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Regression from a Biological Standpoint

By THOMAS D. POWER

'Anatomy, analysing life in space,
accustomed itself to think of time as frozen.'
—Sir Charles Sherrington.

The term regression as used in psychiatry may be defined as the re-living by an individual of his past, or part of it, in the present. Thus, in psychoanalytic therapy the patient may treat the analyst as he did one of his parents in his childhood, while in the dream of the normal person primitive tendencies and mechanisms of thought are revived. It should be noted, however, that regression is rarely or ever clear-cut or total. Although the patient reacts towards the psychoanalyst as he did in his childhood towards his father, yet at the same time he remains well aware of the analyst's true identity. Again, in the dream, although the underlying thoughts and feelings are related to childhood they are disguised and distorted by being mixed up with experiences of much later origin. In both the transference situation and the dream there is a 'telescoping' of the past into the present, a fusing of chronological levels, and a 'condensation' of experience.

Regression can in the main be regarded as an adaptive mechanism, if at times an abortive one, brought about by the operation of stress, environmental or internal. As Meerloo (1962) points out, it is 'a pattern of behaviour that may occur either as a step in the service of renewal and regeneration, or as one leading to a final degeneration and decline'. Regression can, however, occur apart from any noticeable stress when the adaptive faculties of the mind are voluntarily relinquished, as in the process of 'free association' during psychoanalysis, in hypnotism, and in preparation for sleep.

Psychological regression in cerebral disturbance

It is not sufficiently recognized that in a number of organic brain affections psychological regression is also liable to occur. Prominent among these conditions are therapeutic epilepsy, concussion, therapeutic insulin coma, and senile degeneration. In the case of therapeutic convulsions this turning back of the pages of life's history can readily be demonstrated (Power, 1945, 1957). Thus, if the patient be questioned while he is still confused during recovery from a fit it will be revealed that in certain respects he is re-living his past. It cannot be too strongly emphasized, however, that as in the dream and transference situation the regression is not clear-cut; on the contrary, different chronological levels become 'telescoped' together. Sometimes this fusing of chronological levels results in the merging of identities and orientations. As a result the present doctor may be mistaken for a doctor who attended the patient in his childhood, or the present hospital for a former one.

The invariable occurrence of retrograde amnesia in the confusional state following a therapeutic fit (Power, 1965) can also be interpreted in the light of regression: as a defensive recoil of the mind in the dimension of Time in association with the cerebral disturbance. However, the reactivation of the past after a therapeutic convulsion should not be looked upon as arising merely from 'loss of memory' for recent events for the patient actually *re-lives* fragments of his past.

A very similar state of affairs to that which occurs in post-epileptic confusion is liable to follow head injury. Russell and Nathan (1946) mention the fact that during the confusional state following such an injury the patient may give the date as several years previously, with a corresponding reduction in his age. They also state that for a limited time after the injury the patient may re-live his childhood. Purdon Martin (1937) tells of a patient suffering from confusion following

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head injury who re-enacted experiences undergone several years before when working as an engineer in India. Paterson and Zangwill (1944) describe two cases of post-traumatic confusion in which the patients re-experienced former spatial orientations while at the same time remaining aware of the present ones. Correct and incorrect orientations were liable to exist side by side.

Dealing with the subject of 'temporal displacement' after head injury, Whitty (1962) tells of a soldier, aged 22, who sustained a head injury associated with concussion in a motor accident near Ipswich. Ten days afterwards he was apparently able to describe the accident in detail, but it was subsequently discovered that the description applied, not to the recent accident, but to a motor cycle accident which he had sustained at Epsom two years previously. He gave his age correctly for the earlier accident (age 20), but at the same time was able to give his present Army unit and number, although he had joined the Army *after* the first accident. There was, therefore, a mixture of past and present experience.

While all the above-mentioned case reports relating to head injury are capable of interpretation on the basis of regression, it must be clearly understood that the authors quoted are not responsible for such a viewpoint.

In concussion, as in post-epileptic confusion, there is again retrograde amnesia, a further indication of a going back in the dimension of time. Moreover, during the process of recovery earlier events tend to be recalled before later ones (Russell and Nathan, 1946).

The next organic brain affection in which there is regression is therapeutic insulin coma. This has been discussed in great detail elsewhere (Power, 1955) and little more need be said about it. It is claimed not only that in therapeutic insulin coma there is a reduction in the functional organization of the brain to the level of the foetus, but that during the subsequent process of recovery from coma a number of patients (22 out of a series of 100) have the experience either of re-living episodes in their past life, or of being babies again, or of being born again, or of undergoing re-evolution. Those who feel sceptical about all this—and there will doubtless be many—are strongly urged to refer to the paper in question.

The fourth organic brain disability which is associated with regression is senile dementia, although here we see it, as it were, in slow motion. The patient with senile dementia may believe that he is living under the conditions of his childhood and addresses those around him by the names of relatives long since dead. Nevertheless he remains partly in touch with the present, and up to a point can appreciate the true nature of his surroundings and the real identity of those around him. Here again, as in the post-convulsive and concussional confusional states, there is an intrusion of the past upon the present and a telescoping or unification of experience. Incidentally, it is interesting to note that Needham (1962), in a paper entitled 'Is there a second childhood?', gives an impressive list of *physical* characteristics—anatomical, physiological and chemical—displayed by elderly people which resemble those manifested in childhood.

Before leaving the subject of regression associated with organic cerebral disabilities mention must be made of certain phenomena elicited by electrical stimulation of the temporal cortex of the brain. As is well known, Penfield (1958) has reported the re-living of past experiences by some patients following electrical stimulation of the temporal cortex. Penfield says: 'The subject re-lives a period of the past although he is still aware of the present. Movement goes forward again as it did in that interval of time that has now been, by chance, revived, and all the elements of his previous circumstances seem to be there, sights, sounds, interpretations and emotions.' Although Penfield does not interpret it in this way, it seems to me that this is yet another instance of psychological regression associated with cerebral stress. As Walshe (1965) has pointed out, an electrical current applied to the brain surface is an unphysiological stimulus, and the brain is not designed to be activated in this way. Penfield appreciates this so far as the cortex is concerned, but postulates conduction of the stimulus by nerve fibres to the hippocampus where physiological activation is presumed to occur. It does not seem unreasonable,

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however, to regard the cortical stimulus as constituting a 'bio-physical lesion' (Walshe) and to interpret the result in the light of a symptom rather than as a manifestation of a normal activity. Viewed in this way the re-living of the past by a patient when his temporal lobe is stimulated could be interpreted as a dynamic recoil of the mind in the dimension of time associated in some way with the electrical interference with normal cerebral functioning. It should be noted that Penfield's patients not only re-lived fragments of their past but at the same time remained in touch with the present, as patients tend to do in the confusional states associated with epilepsy, head injury, and senile dementia.

Neurological regression

We now come to examine the possibility that a similar mechanism may be brought into play in the somatic sphere when the nervous system is operating under difficulties (stress) arising from disease or injury. In this connection it is interesting to note that Freud seems to have derived his idea of regression from Hughlings Jackson's principle of Nervous Dissolution with which he became familiar when working as a neuro-pathologist in his pre-analytic days. Referring to the influence of Jackson's teaching upon Freud, Riese (1958) points out that in the development of his ideas Freud slightly misinterpreted the Doctrine of Dissolution, for while Jackson's nervous levels represented degrees of complexity, integration and volition of movement, and the scheme was a purely physiological one—a hierarchy of functions—Freud conceived them in a chronological sense as reflecting stages in ontogenetic and phylogenetic development. It is proposed here to misinterpret the Doctrine of Dissolution in the same way as Freud, and to view the subject from the standpoint of ontogenetic reversion.

The question is: 'Can any of the symptoms of organic nervous disease be interpreted as recapitulations of ontogenetically earlier patterns of behaviour? In answering this question, we have first to consider the possibility of reversion to a pre-natal pattern of nervous functioning. Among the neurological symptoms which might be regarded in this way are those associated with a general convulsion. This idea, which arises from the embryological researches of Coghill (1929) on *Amblystoma* and of Barcroft (1941) on the sheep foetus, has been fully discussed in previous papers (Power 1945, 1950). Very briefly, the argument is that in a fit there is a return to the 'total pattern' type of behaviour exhibited in embryo life, and that this results from neurological (and sometimes psychological) stress. Even if this theory cannot be accepted, there is evidence from other sources that a general convulsion represents a primitive type of nervous discharge and therefore a regression. Thus, Grey Walter (1957), referring to the light thrown on epilepsy by the E.E.G. and the clinical researches of Penfield and Jasper in Canada, states that the question arises whether we ought not to regard it as a functional atavism rather than as a degeneration. Again, Morgan (1943), basing himself on clinical grounds, as well as on the results of nerve tissue transplantation carried out by Weiss, gives as his opinion that: 'Whatever the cause, one general conclusion that can safely be reached concerning the nature of epilepsy is that it is a relatively primitive and disorganized response of nerve cells.'

Another symptom of nervous disease capable of interpretation on the basis of regression to the foetal level is 'decerebrate rigidity', for Barcroft (1941) has found in his observations on the sheep foetus that it passes through a stage of decerebrate rigidity during the course of its development.

Again, according to Barcroft, the earliest movements of the sheep foetus are spasmodic in type, so that it is possible to regard the occurrence of muscular spasm in nervous disease as suggestive of ontogenetic regression. It would appear that spasm is the most primitive type of movement.

Finally, while still on the subject of regression to the foetal level, it should be mentioned that Coghill (1943) interpreted the phenomena associated with Head and Riddoch's 'mass reflex' resulting from complete division of the spinal cord in man as a reversion to the 'total pattern' type of behaviour of embryonic life.

Turning now to the reactivation in organic nervous disease of the patterns of behaviour of

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the child rather than of those of the foetus, we recall certain observations made by Freeman (1929). He gives as examples of ontogenetic reversion abnormal postural reactions, automatic associated movements, involuntary movements of a hemiplegic limb in walking, yawning, coughing and sneezing, reflex grasping and groping, and pathological laughing and crying. Commenting on these, Freeman says: 'As I explained earlier these reactions are total reactions, as contrasted with the reactions of individual control that are built up through practice and individual differentiation.'

Before leaving the subject of neurological regression a further word may be said about Penfield's observations on the results of electrical stimulation of the cerebral cortex. It has already been suggested that the *psychological* results of electrical stimulation of the temporal lobe are open to interpretation as a regressive reaction accompanying cerebral stress. Mention can now be made of the *behaviour patterns* elicited by electrical stimulation of the motor cortex. These have been described as resembling those of a newborn baby. Penfield and Jasper (1954) say: 'The newborn baby is capable of flexion and extension of the arms and legs, and opening and closing of the fist, but there are no complicated finger or foot movements. The baby is capable also of immediate vocalization and of sucking and swallowing, and, no doubt, of salivation as well. All of these are the movements which electrical stimulation of the Rolandic motor strip causes an adult to make.' With regard to vocalization, Penfield and Rasmussen (1950) describe it as 'a vowel sound, a cry without words. One might concede that it resembles the cry of the infant if allowance is made for the difference in structure of the larynx of the adult which produces a heavier tone. It also resembles the cry of some epileptics at the onset of their seizure.' Penfield regards these motor phenomena as arising from stimulation of inborn reflexes in the brain stem via tracts from the cortex. However, they are also capable of interpretation on the basis of ontogenetic reversion: as representing a regression to the behaviour patterns of a child in association with the stress caused by the electrical stimulation of the cortex.

Regression in animal behaviour

Barcroft (1938) found that the normal foetus of the sheep showed movements of certain well-defined types at different ages in response to stimulation. When the foetus was about 40 days old these movements were rapid and 'jerky', whereas in older foetus (about 50 days) they were drawn out and 'sustained'. Thereafter the foetus became quiescent; but if during this final period of quiescence the foetus was exposed and pressure exerted on the umbilical cord, the quiescence was abolished and movements were elicited, which were first of the 'sustained' type typical of the 50-day normal foetus and thereafter of the 'jerky' type typical of the 40-day normal foetus. In other words, the effect of asphyxia produced by pressure on the umbilical cord was to abolish the functions of the brain and spinal cord in the reverse order to that in which they had been evolved. In Barcroft's words: 'as the foetus deteriorates it progressively reverts to the properties of earlier days.'*

Surely this can be regarded as an example of ontogenetic regression produced by internal stress (asphyxia). Interestingly enough from our present standpoint Barcroft adds the following comment: 'When I say that asphyxia tends to bring the picture back to what it had been on the 49th day that is not a quite satisfying statement, for though from the 50th day onwards the reflexes have been put away in actuality, they have been developing in potentiality, so that the response when it is elicited is not precisely what would have been elicited on the 49th day, but something less crude, something more definitely related to the stimulus . . . .' Here, therefore, as in many of our previous examples of regression there is a 'telescoping' of the present into the past, a unification of chronological levels, rather than a clear-cut return to the past.

Other aspects of regression in animals are referred to by Brun and by Tinbergen. Burn, quoted by Dunbar (1954), draws attention to its occurrence in caterpillars and ants under conditions of stress. Thus, the caterpillar taken

* One recalls the popular belief that when people are in danger of drowning their whole past life passes before them.

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out of its cocoon will form a new one. Or the queen ant, all workers and brood having been taken away, will regenerate the state by herself.

Tinbergen (1953) points to a similar regressive mechanism in birds. He says: 'When birds lose their brood they often start a new one. Instead of continuing their development as if nothing had happened, they undergo a profound change. Their testes and ovaries begin to develop sex cells again, their courtship begins anew, they copulate, build a nest and lay eggs. Regulatory capacities of this kind are not the same in all species, but most, if not all, birds have them.'

Regression at cellular level

Under the heading 'Redevelopmental Adaptation' Selye (1957) describes a mechanism which appears to be closely allied to regression. This happens, for instance, when bacteria or the debris of dying cells come in contact with a muscle cell, and the latter must transform itself so as to engulf and destroy these materials. 'It is interesting to note', says Selye, 'that whenever such redevelopmental adaptation is called for, cells specifically shaped to perform certain functions first lose their acquired characteristics, become simple in structure and similar to very young cells, before they can acquire new characteristics to adapt them for other functions. Stress is very powerful in promoting this de-differentiation and rejuvenation of cells; it thereby paves the way for a reorganization of their individuality'.

Yapp and Bourne (1957), discussing the rates and methods of ageing of mammalian cells, refer to a type of cell called 'reverting mitotics' which they describe as 'specialized (differentiated) cells each modified for the efficient performance of a specific function'. Such cells, the authors say, 'may show senescence changes and die. However, following injury, even in quite old animals, they may regenerate in the sense that they undergo a series of rapid mitoses, and the relatively undifferentiated cells that result can differentiate into normally functioning cells of that organ'. This would appear to furnish another illustration of regression in the face of stress.

There appear to be differences of opinion among biologists as to the extent to which ontogenetic recapitulation following regression plays a part in the process of regeneration in animals after injury, but Needham (1965) holds that the phenomenon applies in a striking way to arthropods, where regeneration involves a return to the embryonic state. He adds that such regeneration may also show atavistic features, i.e. phylogenetic regression.

Paedomorphosis

Finally, a word about an evolutionary process which appears to have certain things in common with regression in the individual. This is called 'paedomorphosis'. Huxley (1954) defines it as 'the prolongation of an early phase of ontogeny, juvenile, foetal, or larval, into sexually adult life by some form of heterochrony in development'. The theory, which we owe to Garstang, sets out to account for evolutionary advance by retention in the adult organism of characteristics previously existing only in the young of the species. An excellent brief summary of it will be found in R. M. J. Harper's *Evolution and Illness* (1962). Referring to the theory, Hardy (1954) points out that over-specialization on the part of an organism may lead to an evolutionary cul-de-sac, and that under such circumstances an escape can be provided by a new line of development. On the same subject, de Beer (1958) says: 'In general the environments in which adult animals live are more difficult, specialized and restricted than the environments of larvae. It is possible, therefore, that the significance of paedomorphosis lies in the withdrawal of a species from a "difficult" adult environment to the "easier" environment of its youthful condition, and that this opens up new ecological avenues of evolutionary possibilities.'

This is certainly very like the process and purpose of regression in the individual. There is again the difficult environment forcing a return to a youthful condition in the service of re-invigoration.

Discussion

From the foregoing brief references it will be seen that a process very similar to psychiatric

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regression operates in widely different biological fields. Indeed, Freud himself (1922) seems to have been aware of this when considering the relationship of instinct to the 'compulsion' to repeat the past. He believed that instincts were essentially conservative in nature and were concerned with the reinstatement of an earlier condition which had to be abandoned under external pressure.

One of the advantages of considering regression from a biological standpoint is that it emphasizes the part played by it in regeneration rather than in decay. In psychiatry we are all too likely to see it in association with irreversible mental deterioration, although, of course, temporary regressions frequently occur, as in the course of psychoanalysis and in recoverable mental disorder. However, in general biological fields the re-invigorative effect is more obvious.

The common feature exhibited in all types of regressive reaction noted in this paper is a return of the organism to an earlier level of functioning in the face of stress of one sort or another. In the course of this journey backwards complex adaptive mechanisms are replaced by simpler and more general regulatory principles. But in the case of the mind and nervous system this reduction in the level of functioning should not be interpreted as one would the results of brain section by the physiologist's knife. On the contrary, the latest evolved elements participate in the regression and eventually become submerged in the reawakened past.

In both mind and neuro-muscular system there is in regression de-differentiation and unification of function in the dimensions of time and space. Thus, in a convulsion, an allegedly regressive manifestation, temporal and spatial differentiation of movement is abolished, giving rise to a mass, spasmodic movement; while in certain confusional states experiences normally separated in time and space become telescoped together, with the accent increasingly on the past. Despite the unbridgeable gulf between the mental and the physical, 'primitivization' and functional unification appear to operate together in each field. The conclusion seems irresistible that this reflects an underlying monism.

In acute mental regressions, such as those associated with the confusional states following a convulsion or head injury, this drawing together or unifying of the past and present is manifested in two ways: either past orientations, experiences, and identities are re-lived side by side with present ones, despite the resulting inconsistencies (which may be bridged over by confabulation); or, alternatively, the past and present are fused together, the past playing the major role.

The telescoping of psychic material in regression leads to a more diffuse form of mental functioning, which when viewed from a wider biological standpoint would appear to correspond to a reduction from the heterogeneous towards the homogeneous, in accordance with the teaching of Herbert Spencer on Dissolution. Such an increase in diffuseness or homogeneity in mental functioning would seem to parallel the de-differentiation in histological structure observed in tissue cells during reversion to the embryonic type prior to regeneration.

In conclusion we may ask ourselves if there is not a process resembling regression continuously in operation in our normal mental life? Is there not a constant reference backwards in all our thinking? As Ernest Jones (1948) says: 'The whole meaning of comprehension and explanation is the referring of the unknown to the known.' This being so, even a minor problem, far removed from anything that could be regarded as stress, invokes a reference backwards to the past. And is not the purpose here again one of adaptation? As Meerloo (1962) puts it: 'It is man's dilemma that he has to see through the eyes of the past that which he has to verify and correct in the present.'

Summary

Regression is defined as the re-living by an individual of his past, or part of it, in the present. Viewed in this way it can be seen as an adaptive mechanism, if at times an abortive one, operating in widely differing biological fields far removed from psychiatry. Instances of it are given (1) in the psychological field in association with organic cerebral disturbance, (2) in the somatic sphere in neurological disease, (3) in the

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sphere of animal behaviour in the face of stress, (4) at the cellular level in association with regeneration.

In both mind and nervous system regression is associated with de-differentiation and unification in the dimensions of time and space. This results in greater diffuseness in functional organization which may be compared with the increase in homogeneity displayed by tissue cells prior to regeneration.

Mention is made of an evolutionary process known as 'paedomorphosis' which somewhat resembles regression in the individual.

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