
Special Articles

The Contribution of Hughlings Jackson to an Understanding of Dissociation

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The author provides a preliminary framework for a systematic and dynamic understanding of dissociation through a consideration of the theories of Hughlings Jackson. Jackson's ideas are briefly reviewed. He saw the proper scientific investigation of mental illness as an experimental investigation of mind. Accordingly, his argument begins with this fundamental concept. His views of the brain-mind relationship and of mind, or self, resemble modern conceptions. He viewed the self as double and focused on those disruptions of the self system which he called the "dreamy state." This state involves an "uncoupling" of normal consciousness, resulting in the loss of the most recently developed forms of memory and of the stream of consciousness. Dissociation is seen here as analogous to the dreamy state. Jacksonian theory predicts the main features of dissociation, i.e., constriction of consciousness, a particular form of amnesia, disaggregation of perceptual phenomena, depersonalization, derealization, and hallucinosis. It leads to the view that dissociation can be seen, in essence, as an uncoupling of consciousness

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John Hughlings Jackson (1835-1911), the father of British neurology, is best known for his investigations of epilepsy and aphasia. However, a principal aspect of his opus has been neglected. He was a pioneer theorist in the sphere of mental illness. Freud was influenced by some of Jackson's main ideas (1, p. 403).

Although Jackson has remained a figure of interest for psychiatrists and psychoanalysts (2-4), his influence in their disciplines has not endured. In this article, central aspects of his theory are reexamined in order to approach the problem of the conceptualization of dissociation.

Despite a great deal of recent research and writing on the subject, the concept of dissociation remains elu-

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sive. Many investigators use the term loosely to denote states such as daydreaming (5) or absorption in intellectual and imaginative activity (6). Such looseness of the concept diminishes its clinical value and contrasts with the description by Pierre Janet (7-9), who depicted a circumscribed phenomenon limited to pathological states.

Waller and colleagues (10) identified five key features of the phenomenon: disturbances in memory, derealization, depersonalization, a discontinuity of personal existence, and hallucinatory phenomena. To these phenomena must be added contraction of the field of consciousness, which was central to Janet's description. Jackson's theory of self is briefly reviewed to show how it predicts the emergence of these six phenomena.

JACKSON'S MODEL OF THE MIND AND CONCEPT OF SELF

Jackson's approach to an understanding of mental illness began with a working model of "mind" (11, vol. II, p. 4). He saw mind, or self, as a manifestation

of brain function. Nevertheless, he warned against a confusion of "psychical states with nervous states" (11, vol. II, p. 9), of mind with brain. He believed that one arose out of the other, so that there emerges a "concomitant parallelism" (11, vol. II, p. 42). Anticipating philosophical argument, Jackson asked "that the doctrine of concomitance be provisionally accepted as an artifice, in order that we can study the most complex diseases of the nervous system more easily" (11, vol. II, p. 85).

The next step in his argument concerned an adequate description of "self." Jackson believed himself to be the first to use the term in medical writing (11, vol. II, p. 96). He conceived it as double, consisting of subject and object or, as he put it, of "subject consciousness...symbolized by 'I' [and] object consciousness....Each by itself is nothing; [each] is only half itself" (11, vol. II, p. 93). In essence, self depended on the emergence of what he called the "introspection of consciousness" (11, vol. II, p. 96).

Early in his career Jackson worked under the physician Thomas Laycock (12) and was impressed by his doctrine of reflex cerebral action (11, vol. I, p. 122). Jackson was also influenced by the philosopher Herbert Spencer, who suggested an evolutionary organization of the brain. These two ideas were joined in Jackson's quest for an understanding of the evolution of self. He conceived of the central nervous system (CNS) in terms of its simplest functional unit. For Jackson, this unit was reflexive, the smallest element of sensorimotor function. Each of these units is a representing system. The brain, in his view, evolves and develops through an increasingly complex coordination of these units. As the organism evolves to a higher stage of function, it is not as if something new were being tacked on, which provides new representations. Rather, there is a re-representation. At a higher stage still, there is a re-re-representation (11, vol. II, p. 42), so that the most recently evolved part of the brain, the cerebral cortex, is "universally representing" (11, vol. II, p. 82). "The whole nervous system is a sensori-motor mechanism, a co-ordinating system from top to bottom" (11, vol. II, p. 41).

Jackson rejected the idea that the mind or self requires a special new form of neural function to be built into the human brain. He wrote: "There is no autocratic mind at the top to receive sensations as a sort of raw material, out of which to manufacture ideas, etc., and then to associate these ideas" (11, vol. II, p. 98). The appearance of self is the manifestation of a more complex coordination than previously. What is new, then, is a new, or higher, system of unification of the whole organism whereby the organism as a whole is adjusted to the environment.

Self, however, is dependent on the evolution of anatomically new structures. Jackson suggested that the evolutionary development of the prefrontal cortex is necessary to the emergence of self. In this sense it could be called the "organ of mind" (11, vol. II, p. 399). However, this is not to say that self resides in the prefrontal cortex. Rather, the new structure allows a more

complex coordination of what is "anatomically a sensori-motor machine" (11, vol. II, p. 84).

In summary, Jackson conceived of the CNS as having a hierarchical organization that reflects evolutionary history. He used "the terms lowest, middle, and highest centres...as proper names...to indicate evolutionary levels" (11, vol. II, p. 41). Ascending levels show increasing integration and coordination of sensorimotor representations. The highest-level coordination, which allows the greatest voluntary control, depends on prefrontal activity. Self is a manifestation of this highest level of consciousness, which involves doubling. This doubling is established by the reflective capacity that enables one to become aware of individual experience in a way that gives a sense of an inner life.

This reflective capacity is most clearly seen in its involvement in a certain kind of memory, which Jackson described using the following example. "A smell, say, of roses, I now have makes me think of a room where I passed much of my time as a child" (11, vol. II, p. 361). In Jackson's terms the experience is "double." Two models are held in the mind: one of a room in the past and another of a room in the present.

This kind of memory is made up of episodes of personal experience that have a sensory aliveness. Something from the past is brought before the "eyes of the mind." Endel Tulving (13, 14) called this form of memory "episodic." It involves not only memory but also an awareness of remembering. It has a dual form or, to use Tulving's term, it is "autonoetic" (15).

Tulving's seminal work distinguished episodic from semantic memory. "Semantic," in this usage, does not refer to words but to facts and knowledge. This kind of memory is adualistic. It is "noetic." In remembering facts such as the capital of France or the names of coins, we have no simultaneous awareness of the episodes during which these facts were acquired.

Other forms of memory are "anoetic" in that consciousness is not necessary to them. They include procedural memory, which concerns routines of movement, and perceptual representation, which is a hyper-specific, inflexible, and atomized system of featural recognition (16).

These different forms of memory do not arise in human development all at once but appear serially during childhood. Anoetic forms of memory are apparent soon after birth (17). Semantic memory (i.e., noetic memory) is demonstrated toward the end of the first year of life, when a child might crawl to a cupboard to find something he or she knows is kept there (18, 19). This fact or piece of knowledge can become "declarative" in the latter half of the second year, when language is acquired. Autonoetic memory arises quite late. It is clearly established at about age 4, when the child can describe episodes that occurred months previously (20). This form of episodic memory is termed either "remote episodic" or, more usually, "autobiographical." Episodic memory for events occurring within the last few days is displayed by 2-year-olds (21).

These various kinds of memory have different neurophysiological bases. Episodic memory, which I have suggested is related to the appearance of self (17), depends on activity in the prefrontal cortex (22, 23). This is not to say that it is located there. Rather, prefrontal activity is necessary to a neural network, linking many other regions, that underpins episodic memory.

Semantic memory, especially where it is verbalized, also involves frontal activity. However, "both neuroimaging and lesion studies have already yielded evidence that the prefrontal cortex plays an important role in episodic memory, above and beyond any role it has in semantic memory" (24). The early-developing forms of memory, which are anoeitic, operate independent of frontal function (24).

DISSOLUTION AND PARALLEL CONCOMITANCE

Jackson's best-known postulate was based on meticulous observation of neurological patients and also the theory of evolution. He considered that those functions which appeared last in evolutionary terms, and which emerge late in human development, are the most fragile and are lost first. He called this process "dissolution," the reverse of evolution. The individual functions in a way that is more automatic, less under voluntary control, and performs in a manner that is less complex, than in a normal state. In addition to the loss of late-developing functions, there is a discoordination between and exaggeration of earlier functions.

The main thesis of this article depends on the Jacksonian postulate stated above. It argues that the phenomenon of dissociation is a manifestation of a disruption of those cerebral functions which develop late and which appear last in evolutionary terms, and which involve or are related to the reflective capacity. Put another way, uncoupling of consciousness, or undoubling of the self, is essential to dissociation. This idea also depends on Jackson's doctrine of "parallel concomitance."

Parallel concomitance implies, in conformity with a current neuroscientific position (25), that brain states influence mind, and vice versa. It further implies that an assault on the brain-mind system has similar results whether this assault is on the brain or on the mind. Seen in this way, psychological trauma is analogous to a physical or chemical insult to the brain-mind system. Jackson's idea of parallel concomitance led him to suggest that a study of disruptions of cerebral function may lead to an understanding of psychological disorder.

The disruption of cerebral function which fascinated Jackson was that which followed mild cerebral electrical dysrhythmia. It produced a slight change in consciousness, which Jackson called the "dreamy state." Although Jackson did not formally study dissociation, I am suggesting that his dreamy state provides a model for studying the basis of dissociation and an explanation of the main features of dissociation outlined earlier. This suggestion depends on recent evidence which

indicates that dissociation is related to psychological trauma (26-29).

Jackson noticed that during the dreamy state, people perform complicated actions of which they seem unconscious. Furthermore, there is impaired memory for the period of these actions. Jackson called these behaviors "automatisms." They are seen here as analogous to those disorders which Janet also called automatisms and which are manifestations of dissociation (7-9). It is important to note that Jackson understood this state to be not a consequence of the epileptic discharge itself but of a notional neuronal "exhaustion" that followed it. In a similar vein, Janet (8, p. 333) considered that exhaustion was involved in the production of psychogenic dissociation. The following account provides an example of an automatism.

One of Jackson's patients, a doctor, reported an occasion when he was called to see a patient with a respiratory complaint. While beginning to examine him, the doctor became aware that he was going to have a slight fit and he turned away from the people in the room so they would not notice. "Coming to" some time later, he found himself writing out the diagnosis of pneumonia of the left base. The patient was no longer in the room and had presumably been sent to bed. Nobody seemed to have noticed anything strange about the doctor's behavior. Feeling the need to check his diagnosis, he re-examined his patient. He found, as he wrote, "that my conscious diagnosis was the same as my unconscious" (11, vol. I, p. 405).

The doctor was behaving in a manner which nobody saw as strange. He was conscious and was working in a very sophisticated way, using a memory of the facts of his medical training. However, he was unable to remember anything of what he had done. No memory of the event remained. Episodic memory was lost.

This man had suffered an uncoupling of consciousness. This was manifest not only in terms of memory but also in the loss of the stream of consciousness, which depends on the reflective capacity. In such states one is conscious only of immediate stimuli in the environment and the body. There are no imaginings, no memories of past events, and no narrative. The experience is of the immediate present. There is a constriction of consciousness. This can be compared to the experience of immediacy in psychic trauma, when one is only aware of the traumatizer, the terror, the beating heart, and other bodily sensations. It might be expected that such experience will be recorded not in episodic memory but in earlier memory systems. As a consequence, it will be poorly remembered or "unconscious." Total amnesia for psychologically traumatic events is increasingly reported (30-33). Such amnesias are conceived as dissociative (33). Jacksonian theory predicts that dissociative amnesias will be more common where the brain-mind system has been made vulnerable by previous disruptions, such as head injury (34) or psychological trauma during the maturational period (35).

These ideas suggest that dissociation, at its first occurrence, is a consequence of a psychological "shock," or high arousal, rather than a protection against it. The fact that dissociation is not protective is shown by findings that dissociation at the time of the trauma is a strong predictor of posttraumatic stress disorder at follow-up (27, 29, 36, 37). Recurrent dissociative episodes might be conceived of as learned responses. They can be triggered by contextual cues or reproduced for defensive purposes.

THE PHENOMENA OF DISSOCIATION

The phenomena of dissociation can be understood in terms of Jackson's dissolution hypothesis. This suggests that the most recent functions, dependent on prefrontal activity, will be lost through a traumatic insult to the brain-mind system. Episodic memory, which, as previously remarked, is dependent on prefrontal activity, was not operative in a dissociative state, involving fugue, studied by Schacter et al. (38, 39). However, semantic memory was retained. It might be supposed that during massive psychological trauma, semantic memory, which appears late in the first year of life, would also be lost. In this case, the experience would be encoded in more primitive or anoetic forms of memory, i.e., in procedural memory or in the perceptual representation system. This is consistent with the manifestation of traumatic memory as a motor repertoire (40, 41) or as fragmentary sensory imprints (42). For example, one of our patients would, from time to time, feel the skin of her forearms twisting laterally. She had been raped by two men, one of whom pinned her down by holding her forearms.

Prefrontal activity underpins aspects of attention. There is evidence that it is necessary to the process that holds representations of stimulus information "on-line," in working memory (43). Put another way, this activity allows a number of channels of information to remain open at one time. An example of this capacity is driving a car while conversing with a passenger, at the same time listening to music on the car radio. Should this system fail, the number of channels of information kept open is diminished. There is, to use Janet's concept, a constriction of consciousness. This state is not to be confused with absorption in imaginative activity, which involves a high level of processing, with multiple levels of awareness operative. This state involves attentional selection, also a function associated with prefrontal activity (43). Attention necessarily involves selective inattention in the manner demonstrated in simple form by the phenomenon of habituation to an initially novel but meaningless stimulus that is repeatedly presented. The orienting response to the stimulus, shown in various ways such as fall in skin resistance and desynchronization of the EEG, soon disappears. The "repeatedly presented stimulus loses its

novelty, and special mobilization of the organism on its appearance is no longer necessary" (44, p. 56); i.e., habituation occurs. People in whom dissociation is a feature of their clinical presentation have a remarkable inability to habituate (45). Selecting between meaningful and nonmeaningful stimuli is also diminished in those who have been traumatized (46) and in those with somatization disorder (47), who characteristically have a development scarred by abuse (48, 49).

Jackson's hypothesis predicts that a higher-order activity such as "self" will be lost under noxious circumstances. This will result in at least some level of depersonalization. This can be understood in terms of the core of personal feeling, which might be called "me-ness" (50, p. 107) and which permeates the stream of consciousness. With increasing intensity of trauma and loss of the stream of consciousness, there is a diminution in the sense of me-ness and a sense of personal estrangement. Jacksonian theory also predicts a second consequence of the loss of the stream of consciousness. Since he conceived of self as a unifying system—a state of higher coordination—its loss would involve discoordination, a failure of synthesis in Janet's theory (51), of the components of psychic life. The British writer Rebecca West was able to describe this state of relative psychic disconnectedness following a subdelirium. She wrote, "Instead of being a stream, my mental life was a string of disparate beads" (52). Her experience was accompanied by a feeling of strangeness, i.e., derealization.

The derealization of dissociation can be explained in terms of another of Jackson's doublings that he considered fundamental. It involves a constant matching between models of the world formed in the past and those appearing in the present. Jackson wrote that "what is most fundamental in mental operations [is] the double process of tracing relations of likeness and unlikeness" (11, vol. II, p. 129). Derealization can be understood as a consequence of mismatching between the models of memory and those of immediate experience (53). The disconnectedness experienced by the individual involves an unlinking of the bodily feeling that is at the core self. The alterations in bodily experience include perceptions of changes in the shape, in the density, and in the weight of the body (54).

Finally, Jackson's theorizing also touched on hallucinosis, which he considered in terms of the "faces in the fire" phenomenon (11, vol. II, p. 25). We all have the capacity to see shapes in the flames of a fire, in clouds, and in rocks; they are often faces. However, a higher-order monitoring and evaluating function results in these experiences being judged illusory. Loss of this function, which might correspond to Janet's *fonction du réel*, prevents the reality of these illusory perceptions from remaining unquestioned. This approach to the origin of hallucinosis has recently been explored in a number of brain imaging studies (55).

DISCUSSION

As Luria has remarked, the complexity of Hughlings Jackson's thinking was often beyond the comprehension of his contemporaries (44, p. 24). His original and innovative proposals included the theory of lateralization of hemispheric function (11, vol. II, pp. 129–145; 44; 56). Jackson's thought was "particularly modern—so much so, in fact, that his ideas are receiving more serious consideration today than they did in his own time" (56, p. 338). His theory of self, which depends on the emergence of prefrontal activity, resonates with contemporary conceptions (57, 58). Jacksonian theory has been little used to understand mental illness. However, the conceiving of mental illness as a disturbance of the brain-mind system (25), rather than in terms of the organic/psychogenic dichotomy, may lead to his ideas being seen as relevant and useful, for example, in an understanding of borderline personality disorder (59, 60). Jackson did not formally study dissociation, but his theory is helpful in conceiving this complex phenomenon.

In this article it is suggested that dissociation can be understood in terms of Jackson's hierarchical model of the organization of the brain, which is based on evolutionary history. The highest form of consciousness, dependent on the highest level of coordination among the elements of CNS function, he called self. It is experienced in the dual form created by the capacity for introspection. His dissolution hypothesis, put forward in 1873–1874 (11, vol. II, p. 3), suggests that this form of consciousness, which is new in evolutionary terms, will be lost first when cerebral function is slightly disrupted. An inquiry into the nature of dissociation that is grounded in Jacksonian theory allows us to go beyond an understanding of a phenomenon that depends merely on description or convention. His concept of self, together with the dissolution theory, predicts the principal features of dissociation.

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