A PARALLEL STUDY OF THE PSYCHO-GALVANIC REFLEX AND THE HYPERGLYCÆMIC INDEX IN PSYCHOTICS.

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McCOWAN and Quastel (5) have shown, in recent work carried out in this hospital, that a close relationship exists between variations in the affective state of psychotic subjects and abnormalities in the glucose tolerance curves. So marked is the parallelism between these two that it has been found possible to make use of an index, known as the hyperglycæmic index (H.I.), which furnishes a valuable guide to the degree of emotional tension experienced by the subject. The method of determining the index is fully described in their paper; but it may be briefly stated that it is zero when the glucose tolerance curve is normal, and varies up to 100, depending upon the degree of sustained hyperglycæmia present. The affectivity of the patient was determined clinically, and, in order to test the validity of their thesis that the emotional tension and H.I. varied *pari passu*, it was considered that objective evidence of the patient's affectivity would be of value.

A study of the psycho-galvanic or skin reflex is probably the only reliable means at present available for providing this objective evidence, and the present paper incorporates the results of an investigation, carried out with a view to establishing whether a parallelism exists between the psycho-galvanic reflex and the H.I. in psychotics.

The Psycho-galvanic Reflex an Expression of the Emotional Reactions.

The psycho-galvanic reflex is to be regarded as an inevitable response to an appropriate stimulus, and to be due to an increased functional activity on the part of the individual in the presence of actual or threatened danger.

The reflex depends on a lowering of the skin-resistance to the

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passage of a constant current. The mechanism by which this is brought about has generally been accepted as in some way due to metabolic activities on the part of the sweat-glands, but McDowall and Wells (6), as the result of various experiments, state that the fall in resistance is due to vaso-constriction of the peripheral vessels. They conclude that " the reflex may be considered as part of the mechanism by which the animal adapts itself to the anticipation of muscular exercise and defence. In man, the reflex occurs not only on sensory stimulation, but in anticipation of the stimulus. The threatening movement may be looked upon as a conditioned stimulus which has developed as the result of experience. The fact that many of the emotional stimuli affecting civilized man may bring about a reflex . . . suggests that in response to such stimuli the individual is defending or preparing to defend himself."

Golla (2) states that an adequate stimulus is one threatening a change in the environment likely to cause bodily damage, and capable of producing a disturbance of the smooth workings of bodily activities. He shows that the reaction is not under voluntary control, and cannot be evoked by the simulation of an affective state. In the absence of increased functional activity, therefore, no reflex is obtained, although the subject may be aware of the nature of the stimulus and simulate the appropriate behaviour.

The simplest form of stimulus is one causing physical discomfort, such as a pin-prick, the application of which will produce a galvanic deflection varying in magnitude with the sensitivity of the subject.

A similar, or even larger, deflection is caused by a threatened, as opposed to an actual prick, showing that the anticipation of danger is sufficient to cause an increased functional activity. If psychical stimuli are employed, as may be done by means of the word-association method, the same sequence of events occurs. Words capable of actuating a complex evoke a response, although the subject may have to apply introspective methods to determine their emotional significance.

The responsiveness of the subject varies at times, and Golla (2) noted that the vegetative nervous system did not always react uniformly to the same type and intensity of stimulus. Cattell (1), who analysed this variation in responsiveness in normal subjects, found that it varied with the mood and condition of the individual. In such conditions as worry, irritability, cold and physical discomfort, the deflections to any given stimulus were increased; and it would appear that, where these conditions prevail, the

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sympathetic system is unduly sensitive, and the functional activity produced by a nocuous stimulus is in excess of the normal requirements. When such excessive deflections persist, the individual is considered to be showing increased affectivity, a condition which can be regarded as pathological. If a word-association test be carried out in such a case, the subject will be found to react to words normally inadequate to evoke a response, and will appear to attach emotional significance to most of the facts of his environment. All stimuli can, in a sense, be regarded as presenting themselves to him in the form of potential dangers, and he displays in his reactions evidence of apprehension and emotional unrest. Such a condition constitutes, clinically, a state of increased emotional tension; and in the present series of cases it invariably occurs whenever there is so great a disturbance of the smooth working of bodily activity as to cause a sustained hyperglycæmia after the ingestion of 50 grm. of glucose. When, on the other hand, the galvanic deflections are diminished, so that the subject fails to react normally to a nocuous stimulus, as in stuporose and hysterical states, it would appear that the affective mechanism is at fault, since, though aware of the harmful nature of the stimulus and able to simulate the appropriate reactions, he fails to experience any depth of corresponding feeling tone, and certainly shows no increase of functional activity. Such decreased affectivity in the present investigation is unaccompanied by any rise in the H.I.

The psycho-galvanic reflex, then, is due to changes in the affective state, such changes depending upon the intensity of the stimulus and the responsiveness of the subject. The reflex is inevitable and outside voluntary control; it therefore offers a truer criterion of the emotional reactions than can be obtained by subjective methods. A galvanic deflection is produced when a certain level of affectivity is reached, this affectivity being dependent upon the degree of emotional tension present at the time of the test, and varying in response to variations in the functional activities of the individual.

Review of Past Work on the Psycho-galvanic Reflex in Psychotics.

The emotional reactions in the various forms of psychoses have been extensively studied by means of the psycho-galvanic reflex, observers having chiefly concerned themselves with clinical groups rather than with individual cases.

In observations on the psycho-neuroses and early neuroses,

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McCowan (4) found no uniform response to the test in dementia præcox, but evidence of increased emotivity in early hebephrenics. He shows three types of affectivity to exist in the psycho-neuroses, *viz.*, diminished, increased, and normal but increased to special complexes. Like Golla, he found a marked decrease in affectivity in hysteria, the reactions being small and infrequent, while the deflections were large and numerous in anxiety neuroses. Although, as a whole, the anxiety cases gave evidence of increased affectivity, he met with some exceptions; and, taking increased and diminished affectivity as the distinguishing factors of hysterics and anxiety neurotics respectively, he suggested that such exceptions were fundamentally more akin to hysteria, in spite of their clinical resemblance to anxiety neurosis. In a study of dementia præcox at various stages, Gregor and Gorn (3) found that the reactions became less as the disease advanced, and reappeared as improvement took place, and that the same sequence of events occurred in the manic-depressive psychoses; they found the reactions normal in benign stupors and diminished in hebephrenia. Peterson and Jung (8) found nothing noteworthy in hebephrenia, but variations from the normal in catatonic forms, their most important observation being the complete absence of reactions in acute catatonic stupor. In the manic-depressive psychosis, Westburgh (10) found a decreased effect in the depressed phase, but not so marked as in the maniacal. He states that in this group as a whole there is less uniformity of galvanic deflections than in either dementia præcox or normal subjects. He maintains that in manic-depressives it is possible to foretell a change of phase by a study of the galvanic reactivity. Syz (9) found the reactions diminished in depressions, and numerous irregular fluctuations unconnected with overt stimuli in schizophrenia, and considers these to be due to stimuli of endogenous origin. Odegaard (7) recorded diminished reactions in organic states and schizophrenia, but high and abundant deflections in conditions of agitation and anxiety.

These observations lead to the conclusion that the use of the psycho-galvanometer in the study of the psychoses is not to differentiate clinical entities, but rather to evaluate the affective state of the subject at the time of the test. When cases are examined from a dynamic as opposed to the more usual static point of view, it is seen that, in the psychotic, as in the normal, the responsiveness varies with the degree of emotional tension present, and offers objective evidence of the functional activities experienced by the individual.

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The Present Investigation: Procedure and Methods.

The use of the psycho-galvanometer presupposes some intelligent co-operation on the part of the subject; and it is obvious that psychotic patients do not lend themselves readily to examination by this method. Failure to understand the nature of the test, lack of interest and attention, agitation and hallucinations, present serious obstacles to such an investigation.

The results given below are taken from a series of twenty cases, of various reaction types, from whom it was possible to obtain complete records. In ten of these cases the sugar tolerance curve was normal, while in the remainder there was a rise in the hyperglycæmic index.

The tests were carried out on the day preceding or the day following that on which the sugar tolerance curve was obtained, no clinical change having been noted in the interval. In the case of female patients, no test was carried out during the menstrual period. The examinations were all made in the early afternoon, thus obviating any complications due to diurnal variation in the skin resistance. The word-association tests were used, and, since the object was to determine the general reactivity rather than to elucidate special complexes, identical tests were used throughout the series. A low intellectual level and an inability to concentrate were among the difficulties encountered; and, in order to minimize mental effort and consequent fatigue, the tests were made short and simple in character. Four neutral words were interposed between each "key" word likely to stimulate a complex, and the deflections to the first six words were disregarded in the results, as various disturbing factors are known to enter into the early reactions (Peterson and Jung (8), Golla (2)). The reaction time and galvanic deflection to each of the remaining words were noted and recorded, and it is from these records that I have drawn my deductions.

Controls were available in the form of convalescent patients in whom the H.I. was zero, their reactivity serving as a standard in assessing results. It is of interest to note that an analysis of the results obtained from these patients shows a close correspondence in the affectivity of persons of the same class, intellectual level and reaction type, as shown in Table I.

Tests.—The subject was comfortably seated with his back to the apparatus and observer; he was given time to accommodate himself to his environment, and a simple and reassuring explanation of the nature of the test was given.

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Electrodes, consisting of zinc pads covered in wash-leather and soaked in warm saline, were applied to the back and palm of the hand, which was then introduced into one arm of a Wheatstone bridge. The temperature of the saline was maintained constant throughout the experiment.

The skin resistance, which was found to vary between 5,000 and 50,000 ohms in different patients, was determined, and the deflection caused by an additional resistance of 1,000 ohms noted. The reactions were noted to a cough on the part of the subject, a sudden noise produced by a rattle; and, in the case of stupors, to a threatened and actual pin-prick. No specific significance was attached to these findings, but they served to accustom the patient to the experiment, and formed a useful guide to the sensitivity of the galvanometer. The instrument was sufficiently sensitive to indicate a galvanic deflection of 0·1 cm., this being outside any experimental error. The word-association test was then read out, the patient being instructed to answer in the usual manner. Where no verbal or galvanic response was obtained, a variable length of time was allowed to elapse before passing on to the next word, depending upon the evidence or otherwise of mental effort and attention.

Results.

Since uniform stimuli were used throughout the investigation, we may conclude that the responsiveness of the subject was dependent upon the degree of emotional tension present at the time of the test. The following cases show that where there was a sufficient disturbance of functional activity to cause a sustained hyperglycæmia the patient gave objective evidence of increased emotional tension. Variations in affectivity were found to be coincident with variations in the H.I., so that when the latter approached 100 there was a marked increase in the number of deflections, which became normal as the index fell to zero. Further, where the subjective signs of emotion were associated with a normal or decreased affectivity there was no rise in the H.I.

The different reaction-types will now be considered, with illustrative cases.

Melancholics.

The first case illustrates the parallelism between the H.I. and galvanic reactivity in a depressed patient, who, with an H.I. of

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87, reacted to almost every word, but when convalescent, with an H.I. of zero, gave deflections to only a few words of a definitely complex-stimulating nature.

CASE 1.—M. L—, female, æt. 50; domestic; married. Admitted 31.12.30. On admission she was acutely depressed and agitated, with delusions of sin and unworthiness, and a fear that the police were "after" her for petty thefts and drunkenness.

This was her state on 16.1.31, when her H.I. was 87, and on the next day, when the following results were obtained.

It should be noted that in this, as in the remaining examples, only one of the four neutral words is inserted between each "key" word for economy of space.

Key word.	Response.	Reaction time in seconds.	Galvanic deflection (cm.).	Key word.	Response.	Reaction time in seconds.	Galvanic deflection (cm.).
Sin	Heaven	6	0·5	Square	Mile	5	0·2
High	Low	1	0·4	Husband	Daughter	2	0·5
Home	*Nil*	..	0·5	Smooth	Rough	2	0·3
Pen	Ink	1	..	Rich	Poor	1	..
Death	Alive	1	0·3	Soldier	Tommy	1	0·2

S.R., 36,000. 1,000 ohms — 2·0 cm.

S.R. = skin resistance. 1,000 ohms—2 means that an additional resistance of 1,000 ohms caused a deflection of 2. This is a means of determining the sensitivity of the apparatus.

26.6.31: Clinically she was convalescent, taking an interest in her surroundings and working in the hospital kitchen.

Her H.I. was now normal, and so were her galvanic deflections, as given below:

Key word.	Response.	Reaction time in seconds.	Galvanic deflection (cm.)	Key word.	Response.	Reaction time in seconds.	Galvanic deflection (cm.).
Square	*Nil*	10	..	Husband	Sweetheart	10	0·2
Home	House	20	0·6	High	Higher	3	..
Smooth	Rough	2	..	Death	Alive	9	0·2
Sin	Wicked	4	..	Pen	Ink	1	..
Soldier	Officer	3	..	Rich	Poor	1	..

S.R. 27,000. 1,000 ohms—2.

That an increased emotional tension is accompanied by a disturbance of functional activity is shown by the following case of retarded depression, in which a sudden emotional upset was found to be associated with a rise in the H.I. and an increased emotivity.

CASE 2.—B. D—, female, æt. 31; single; domestic. Admitted 1.11.30.

She was a case of reactive depression, who, at the time of the tests on 15.1.31 and 16.1.31, appeared mildly depressed, retarded and uninterested in her surroundings. That she was not under much emotional tension was suggested by her H.I. of 17; and this was corroborated by the comparatively normal deflections recorded in the word-association tests.

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Key word.	Response.	Reaction time in seconds.	Galvanic deflection (cm.).	Key word.	Response.	Reaction time in seconds.	Galvanic deflection (cm.).
Kiss	Tears	5	0·4	Bright	Gloomy	2	..
Black	White	1	..	Death	Alive	10	0·2
Home	Away	5	..	Young	Old	7	..
Blunt	Sharp	2	0·2	Shame	Goodness	10	..
Mother	Father	1	0·6	Share	Part	3	..

S.R., 34,600. 1,000 ohms – 2·5.

On 10.2.31 she became upset while out in charge of her relatives, and made a half-hearted attempt at suicide by drowning. On her return to hospital she was very depressed and agitated. On 11.2.31 her H.I. was 40, and corresponding with this her psycho-galvanic reflexes were greater and more easily aroused.

Key word.	Response.	Reaction time in seconds.	Galvanic deflection (cm.).	Key word.	Response.	Reaction time in seconds.	Galvanic deflection. (cm.).
Ashamed	Wrong	10	0·5	Black	Colour	1	0·2
Share	Part	10	0·8	Death	End of life	2	1·0
Mother	Help me	5	0·5	Town	Place	2	..
Old	Age	20	..	Home	Comfort	3	0·8
Kiss	Caress	2	1·0	Bright	Dull	2	..

S.R., 38,000. 1,000 ohms – 2.

Observations on normal and hysterical subjects (Golla (2), McCowan (4)) have shown that no amount of histrionic display is capable of evoking a galvanic response. I have found the same phenomenon to occur in psychotics. Patients in whom clinical signs of agitation and apprehension are unassociated with a sustained hyperglycæmia give objective evidence of normal or even decreased affectivity, showing that they experience none of the emotional tension their behaviour suggests. This finding is illustrated by the following case. The patient at the time of the test presented typical signs of agitated melancholia; she expressed alarm and apprehension at the sight of the galvanometer, and was with difficulty persuaded to submit to the examination.

Case 3.—L. T—, female, æt. 53; married; housewife. Admitted 7.10.29.
On admission she was extremely agitated, appeared very depressed, voiced various delusions of unworthiness, and was actively hallucinated, hearing voices accusing her in foul language of various misdemeanours. She showed little change; and this was her condition on 7.1.31, when her H.I. was 0. The next day the following results were obtained with the psycho-galvanometer.

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Key word.	Response.	Reaction time in seconds.	Galvanic deflection (c.m.)	Key word.	Response.	Reaction time in seconds.	Galvanic deflection (cm.).
Fear	*Nil*	..	..	Mad	*Nil*	..	..
Fat	Thin	3	..	Kiss	Quick	2	..
Clean	Dirty	1	..	Smooth	Rough	1	..
Sweet	Sour	6	..	Man	Woman	1	..
Shame	Ashamed	5	..	Death	Life	2	..

S.R., 27,500. 1,000 ohms — 2·5.

Six months later, her clinical condition having shown no material change, the psycho-galvanic reactions were re-examined and the H.I. again determined, the same result as above being obtained in both.

Benign Stupor.

The H.I. in most cases of benign stupor has been found to be normal. In the view of McCowan and Quastel (5) the stupor reaction is a defensive mechanism whereby the individual attempts a complete withdrawal from reality and a consequent release from emotional tension. In the first of the following two cases of benign stupor this mechanism is shown to have succeeded, the objective evidence offered by both the H.I. and psycho-galvanic reflex indicating that there was no disturbance of the affective state; while, in the second case, the attempt had failed, since, though the patient's behaviour justified a diagnosis of stupor, the rise in the H.I. and the increased affectivity show that she was experiencing a considerable degree of emotional tension.

Case 4.—G. G—, female, æt. 18; single; domestic. Admitted 5.9.30.
She is a manic-depressive moron; on admission she was in a state of deep stupor, entirely mute, taking no notice of her surroundings, but clean in habits. The stupor was less deep by 30.4.31, when her H.I. was 0, but she was still practically mute and quite uninterested in her surroundings. That she was not under emotional tension is shown by the following example of her galvanic reflexes:

Key word.	Response.	Reaction time in seconds.	Galvanic deflection (cm.).	Key word.	Response.	Reaction time in seconds.	Galvanic deflection (cm.).
Kiss	*Nil*	..	..	Death	*Nil*	..	0·5
Soldier	,,	..	..	High	,,	..	..
Fear	,,	..	..	Shame	,,	..	..
Father	,,	..	0·3	New	,,	..	..
Bright	,,	..	..	Home	,,	..	0·3

S.R., 19,000. 1,000 ohms — 2.

Case 5.—E. J—, female, æt. 23; single; domestic. Admitted 1.6.31.
Following an actively depressed phase, she was admitted in a state of stupor. She

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wore a look of perplexed misery and was totally uninterested in her surroundings, was aroused with difficulty, and, for the most part, was mute, apart from an occasional exclamation of "I am very wicked." This was her condition on 8.6.31, when her H.I. of 42 suggested that her stupor reaction had not succeeded in allaying her emotional tension; and this was supported by her increased galvanic deflections, so different from the previous case. She is probably best regarded as a mixed state of stupor and melancholia, for, even clinically, it was fairly evident that her usual appearance of apathy was more apparent than real.

Key word.	Response.	Reaction time in seconds.	Galvanic deflection (cm.).	Key word.	Response.	Reaction time in seconds.	Galvanic deflection (cm.).
Sin	Wicked	6	1·4	Father	My father	6	1·0
High	*Nil*	..	0·4	Quiet	Peaceful	6	0·2
Home	My home	11	0·8	Fear	Afraid	25	1·0
Town	*Nil*	..	..	Loud	*Nil*	..	..
Kiss	,,	..	0·6	Death	,,	..	0·4

S.R., 43,000. 1,000 ohms — 2.

Dementia Præcox.

Since in dementia præcox the individual tends to withdraw from the reality of his environment, we should expect to find his reactions to external stimuli diminish as the disease progresses; and Gregor and Gorn (3) found that the later stages are characterized by a decreased affectivity. As long, however, as the patient was capable of experiencing emotional tension, whether due to external or internal factors, it was found in the present investigation that the psycho-galvanic reflex appeared to correspond to that of any other type of individual in similar circumstances. The possibility of complications due to endocrine dysfunction cannot, however, be disregarded in schizophrenia; and this prevents any dogmatic statement in the present context. Of the following two cases, the first suggests that, although the disease is of many years' standing, there is no definite deterioration of the affective mechanism, since the patient's affectivity was in harmony with her thought-content at the time of the test, and there was an increased functional activity sufficient to cause an H.I. of 25. In the second case, within a few months of onset the patient, who was indulging in free phantasy formation and stereotyped mannerisms, displayed, clinically, no evidence of emotional tension, and gave objective evidence of a slightly decreased affectivity in keeping with her general behaviour.

Case 6.—J. B—, female, æt. 30; single. Admitted 24.4.28, with a history of many years' duration.

She is a case of dementia paranoides with grandiose and persecutory delusions,

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chiefly of a sexual nature; *e.g.*, that the nurses are men disguised as women, and that she is sexually assaulted by them. She claims to be a great actress, and her conduct is much dictated by this delusion. At times she is impulsively violent, and during the test on 19.2.31 she was sullen and resentful. Her affective state is still roughly in harmony with her delusions. The following examples of her galvanic deflections agree with her H.I. of 25 in showing increased emotional tension. During the test it was noted that the large deflection to the word "Mother" was incongruous with the association "Perfect one." When questioned, the patient explained that she knew some mothers were perfect ones, but that her own mother was always drunk, that she could not love her, and hated thinking of her. During this explanation there was a further deflection of 2.

Key word.	Response.	Reaction time in seconds.	Galvanic deflection (cm.).	Key word.	Response.	Reaction time in seconds.	Galvanic deflection (cm.).
Home	Away	4	0·5	Soldier	Clever	3	..
Slow	Quick	15	0·4	Mother	Perfect one	9	0·8
Kiss	Caress	6	0·8	Light	Dark	4	..
Straight	White	6	..	Death	Living	2	0·2
Hell	Don't want it	6	1·5	Man	Woman	2	0·6

S.R., 22,500. 1,000 ohms — 1·8.

Case 7.—D. L—, female, æt. 30; single; musician and typist. Admitted 20.4.31, with a history of six months' duration. She is a hebephrenic, who exhibits considerable schizophrenic splitting in her cognitive and affective life. She is strongly father-fixated, and this is clearly demonstrated in the symbolism in which she describes her various delusions, which are largely sexual in nature. She is very autistic, and spends much of her time standing about, deep in phantasy, smiling fatuously, and oblivious to her surroundings. Emotional flattening is apparent. This was her condition on 9.6.31, when her H.I. was 0. The following is an example of her galvanic reflexes:

Key word.	Response.	Reaction time in seconds.	Galvanic deflection (cm.).	Key word.	Response.	Reaction time in seconds.	Galvanic deflection (cm.)
Hell	Heaven	30	..	Mirror	Reflection	5	..
Sing	Play	3	..	Fear	Of staying here	40	0·3
Kiss	Lips	3	0·4	Work	Play	1	0·3
People	Persons	3	..	Death	Life	15	..
Father	Mother	1	..	Clean	Dirty	1	..

S.R., 28,100. 1,000 ohms — 2.

Catatonic Stupor.

The following case of catatonic stupor reacted in a manner similar to that reported by other workers. The H.I. was zero, and the affective mechanism failed to respond to intense stimuli "threatening a change in the environment likely to lead to bodily damage."

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Such objective evidence shows that the patient was experiencing no emotional tension.

CASE 8.—J. O'R—, male, æt. 44; married; labourer. Admitted 16.2.31. He was admitted in a state of catatonic stupor, entirely inaccessible, lying in bed motionless with a miserable expression, taking no notice of questions or other stimuli, faulty in habits and resistive to all nursing attention. This was his condition on 17.1.31, when his H.I. was 0. The following day his galvanic reflexes were tested, when he gave no galvanic or verbal response to the word-association test.

	Galvanic deflections.
Threatened shot	..
Pistol shot	..
Rattle	..
Threatened pin-prick	..
Pin-prick	..

S.R., 43,000. 1,000 ohms — 2.

In the following tables an attempt has been made to give the results of this investigation in tabular form. The percentage number of deflections occurring in the word-association test has been calculated, and the findings suggest that this gives a fairly accurate picture of the patients' affectivity. For this deduction to be valid, the sensitivity of the galvanometer would have to be the same at each test; and, as far as possible, this was achieved in the present investigation. The first table contains the results of the convalescent patients whom I used as controls. In the second is shown the emotivity of patients of varying reaction types in whom the H.I. was zero, and it will be seen that, in this group, restlessness and agitation are associated with decreased affectivity. The third table gives the findings in those cases where subjective evidence of emotional tension was accompanied by a rise in the H.I., and shows that in such cases there is a marked increase in the number of deflections.

TABLE I.—*H.I.*, 0.

	Percentage number of deflections.	State during test.
1. G. S—	20	Co-operative and cheerful.
2. A. K—	22	,, ,,
3. M. C—	22	,, ,,
4. A. B—	20	,, ,,
5. D. M—	20	,, ,,

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TABLE II.—*H.I.*, 0.

	Reaction type.	Percentage number of deflections.	State during test.
1. M. R—	Schizophrenia	9	Flippant and restless.
2. D. L—	,,	18	Smiling.
3. M. C—	Recent melancholia	13	Dejected.
4. L. T—	,, ,,	11	Agitated and restless.
5. G. G—	Benign stupor	18	Mute.
6. J. O'R—	Catatonic stupor	0	,,

TABLE III.—*H.I., plus.*

	Reaction type.	H.I.	Percentage number of deflections.	State during test.
1. E. C—	Recent melancholia	62	50	Depressed and emotional.
2. M. L—	,, ,,	87	52	,, ,,
3. E. T—	,, ,,	42	39	,, ,,
4. B. D—	,, ,,	17	29	Retarded and depressed.
		40	54	Agitated.
5. A. L—	,, ,,	78	60	Depressed and agitated.
6. A. B—	Confusional insanity	33	39	Restless and incoherent.
7. C. E—	Schizophrenia	26	38	Restless and emotional.
8. J. B—	Dementia præcox	25	30	Sullen and depressed.
9. L. C—	Catatonia	52	35	Not stuporose.
10. E. J—	Benign stupor	42	55	Perplexed.

CONCLUSIONS.

(1) The psycho-galvanic reflex, being an inevitable response and outside voluntary control, can be used to supply objective evidence of affectivity.

(2) A parallelism is shown to exist in psychotics between the affective state, as determined by the psycho-galvanometer, and the hyperglycæmic index.

(3) States of increased emotional tension and consequent increased galvanic reactivity are associated with a sufficient increase of functional activity to cause a rise in the H.I.

(4) Conditions in which clinical signs of increased emotional tension are unaccompanied by any rise in the H.I. are found to give normal or decreased galvanic reactions.

(5) Like the H.I., the affectivity as shown by the psycho-galvanometer is found to depend, not upon the type of psychosis, but upon the degree of emotional tension present at the time of the test.

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(6) The percentage number of deflections obtained during the word-association test varies approximately with the affectivity of the subject and can fairly be used as a means of comparison between different patients, provided the sensitivity of the galvanometer be kept constant.

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