder depressions fatigue will be more evident, and may even replace

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a mild depression, as Adolf Meyer has pointed out. Myers has stressed the significance of this fact in industrial psychology.

In everyday life, too, fatigue commonly indicates unsolved or unsolvable conflict, and an underlying anxiety or depression. The "tired child" is often a child who is anxious or depressed over some unsolved or—to him—unsolvable conflict. The psycho-analysts attribute neurasthenia to continual masturbation. One must, however, distinguish the physiological "sleepy" fatigue following coitus or masturbation from the "irritable" fatiguability following emotional conflict.

Post-masturbational neurasthenia is no commoner than conflict in masturbators; it is due to the conflict, not to the masturbation. The physiological limitations of the genital mechanism make excessive masturbation difficult, especially in men. The nearest approach to excess is found where masturbation has become a compulsive act, which is likely to occur as a defence against anti-social or perverse desires.

The Psychotic Reactions.

The psychoses can be considered here only briefly.

Anxiety which has not been solved objectively or shelved psychoneurotically ultimately gives way to depression. In anxiety the individual has desires, and still hopes for their consummation; in melancholia the individual has ceased to hope, but continues to desire.

Depression may persist temporarily or permanently. In individuals of a certain constitutional type it may give way after a short period to a pathological elation, where the intolerable conflict is solved on a hallucinatory, delusional or hysterical basis. The maniac's "flight of ideas" may well be an hysterical "escape from reality".

In individuals of another constitutional type the personality seems to disintegrate altogether. Depression is short-lived and little in evidence. Rapidly the individual passes into a state in which each impulse is gratified almost as it arises. No tension is allowed to arise, and apathy dominates the clinical picture, although, in actual practice, anxiety, depression and elation flash across the general background of apathy.

Clinically one finds it convenient to differentiate three main types of functional psychotic. The first reacts by depression or elation or both; the second predominantly and progressively by apathy; the third by a blend of compensatory objective action with mental activity of the more primitive hyponoic levels of the organism, and here the mood may range from anxiety through depression and elation to apathy. The first type corresponds to the manic-depressive or syntonic psychoses, the second to the schizophrenic psychoses, the third to paranoia.

The anxiety-neurotic desires and still hopes; the melancholic has ceased to

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hope but still desires; the "regressed" individual has ceased either to hope or to desire; instead he has reverted to an infantile, almost automatic gratification of segmental and other impulses as they arise.

The third psychosis is paranoia. True paranoia is rare, and possibly commoner outside than inside institutions. Paranoidal trends, however, are common enough as secondary reactions superimposed on other psychoses, and occur also in neurotics, and transiently in comparatively normal individuals.

The paranoidal reaction is a blend of compensatory objective action with mental activity of the more primitive, i.e., hyponoic levels of the organism. Anxiety, depression, elation and some degree of apathy may each colour the picture according to the degree of success or failure which the compensation is achieving at any given moment. In true paranoia the strong relationship with objective reality tend to prevent a dissociation of the personality.

These are probably the three fundamental functional or biogenic psychotic reactions, and the classifications of clinical psychiatry result from the interplay of sex, age, intelligence, degree of culture, etc., on these three reactions. The critical epochs of adolescence, involution and senility—with the physical changes and changes in situation that they bring with them—all tend to vary the clinical picture rather than the fundamental mechanism.

Constitutional and Situational Factors in the Psychoses and Psychoneuroses.

Of the three psychotic reactions that we have been considering—the syntonic, the schizophrenic and paranoia—it seems likely that the first two are closely related to constitutional type, and therefore to hereditary factors; the third seems to be more closely related to acquired situational factors. In either of the first two there is a predominant mood or mood-cycle to which the mental attitudes found are secondary; in paranoia, the moods vary with the success or failure which the compensation is achieving at any given moment.

It has been suggested of schizophrenia that there is a schizophrenic disposition and a schizophrenic process; that is to say, an innate predisposition and an acquired mode of reaction. The disposition by itself presumably results in a schizoid type of personality; the process—one which involves a progressive "shutting-in" of the personality—if added to the disposition results in schizophrenia. It seems reasonable to suppose that there may be not only a cycloid disposition—which is generally allowed—but also a cycloid process. It is interesting to note in this respect that a Russian observer, Nastiukova, found a definite "cycloidization" of the personality in salesmen; while conversely, Ravkin and Schneider found a tendency to "schizophrenization" of the personality in teachers.

I would suggest, roughly speaking, that where disposition and process

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pull in different directions we tend to get a psychoneurosis; where they pull in the same direction we get a psychosis. Where disposition and process correspond, they unite to form a clear-cut syntonic or schizophrenic psychosis.

The paranoidal reaction, being situational—though possibly a sub-variety of the schizophrenic process—may be found in either the syntonic or schizoid individual. Probably in the syntonic type it is secondary and more often temporary; in the schizoid type it seems especially likely to form an enduring expression and extension of some component of the schizoid personality and disposition.

PART II.

Pavlovian Aspects of the Problem.

THE ELEMENTS OF A RESPONSE.

Pavlovian and Freudian theory will probably converge.—The Pavlovian and Freudian approaches to mind are in no sense inconsistent. This suggestion will be amplified in the following argument.

The "conditioned reflex" approach of Pavlov can be most easily understood and criticized if we formulate a concrete prototype. Let us take an experiment identical with one of Pavlov's.

The reflex or response—we shall discuss the terms shortly—is the salivary component of the food reflex; the unconditioned stimulus (U.C.S.) is the taste of meat powder, i.e., desiccated meat; the conditioned stimulus (C.S.) is the metronome rate of 100 beats a minute. The metronome stimulus is allowed to accompany or precede in time the unconditioned stimulus, i.e., the taste of meat powder. This is repeated, and in each case the experimental dog is fed with meat powder. The feeding, the actual eating of the meat powder, is the completion of the response.

After a number of repetitions the response of salivation is conditioned to the metronome rate of 100, and we have a conditioned response (C.R.).

The five components of the conditioning process.—So far, be it noted, we have considered four necessary elements in the conditioning of a response—the U.C.S, the stimulus to be conditioned (C.S.), the response to be conditioned, and the completion of the response or the "feeding".

Two points may be observed. First, the completion of the response, i.e., feeding, must be distinguished from the response itself, i.e., salivation, since salivation is not necessarily followed by feeding. Secondly the function of the meat powder in the feeding must be distinguished from its function as a U.C.S.; that is to say, the taste of it must be distinguished from the eating of it. The one initiates the response, the other completes it.

A fifth all-important element has not yet been considered. Pavlov points

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out that with a dog which has been sated and is not hungry, there will be little or no response to the U.C.S., and the new stimulus will be conditioned with difficulty if at all. Without appetite there can be little or no unconditioned response (U.R.); without completion of the response of feeding there can be no conditioned response (C.R.). Appetite and feeding are thus vital factors in the conditioning process.

Of these, appetite, the fifth element, would seem to be the *sine qua non*, the dynamic force behind the entire conditioning process.

Pavlov, in a quarter of a century of the most meticulous and painstaking work—work destined to be epoch-making—has made an adequate beginning to the study of the conditioning process. But he has not studied—nor could one well expect him to—the dynamic forces underlying and activating the entire process.

Freud, in a somewhat speculative and empirical way, has thrown much light on the middle term that lies between stimulus and response; and has done so in what is, in our present state of knowledge, the only way likely to be of immediate profit. The tempo of physiological research must necessarily lag a long way behind the flights, intuitions and empirical formulations of the clinical psychiatrist, the psychopathologist and the psychologist.

R.S., R.P. and R.E.—In any response there are three essential components with their subsidiary elements: the reflex-stimulus (R.S.), the response with its reflex-path (R.P.), and the response-energy (R.E.).

Under R.S. we may consider two elements:

1. The C.S., i.e., metronome.
2. The U.C.S., i.e., meat.

Under R.P. we may consider various types of response—cerebro-spinal, autonomic, and even metabolic. Cerebro-spinal responses are "to" or "away from"; they are responses of "approach" or "withdrawal". The salivary reflex is a prototype of the response of "approach". The other type is exemplified in the withdrawal of a limb or the whole body from nocuous stimuli and danger.

In the "approach" type of response we may consider for convenience three elements:

1. The tendency of the organism so to orient itself as to approach the appropriate stimuli (C.S. and U.C.S.). This we might call the "approach" (Ra.), and we shall discuss it later as the "appetitive tendency".
2. The preliminary part of the response, i.e., salivation (Rp.).
3. The consummatory part of the response, i.e., the feeding (Rc.).

The first element of such a response is a "getting into position", the second is a "preparing", and the third is the actual "feeding" or consummation, this being the part of the response which determines important reciprocal changes in the R.E.

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In the " withdrawal " type of response these three elements coincide more or less, and are contained in the one act of withdrawal.

The third essential component in the response is the response energy (R.E.), that is to say the urge or " appetite " behind it.

The R.E.: Its Nature and Laws.—On the nature of the R.E. I have already speculated. I have suggested that it derives ultimately from metabolic and tissue tensions and the summation of such tensions. We may include among these the diffuse biochemical tensions or " blood-hungers ", such as for instance regulate the respiratory centre. In Pavlov's experiment, for example, the source of R.E. is the increased tension and excitability of the salivary centre due to biochemical changes in the blood.

I have also suggested that the autonomic-endocrine link stores and regulates such energy, and activates the cerebro-spinal system in such a way as to modify the external and internal factors that have determined these primary tensions.

There is then a reciprocal and reversible reaction between tissue metabolism, autonomic-endocrine tension and cerebro-spinal activities. Probably, as Miller suggests, the autonomic-endocrine intermediary link translates the tempo of tissue metabolism into the tempo of cerebro-spinal activity and vice versa. It co-ordinates the immediacy of the one with the lag of the other.

We may therefore consider metabolic tensions as the *source of energy;* the autonomic-endocrine link as a *biological reservoir* with a thermostat-like action that tends to maintain the sum of metabolic tension within certain limits, so that it neither rises nor falls beyond these limits; and the cerebro-spinal system as a *discharge-system* which is activated by the autonomic-endocrine link, acts reciprocally on the other two systems, but derives its energy ultimately from the metabolic source, via the autonomic-endocrine link.

It is possible that in some degree and in respect of certain simpler activities the autonomic-endocrine link and even the metabolic source may discharge certain tensions directly, and that they do so regularly. It is the accumulated sum of undischarged metabolic and autonomic tensions that keeps the cerebro-spinal system taut and ready to react instantaneously. Should the tension become very great and cerebro-spinal activity so obstructed that it cannot discharge it, then again the autonomic-endocrine link becomes its own discharge-system, but now, instead of a specific cerebro-spinal response, or a local segmental autonomic response, we have a diffuse generalized mass-response of the autonomic system, an increase of visceral tensions and anxiety.

R.S. and R.P. are then normally functions of cerebro-spinal activity. R.E. is a function of the metabolic source acting through the autonomic-endocrine reservoir. Speculatively one might suggest that the metabolic source corresponds to the Freudian id.

A few words on the laws of the R.E.

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The completion of a response by " feeding " releases tension and produces pleasurable affect ; it also conditions a stimulus or helps to keep it conditioned. This corresponds to one of Thorndike's Laws of Learning, i.e., the Law of Effect or Satisfaction, according to which the more one likes the result of doing something the easier it becomes to do. Correspondingly, to obstruct a response by withholding the " feeding " produces unpleasurable affect and tends to " de-condition " it.

We see, then, that " feeding " is the conditioning factor, its absence the de-conditioning factor. This is a fundamental law of the R.E.

Again, the greater the *degree of tension* which is relieved, the more strongly is the stimulus conditioned to the response. Also, some instinctive responses have greater *biological significance* than others, as Sherrington has pointed out, and the stimuli to such responses take precedence over the stimuli to other responses. The greater the biological significance of a response the more readily can it be " signalized ".

To summarize, conditioning is a function of the discharge of energy that occurs with " feeding ". It is a function, therefore, first of the initial tension, and incidentally of the strength, nature and comparative biological significance of the R.E., secondly of the degree of tension-release that occurs.

The laws of the R.S.—Under the heading R.S. we are considering both conditioned and unconditioned stimuli. These are the trigger-stimuli that release R.E. Pavlov's work has been largely concerned with the relationships, more especially the time relationships, between these two, with what has been termed the " signalization " of a response.

Briefly, where a stimulus is to be conditioned it must precede or coincide with the unconditioned stimulus in time. Once the time condition has been fulfilled, and granted that R.E. and R.P., i.e., the reflex path, are constant and that the response is consummated, then the efficiency of the conditioning will depend—

(*a*) On the intensity of the stimulus.
(*b*) On the frequency of its repetitions.
(*c*) On its extensity or duration in time.
(*d*) On its recency or position in time.

Some of these factors have been considered by Thorndike in his well-known Laws of Learning. His Law of Exercise is an expression of the frequency factor ; his Law of Recency corresponds, of course, to the recency factor.

The laws of the R.P.—In any given instance the ultimate response, to become effective, will depend on such factors as—

1. The comparative intensity, extensity, frequency and recency of the competing stimuli or summations of stimuli, *q.v.*, laws of the R.S.

2. The strength and nature of the response-energies involved and the degree of tension-release that occurs, *q.v.* laws of the R.E.

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3. In the last instance:

(*a*) The general physical state of the organism.

(*b*) The specific physical state of the neurones of the response-apparatus or response-path.

(*c*) Possibly on certain "chronaxic" time relationships between one neurone and another.

Factors to be considered under the third heading will be such as: The composition of the blood, thyro-suprarenal and other endocrine activities, the effect of fatigue, drugs, etc. The physical state of the neurone will depend, in addition, on recent activities in the neurone.

As to the varieties of response, that is a subject I have touched on on p. 484, and I do not propose to go into further detail here. I have suggested that we may have responses not only on the cerebro-spinal level, but also on the autonomic-endocrine level and on the metabolic level. With regard to the last, an interesting subject for investigation, from the viewpoint of Pavlovian "conditioning", would be the study of biochemical responses, such as the mobilization of blood-sugar, etc. If it were found that they could be conditioned, it would be another interesting link between the physiological (autonomic-endocrine) reflex and the emotional response—a further link between psyche and soma.

Responses to drugs are not in the same category. Strictly speaking, they are not so much active responses as "effects" of drugs. They act, not so much by provoking a reaction, cerebro-spinal or autonomic, as by paralysing or irritating certain components of the reflex arc. Experiments by Pavlov's co-workers seem to indicate that these pharmacological "effects" can also be conditioned. It was found, for instance, that some of the effects of morphine and apomorphine could be conditioned to a tuning-fork of a definite pitch, to the hypodermic injection of distilled water, or to the mere preparations for injection.

Reflex v. *response*.—The words "reflex" and "response" are used here rather loosely. One might question the use of the term "reflex" for reactions such as Pavlov studied, which occurred at anything up to thirty minutes after the presentation of the stimulus.

The term might more justly be confined to the more spinal, more automatic component of the reaction; to the component which is completely independent of previous experience, and which is hereditarily transmitted in the species.

The term "response" might be used when a stimulus has been linked to such an innate "reflex" by the cerebral process of conditioning or signalization. We might therefore speak of an "unconditioned reflex", but of a "conditioned response".

It should be noted, however, that although we speak above of the "spinal" and "cerebral" components, we use the term "reflex" to describe an act of

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behaviour rather than the hypothetical neural path along which this act is determined.

The Conditioning and Deconditioning of a Response.

Conditioning and deconditioning.—A response may be "conditioned" or, once established, may be "deconditioned". The first process has been termed "signalization"; the latter may be called "designalization". The first corresponds to some extent to "habit-making", the latter to "habit-breaking".

Several of the principles of conditioning and deconditioning to be mentioned here may be of use in habit, child guidance and psychiatric clinics generally.

Signalization and the learning process.—What we might call the learning process comprises two activities:

(*a*) The *fixation* or signalization of certain responses.

(*b*) The *elimination* or designalization of other similar but useless responses.

To condition a response:

(*a*) The R.E. must be great enough.

(*b*) The R.S. (C.S. and U.C.S.) must rise above a certain threshold.

(*c*) The response (R.P.) must be unobstructed and consummated.

Once these conditions are fulfilled, the fixation of responses obeys the laws of R.S., R.E. and R.P. that we have already discussed.

The elimination of responses becomes necessary because a conditioned response—say to a note of a certain pitch—will occur when notes of nearby pitch are present. The process of eliminating responses to these nearby stimuli has been named "differentiation". Pavlov produced this "differentiation" in two ways which he used to reinforce each other:

1. The *direct* method, in which the stimulus to be conditioned is repeated frequently and strongly, and becomes more specifically conditioned by the repetition.

2. The *indirect* method, in which the nearby stimuli are presented frequently, "feeding" being withheld on each occasion. The nearby stimuli become conditioned inhibitors, while the original stimulus remains the specific conditioned stimulus. We have a "contrast" inhibition.

Designalization or unlearning.—A response may be deconditioned in either of three ways:

(*a*) By *reducing the R.E.* or appetite until it becomes ineffective.

(*b*) By *withholding or inhibiting the R.S.*, that is to say, the C.S. or U.C.S., or both.

(*c*) By *obstructing a response already begun*, that is to say the R.P.

In the first instance, the animal is sated and a stimulus will have little

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or no effect, because there is insufficient energy or tension to initiate a response. In the second instance, the stimulus (C.S. or U.C.S.) to the response may be simply withheld, or may conflict with the stimulus to a more powerful response and be cancelled out. In the third instance, a response may actually be initiated, but is obstructed before it can achieve its purpose.

Some methods of designalization.—We may discuss some of the varieties of deconditioning a response with which Pavlov experimented.

1. *The conditioned stimulus may be converted into a conditioned inhibitor* (*C.I.*).—A metronome-rate, conditioned to cause salivation, will—if it is repeated and not followed by "feeding"—eventually become a conditioned inhibitor of salivation. Another stimulus, the smell of camphor for instance, may become co-conditioned to the metronome, and then becomes itself a conditioned inhibitor of the second order.

Here, by obstructing a response already begun we are deconditioning it. This is the simplest variant of method (*c*), mentioned in the previous section, and corresponds to the breaking of habits by causing them to end in failure.

2. *The conditioned stimulus to one response may be made to become the conditioned stimulus to another response*—possibly to one which is biologically more significant. This second response will tend to oust the first, and this method corresponds to the breaking of habits by the formation of counter-habits based on stronger urges or incentives.

3. *The conditioned stimulus to a response may be inhibited by a novel or unusually strong stimulus.* Pavlov calls this external inhibition. It corresponds to the shock method of breaking habits; if the shock is repeated often enough, the habit will ultimately be broken up.

With regard to inhibition of the stimulus, this may be external or internal according to Pavlov. External inhibition is produced by strong or novel stimuli; internal inhibition is produced when a C.S. is made a C.I., or when the U.C.S. to a response is made the C.S. to another response—a possibility which we are now about to discuss.

4. *The unconditioned stimulus to a response may be made the conditioned stimulus to another response,* as in some experiments of Pavlov. Thus, to prick a dog's paws is normally the U.C.S. to a "defence" reflex of withdrawal. When a moderate pricking stimulus is applied and followed by food, the pricking stimulus becomes a C.S. to the salivary response, and ultimately induces salivation, but no withdrawal.

Two things are to be noticed: first, a U.C.S. may become the C.S. to another response; secondly, when this occurs, the U.C.R. (unconditioned response) of the weaker reflex is inhibited. The response to a U.C.S. may therefore be modified, and a sexual stimulus for example might conceivably be conditioned to a non-sexual response. This may be of some interest from the point of view of making and breaking habits.

We see, then, that habits may be broken by causing them to end in failure,

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by forming counter-habits as a result of counter-incentives, and by the shock method ; possibly also by other manœuvres not here discussed.

The Relationship of Moods to Conditioning.

Anxiety and deconditioning.—Up to a point, the greater the R.E. or instinctive tension, the more easily can the response be conditioned by its successful completion and the more easily can it be deconditioned when it is obstructed. Anxiety and deconditioning are both results of the obstruction.

We have suggested in Part I that where instinctive energy cannot find a normal outlet we get—

(*a*) A viscero-cortical reaction accompanied by consciousness of tension ; this is the more conscious component of anxiety.

(*b*) A diffuse segmental and visceral discharge, i.e., the visceral symptoms of anxiety.

Anxiety is then essentially non-adaptive, as are all moods associated with rising tension, such as anxiety and depression. Normal elation may follow adaptive activities, but merely as a by-product ; it occurs as the result of a rapid relief of tension, but is not in itself an adaptive element.

As for the amount of anxiety that is actually experienced, that must depend not only on the degree of tension in the affected segment, but on the sum-total of tension in all other segments, and also on a group of unknown factors—innate or acquired—which decide the " tension-tolerance " or " anxiety-tolerance " of the individual.

Basic attitudes : Love, fear and anger.—So far we have considered the affective emotional responses of anxiety, elation, depression and apathy. We may go on to consider the relationships of the individual to the objects or configurations of stimuli which release these responses.

Three such conative relationships may be considered and the basic attitudes which they produce—love, fear and anger. Watson, in his behaviouristic approach, regards these as the fundamental emotional responses. I would suggest that *love*—using the word in a very wide sense—is the " attitude " or conative " set " that one takes up to objects that repeatedly relieve tension and incidentally produce some degree of elation. Like the other conative " attitudes " which we are to discuss, it tends to relieve hypertension with its concomitant moods and to induce relaxation with its concomitant moods. Love is then the attitude to objects and stimuli that have repeatedly given relief and are likely to do so again, and is an attitude that leads to " approach ". The object towards which love is felt is one which easily becomes a conditioned stimulus of new responses.

Similarly I would suggest that *fear* is the attitude to objects or stimuli that have repeatedly caused an increase of tension, and are likely to do so again ; it is an attitude that leads to " flight ", or to an equivalent reaction such as

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the hypoboulic reactions of Kretschmer, i.e., the violent-motor reaction and the sham-death reflex. Just as love is an attitude to objects that produce elation, so fear is an attitude to objects producing some degree of anxiety and ultimately of depression; although the depression when it supervenes may mask the "fear" attitude. It is an attitude which is unfavourable to the conditioning of responses, and the object or configuration of stimuli towards which fear is felt is likely to become a conditioned inhibitor of responses.

Anger—a third basic attitude—is more difficult to understand. Watson suggests that it follows any attempt to restrain movement. I would suggest more specifically that it follows any attempt to restrain the movements either of "flight" or of "approach", and is then the attitude to objects causing such restraints. That is to say fear or love become hate when their characteristic motor responses are interfered with, and hate is thus secondary to fear or love. Anger is then the attitude to objects that have repeatedly obstructed a tension-relieving response of "approach" or "flight", and are likely to do so again, and is an attitude that leads to "fight". In anger the energy of the obstructed response is diverted to the obstructing object. Like fear, anger is an attitude which is unfavourable to the conditioning of responses, and the object or configuration of stimuli towards which anger is felt is likely to become a conditioned inhibitor of responses.

The terms "love", "fear" and "anger" are used, then, to include not only the immediate conative attitude to an object influencing tension, but also the cognitive element of anticipation when such or similar objects are perceived. They must be distinguished from the relief or affective-emotional state that is induced by the gratification of these conative attitudes.

The complete gratification of any response leads to apathy. "*Indifference*" is the attitude to objects or stimuli that are completely neutral and have no effect of any kind.

Generally speaking, objects that elicit fear or anger are objects that tend to decondition responses, whereas objects that elicit love tend to favour the conditioning of responses.

Love, fear and anger are conative attitudes or trends which tend to relieve hypertension with its concomitant moods, and to induce relaxation with its concomitant moods. They are non-specific conative attitudes, and the dynamic urges behind them include the vast number of segmental and visceral tensions. These, purely for convenience, may be considered in two groups, the one group including all those urges concerned with the preservation of the individual, the other group being concerned with the reproduction and maintenance of the species. A useful mnemonic classification of human tendencies is into self, sex and society tendencies, of which the first two are based on innate urges, while the latter is a result of the conditioning of these urges and their associated responses to social objects or stimuli.

To take a concrete example of the attitudes we have been discussing, if we

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withhold or inhibit a food stimulus, we get, along with anxiety, a fear of the inhibiting object. If, on the other hand, we allow the food stimulus to initiate a response, and we then obstruct that response and prevent its conditioning, we get anger; and the anxiety, due to sudden rise of tension, disappears, and is vented in the anger response. Similarly, if we obstruct a "flight" response—such as that of an animal at bay—we get a response of anger.

Pavlovian Interpretations.

Normal and abnormal reactions.—We may attempt to summarize our discussion of "moods" and "attitudes" in Pavlovian terms.

The four cardinal moods may be expressed as follows:

If we suppose that conflict is an interaction between responses or response-energies, then anxiety is a by-product—a thalamic and visceral repercussion—of the conflict, in which one strong instinctive response undergoes a degree of inhibition. Depression follows a conflict in which one response is being permanently inhibited. Elation follows a conflict in which a response is more or less rapidly released of its inhibition. Apathy follows the completest gratification of a response. The "apathy" of the psychiatrist occurs when there is an escape from conflict by gratifying every minor physiological impulse or desire the moment the tension of the response-energy renders it possible.

The four cardinal attitudes may be expressed in the following terms:

"Love" is the attitude to objects and stimuli that present a tension-relieving stimulus, and induce therefore some degree of elation. "Fear" is the attitude to objects that inhibit or withhold a tension-relieving stimulus and induce therefore some degree of anxiety. "Anger" is the attitude to objects that obstruct an actual response—be it one of "approach" or "flight"—and is therefore secondary to "fear" or "love". "Indifference" is the attitude to objects which are completely neutral or have ceased to exercise any effect.

Incidentally there is probably some relationship between the affective-emotional states or moods and organic disease. It seems reasonable to expect in certain of these affective-emotional reactions that the interference with gastric, cardiac, biochemical and other "conditionings" may initiate a *circulus vitiosus* leading to, or predisposing to structural disorder. Organic diseases often follow a single trauma or a continuous mild traumatization, but it seems likely that a large number, if not the majority, of physical diseases are preceded by a functional *circulus vitiosus* of this kind.

Such a relationship between mood and organic disease suggests a possible relationship between constitution-type and disease, for constitution-type and the liability to certain moods or mood-cycles seem to be closely related.

Normal and abnormal types.—Lately, much interest has been shown in the possible relationship of inherited personality-type to the type of maladjustment

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that is acquired; that is to say, to the relationship of pre-psychotic or pre-psychoneurotic personality to the psychosis or psychoneurosis.

The tendency is to divide mankind into types—usually two extreme types with a mixed or intermediate type. In a sense this boils down to the difference between the fat man and the skinny man.

Pavlov suggests a new physiological division into "excitable" and "inhibitable" types, according to whether the predominant tendency is towards excitatory or inhibitory activities. He considers two extreme types and two intermediate types, which correspond to some extent to the Hippocratic "humours", the melancholic, the phlegmatic, the sanguine and the choleric.

The criterion is the relative amount of an hypothetical "excitor" substance in the nerve-cells. Inhibition is regarded as a protective process to prevent depletion of "excitor" substance, and to permit of its further accumulation. The "excitable" type has cells inherently rich in "excitor" substances and excitatory processes will predominate. The "inhibitable" type has cells poor in "excitor" substance and protective "inhibitory" processes will tend to predominate. Pavlov considers that mental disorders occur more often in the extreme types, and that the type decides the disorder.

Before discussing the types of mental disorder we may momentarily consider Pavlov's theories as to their precipitating causes.

According to Pavlov, a mental disorder is precipitated in either of two ways—by *collision* or *shock*. Collision is the acute clashing of excitatory and inhibitory processes in time or in space; it is a neurological expression of the psychological "conflict". Shock is the effect produced by sudden exceptionally strong or exceptionally novel stimuli. Such stimuli will annul the effects of conditioned stimuli, will inhibit conditioned responses, and if repeated frequently will finally decondition these responses. Shock may perhaps be considered as an extremely acute form of collision, in which one of the stimuli is immediately external, is applied suddenly and immediately inhibits other stimuli.

Pavlov suggests that the "excitable" type tends to react to stress with neurasthenia or the manic-depressive psychosis, where the "inhibitable" type will develop hysteria or schizophrenia. The neurasthenia of Pavlov is not a very definite clinical entity, and seems to include mild depressions, fatigue states and some anxiety states. With hysteria, Pavlov includes the phobias and also anxiety in general. Such a classification diverges acutely from common clinical experience, but is certainly suggestive.

One might rightly question how much the grouping into excitable and inhibitable types that Pavlov found in his experimental dogs was due to pre-experimental conditionings rather than to inheritance. That there was an element of both can hardly be doubted.

Again, where Pavlov resorts to the facile naming of responses as "orienting" responses, "purpose", "freedom", "slavery", or "passive defence" reflexes, he helps us little more than does McDougall's arbitrary list of instincts.

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In evaluating Pavlov, one must distinguish between his experimental work and his speculative interpretations of that work. His division into types, although suggestive, by no means settles the matter.

Suggestibility, the "appetitive tendency" and the "substitute stimulus".—An attempt has already been made to explain suggestibility in Pavlovian terms. Certain ingredients of the explanation may be further discussed.

It has been suggested that an organism with visceral or other hypertensions tends to approach the source of stimuli appropriate for the release of such tensions. This "appetitive" tendency we have already termed the "approach". It must be distinguished from the consummatory part of the response or "feeding". Pavlov, however, fails to emphasize this distinction.

The "approach" is exemplified in a Pudovkin film, "Conditioned Reflexes", which was made under the supervision of Pavlov's co-workers, and was recently shown at the Royal Society of Medicine. A monkey was conditioned to salivation and feeding at the appearance of a blue light. When the appropriate light stimulus appeared, the monkey climbed down from his perch and presented himself at the drawer where the food was to appear. To extinguish the conditioned response the blue stimulus was again presented, but, when the monkey climbed down from his perch, no food was forthcoming. Here we have the "appetitive" tendency dissociated from the "feeding", and not necessarily ending in it. It is obvious that they can conveniently be considered as separate components of the response as we have previously done.

But if the "appetitive" tendency does not inevitably end in "feeding", commonplace experience indicates that where the "appetitive" urge is sufficiently strong and no "feeding" is forthcoming, there exists a mechanism for replacing the "feeding" stimulus. Food that is unobtainable will be replaced ultimately by a hallucination of food: the unobtainable love-object will be replaced by the appearance of the object in dream or hallucination.

In either case a "substitute" stimulus has provided a degree of reliet. This mechanism is commoner in the psychoses, and is not readily explained by the Pavlovian hypothesis in its present form, or indeed by any hypothesis. One might, however, attempt to express it, if not explain it, in physiological terms.

According to Head's law, "where two areas of unequal sensibility are connected with the same spinal segment, any stimulation of the nerve of lesser sensibility is referred to the area supplied by the nerve of greater sensibility". We know that viscera are less sensitive than skin, and so we might expect that visceral hypertensions will often induce a referred sensory experience, since the periphery is more sensitive than the viscera.

The "substitute" stimulus is presumably a cortical elaboration of the referred sensory experience; it is the cortical misinterpretation of an endogenous need. In Freudian terms, it is the "projection" externally of an internal need.

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To be suggestible to an object is to pay attention to it. Attention is in a sense a form of directed suggestibility. It has been defined as " conation determining cognition ".

To take an example. Increased excitability of the salivary centre—presumably due to biochemical changes like those which may influence the respiratory centre—will mean an increased suggestibility to hunger stimuli. It will also determine a greater capacity for attention to such stimuli.

Personality.

The objective estimation of personality.—It is still necessary—no doubt it always will be—to estimate personality in purely situational terms, in terms of reactions to the " life situation " in its various forms ; in short, in terms of reactions to specific situations. And one may use—like Burt—the McDougallian " instincts " or " propensities ", which constitute no more than an empirical list of such reactions, or any other classification which seems practical.

The results, too, may—if one wishes—be treated mathematically, provided always that one realizes that one is dealing with an almost infinite number of variables ; and that mathematical formulations are as yet more helpful as a means of graphic representation and as a mnemonic aid than as a means of elucidating the nature of such situational reactions.

However, by a statistical study of such reactions and their incidence, and by correlating them with social and other conditions, the results can be of practical use to the directors of clinics, to those who are empowered to provide new clinic facilities, and to those who are studying the comparative efficacy of various therapeutic devices and procedures.

Personality in terms of R.E., R.S. and R.P.—Although a " paper and pencil " recording of observed traits or behaviour reactions remains the most practical method, at the moment, of studying personality, yet there is every reason why we should continue to investigate certain components of personality along more or less physiological lines.

Bloor has made some valuable suggestions in this direction, some of which are included in the classification offered below. These components may be considered in terms of R.E., R.S. and R.P. The classification given below is necessarily crude and tentative, and often includes, under one heading, elements that might be considered under one or more other headings.

The following elements may be considered as aspects of response-energy (R.E.) :

1. Excitability or ease of response. This will be related not only to the amount of visceral or general metabolic tension, but also to the local chemical tension of nerve-cells—in itself an expression of local metabolism.

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2. The level of the initial response.

3. The duration of the response.

4. The perseveration of responses or their resistance to interference or obstruction. Pinard, in a paper read before the British Association at Bristol (1930), pointed out the practical significance of this element in personality. His work seemed to show that maladjustment occurs more often in extreme types, in those in whom perseveration is either very strong or very weak. The moderate perseverators are apparently, according to Pinard, the more adaptable types. Pinard's methods, incidentally, were purely psychological.

5. The predominance of either excitatory or inhibitory activities.

6. The direction of responses, whether predominantly inward or outward, i.e., visceral or muscular; a result of the particular tensions or forms of R.E. concerned.

7. The relative strength and significance of the various response energies.

8. The effect of failure to complete a response (i.e., "no feeding") on the response energies themselves.

At this point we may suggest that the conative power of the individual seems to depend on the amount of tension that he can tolerate comfortably; in short, on his anxiety-tolerance.

Anxiety-tolerance is no doubt contingent not only on innate factors, but also on the amount of environmental obstruction that there has been to responses of great biological significance, such as the sex instinct. The way in which our present transitional civilization—more advanced materially than culturally and emotionally—plays ducks and drakes with our sexual impulses, accounts for much of the easily avoidable anxiety and unhappiness that needlessly complicate a sufficiently complicated existence.

The following elements can be considered under the heading of the response-stimulus (R.S.):

1. The relationships between variations in conditioned or unconditioned stimuli as regards intensity, frequency, extensity in time and recency on the one hand, and the intensity, latent period and duration of the responses to them on the other hand. These might be expressed in the form of conventional ratios or quotients.

2. The relative efficacy as unconditioned stimuli of auditory, visual, gustatory, kinæsthetic and other stimuli.

3. The relations of the different stimuli in a *Gestalt* or configuration of stimuli to each other.

4. The laws according to which the U.S. of one response may become the C.S. of another.

There are, of course, other elements and relationships, not considered here, that might well repay study.

The following elements can be considered under the heading of the response-apparatus (R.P.):

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1. *The speed of response.*—This depends:

(*a*) Generally on metabolic activities, on thyro-suprarenal efficiency, on blood composition, etc.

(*b*) Specifically, on nerve structure and function.

2. *Fatiguability.*—This depends on similar factors—general blood factors and local conditions; among the latter possibly the condition of synapses.

3. *Rapidity of recuperation.*—This is related to fatigability.

4. The relations between one response and another in a Gestalt or pattern of responses.

When discussing neurasthenia I pointed out that heightened fatiguability is a common result of chronic anxiety, or of depression. That emotional stress can influence the sugar and adrenaline content of the blood, and presumably other components of the blood, is now becoming increasingly evident in the light of recent work. If emotional changes produce blood changes, it is reasonable to suppose that they also produce changes in the response-apparatus.

The Future of Freudian and Pavlovian Theory.

It seems reasonable to hope that the interaction between Freudian and Pavlovian theory will ultimately produce a more fruitful approach to the study of "mind" or "behaviour", or whatever one chooses to call it.

On the Pavlovian side one has most to hope from an experimental study of the R.E., the dynamic energy underlying and activating responses; this seems to be the crux of the matter. Already some of Pavlov's co-workers, notably Rikman, Conradi and Soloveychik, have made a hopeful beginning in this direction, and their experimental work seems to indicate definitely that the excitability of the subcortical centres definitely influences the activity of the cortex.

On the Freudian side, one has most to hope from a liaison between the analytical psychologist and the experimental and academic psychologist, and from an experimentalization of the psycho-analytic approach. Psychoanalysis has by now had sufficient time to come to certain valuable conclusions, especially with regard to affective-emotional processes—using its own technique and terminology. The time surely has come when its findings should be correlated with the work of the academic psychologists on the more cognitive aspects of mental activity, and ultimately perhaps with the results of Pavlovian experimentation. That this need is being realized is indicated by Flugel in an essay in the *Psychologies of 1930.*

Inevitably the tempo of physiology is slower by far than the tempo of psychology and psychiatry. Between the two there must be a lag. But if psychologists and physiologists are sufficiently co-operative and trustful of one another, then there is greater hope of integrating the two approaches.

[*To be concluded.*]

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