

Pain, dissociation
and
subliminal self-representations

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Neurophysiological processes due to cognitive modulatory mechanisms such as hypnosis or traumatic dissociation may strongly affect conscious perception and experience of pain and lead to changes in brain functions. There are suggestive findings that information about pain may be stored and processed during the unconscious state of it and may be recalled in hypnosis or during the therapy. These findings together with further research of subliminal processes give growing evidence for the subliminal self-representations.

Advances in the study of pain show that processing of feeling pain are based on widely distributed processing in the brain (Coghill, Sang, Maisog, & Iadarola, 1999) and closely related to mechanisms of consciousness. The pain is defined as unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage (International Association for the Study of Pain Task Force on Taxonomy, 1994, p. 210). It implicates important qualities of such experiences. Mainly in the aspect that pain represents unique sensory, perceptual and emotional characteristics related to state of consciousness and it distinguish pain from nociception because there is not absolute correspondence between pain and tissue damage (Eccleston & Crombez, 1999).

Pain is related to consciousness and is known that it may be modulated by cognition. Next to ordinary pharmacological mechanisms in modulation of pain there are also cognitive

mechanisms such as attentiveness, emotional context, individual attitudes or personal expectations. These modulatory mechanisms may lead to an analgesic or an anesthetic effect and may alter the perception and transmission of pain. A way of cognition and perceiving environment also substantially changes experience of pain. The main cognitive factors influencing the modulation of pain are attention and emotion (Coghill, Sang, Maisog, & Iadarola, 1999; Villemure & Bushnell, 2002; Eccleston & Crombez, 1999). With respect to attention, a number of reports show that pain is perceived as less intense when individuals draw their attention away from the pain. Other studies show that focusing on pain enhances pain perception. There is now important evidence in humans and non-human primates that the responsiveness of neurons in primary somatosensory cortices to both non-painful and painful stimuli is altered by the degree of attention. This phenomenon corresponds to psychological methods leading to analgesia or anesthesia, such as hypnosis, the effectiveness of which also varies with attention (Coghill, Sang, Maisog, & Iadarola, 1999; Villemure & Bushnell, 2002; Eccleston & Crombez, 1999).

With respect to the emotional modulation of pain mechanisms there are observations that emotional manipulations alter the subjective perception more than the objective sensing of pain (while attention alters both pain sensation and unpleasantness). It suggests that different modulatory circuits are involved in the emotional modulatory mechanisms than in the attentional modulatory mechanisms. The neural substrate regarding attentional modulation of pain is only partially known. It most likely involves various levels of the CNS. Many studies deal with an opiate-sensitive descending pathway from the frontal cortex to the amygdala, periaqueductal gray matter, rostral ventral medulla, and spinal cord dorsal horn. These structures may be involved in the emotional as well as attentional modulation of pain (Coghill, Sang, Maisog, & Iadarola, 1999; Villemure & Bushnell, 2002; Eccleston & Crombez, 1999).

There were proposed information processing models considering attention as a filter, as a resource, and as a mechanism for selection of action (Eccleston & Crombez, 1999). Pain is warning of danger to an organism from natural or social environment and it interrupts, distracts and demands attention (Eccleston & Crombez, 1999). It implicates wider conception of psychological pain where “nociception” represents traumatic stimuli from social environment. It is reasonable to hypothesize that novel painful stimuli will also elicit an attentional shift, particularly after pain onset (Eccleston & Crombez, 1999). Attentional filtering in information processing corresponds to research findings expanding and evolving neuropsychophysiological model of hypnosis that support the view that highly hypnotizable persons possess stronger attentional filtering abilities than low hypnotizable and that these differences are reflected in underlying brain dynamics such as an interplay between cortical and subcortical structures. High hypnotizable persons can both better focus and sustain their attention as well as better ignore irrelevant stimuli from the environment (Crawford, 1994). It corresponds to findings that descending inhibitory pathways that parallel the ascending sensory systems and can modulate quite early responses to sensory information. This suggests that high hypnotizables can better inhibit incoming sensory stimuli. It corresponds to research findings regarding models of attention that propose that the far frontal cortex regulates the limbic system in the active gating of incoming sensory stimuli and it supports the hypothesis that high hypnotizables have a more efficient far fronto-limbic attention system (Crawford, 1994). Corresponding to the hypothesis that novel painful stimuli will also elicit an attentional shift (Eccleston & Crombez, 1999) hypnotic analgesia also represents shift in attentional processing of pain (Crawford, 1994). This shift corresponds also to the neuromatrix theory proposing that pain is a multidimensional experience produced by characteristic “neurosignature” patterns of nerve impulses generated by a widely distributed neural network- the “body-self neuromatrix”- in the brain (Melzack, 1999, 2001).

Modulation of attention in hypnotic states is coupled to the global changes in subjective experience. It markedly influences regulation and monitoring body and mental state of hypnotized subjects. These alterations in “self-representation” possibly underlying the changes in subjective experience provide some support for the notion that hypnosis is a distinct “state” of consciousness, to the extent that self-representation is likely to play a key role in basic aspects of consciousness (Rainville, Hofbauer, Bushnell, Duncan, & Price, 2002; Metzinger, 2000; Damasio, 1999). Hypnotic lack of the self-representation or self-concept leads to the phenomenon of dissociated or divided consciousness (Crawford, 1994; Hilgard, 1986).

Hypnosis and subliminal memory of pain

Hypnosis was shown to be a suitable method for cognitive modulation of pain experience. Hypnosis modulates activity in brain structures involved in the regulation of consciousness and enables to perform analgesia or anesthesia and is useful in many people (Rainville, Duncan, Price, Carrier & Bushnell, 1997; Rainville, Hofbauer, Bushnell, Duncan, & Price, 2002). Investigation of sensing pain in hypnosis shows that information about pain, due to cognitive modulation leading to analgesia or anesthesia, is either not accessible or less accessible to the conscious mind, but may be recalled later. According to some findings it may be present at a subliminal level and a memory of it may be recalled during hypnosis. Hilgard (1986) called this subliminal level “the hidden observer”. The “hidden observer” represents a dissociated conscious state. Some cases are reported where under hypnosis, a patient (his “hidden observer”) was able to remember on pain and described the course of an operation performed under anesthesia of which he had no conscious memory. In many of these reported cases the hidden observer described the experience of pain in such a way as if it were experienced by somebody else (Chertok, Michaux, & Droin, 1977; Nogrady,

McConkey, Laurence, & Perry, 1983; Wolfe & Millet, 1960). This phenomenon was confirmed also by Lewinson (1967) and Cheek (1959, 1964, 1966), who confirmed these findings also when anesthesia was induced pharmacologically.

Researchers dealing with perceiving pain without conscious experiencing of it, due to hypnosis or in cases such as after prefrontal lobectomy, defined two levels of pain phenomena. First represents informational dimension called “sensory pain” and second concerning the experiencing of it is called “suffering pain” (Chertok, Michaux, & Droin, 1977; Melzack & Cassey, 1968).

It is necessary to mention criticism regarding the concept of hidden observer. It has been criticized due to that it can be shaped by situational demand characteristics (Spanos & McLean, 1986; Lynn, Maré, Kvaal, Segal & Sivec, 1994). The view that hidden observer reports can be merely the by products of suggestion recently is not shared above all by ego-state therapist who mean that hidden observers and ego states reflect true latent aspects of the personality (Watkins, 1993; Lynn, Maré, Kvaal, Segal & Sivec, 1994)

Pain and dissociation

Similar modulation of pain as due to hypnosis is also present in the cases of traumatic dissociation. Dissociation is defined as a disturbance or alteration of normal integrated functions of consciousness, memory or identity and leads also to characteristic somatoform changes that represent alterations in sensation of pain (analgesia, kinesthetic anesthesia) or some painful symptoms. Other somatoform symptoms are alterations of perception, motor inhibition, loss of motor control, gastrointestinal symptoms and other (Nijenhuis et al., 1996, 1997; van der Hart & Friedman, 1989; Spiegel & Cardena, 1991). Dissociation on the psychic level emerges such as memory losses, fragmentation of knowledge of the self and experience, splitting of emotional and/or cognitive aspects of experiences, numbing of affect,

psychological escape from unpleasant stimuli, trance-like states, increased suggestibility and greater hypnotizability (Putnam, 1989; Hall & Powell, 2000). Dissociation is mainly induced due to a traumatic event. Most often this event represents exposition of a trauma in childhood due to physical or sexual abuse with following development of symptoms often after many years. Dissociative symptoms also occur due to traumatic events such as accidents, nature calamities or other. Characteristic features of psychic dissociative symptoms are changes in notion of own identity as depersonalization or in serious cases multiple personality disorder. Another experienced symptoms represent changes in notion of external world such as derealization, hallucinations or changes of memory, for example psychogenic amnesia or multiple personality disorder (Spiegel & Cardena, 1991).

Relationship between dissociation and pain threshold is well documented in many studies and those effects similar to modulation of pain in hypnosis due to traumatic dissociation are also present (the so-called hypnoid states). There is well documented that individuals who are victims of trauma are unable to register pain (for example during self-injury) or painful affects (Butler, Duran, Jasiukaitis, Koopman & Spiegel, 1996; Frankel, 1996; Agargun, Tekeoglu, Kara, Adak, Ercan, 1998; Ebrinc, 2002; Trief, 1996; Saxe, Chawla & van der Kolk, 2002; Russr, Shearin, Clarkin, Harrison & Hull, 1993; Orbach, Mikulincer, King, Cohen & Stein, 1997). Patients with dissociative disorders frequently report amnesia for self-injury (Saxe, Chawla & van der Kolk, 2002; Putnam, 1989). This is due to profound changes in affect state, memory and sense of identity in response to environmental stress injury (Saxe, Chawla & van der Kolk, 2002). It leads similarly as in hypnosis to the lack of the self-representation or self-concept that is coupled to phenomena of dissociated or divided consciousness.

According to Helen Watkins (1993) these dissociated self-representations ego states and hidden observers represent organized cognitive structural system of segments of the personality often similar true multiple personalities. These dissociated self-representations

were also observed in normal people in hypnosis (Watkins & Watkins, 1979-80; Bowers & Brecher, 1955; Watkins, 1993; Lynn, Maré, Kvaal, Segal & Sivec, 1994; Merskey, 1992; Rickeport, 1992; Barret, 1995, 1996).

In the cases of multiple personality often occurs similar entity as hidden observer called internal self-helper. It has knowledge of other personalities dissolved by amnesic barrier and knows their organization and relationships. In many cases it becomes the center of the treatment for the integration of the personality (Alison, 1974; Salley, 1988; Gabel, 1989).

Hidden observer in hypnosis is able to recover traumatic and painful accidents and has important clinical utility (Watkins & Watkins, 1979-80; Watkins, 1993; Lynn, Maré, Kvaal, Segal & Sivec, 1994; Salley, 1988). Dissociated subpersonalities were also found in both parallel levels in dreams and corresponding spontaneous or hypnotically induced alterations with significant therapeutic effect (Salley, 1988; Brenner, 1996, 1999, 2001; Barret, 1994, 1995, 1996).

Subliminal perception and information processing

Possibility to recall the unconsciously experienced pain information is based on general postulate that information in the CNS may be processed also without consciousness. It corresponds to many findings, which study subliminal perception and information processing (Kihlstrom, 1987; Shevrin, 2001).

For example, already in 1957 an interesting experiment was performed which led to the restriction of subliminal suggestion in advertising. During a movie presentation two verbal messages were projected for a very short time: "Drink Coca-Cola" and "Eat popcorn". It, according to results, increased the sale of popcorn approximately 58% and in the case of Coca-Cola approximately 18% (Wortman, Loftus, & Marshall, 1992).

Further findings about subliminal processes come also from the field of neurophysiological study of the dynamic and cognitive unconscious and show complexity of information processing without awareness. It is concentrated mainly on the study of the dynamic unconscious connected with emotional conflict. The subliminal stimulation in the form of two different subliminally presented pictures, for example in phobic patients, leads to the distinguishing of these different subliminally presented pictures, one which is connected to the inner conflict (for example picture of a well-known person evoking phobia) and the other which is not associated with the conflict, without any conscious activity of the patient. By measuring changes in skin resistance it was shown that the neutral stimulus does not lead to any observable changes but the picture associated with the phobia results in a measurable response (Poetzl, 1960).

The phenomenon of subliminal stimulation was also studied by analyzing Event Related Potentials (ERP) using P3 (also called P300) wave, which is positive wave with latency 300 ms, after presentation of a stimulus. These studies performed on emotionally disturbed patients show that the P3 wave reflects the neurophysiological changes associated with the subliminal stimulant connected with the emotional conflict (Wong, Shevrin, & Williams, 1994). Additionally, the P3 wave was able to demonstrate that the prosopagnostic patient could distinguish (albeit unconsciously) between familiar and unknown faces (Reanault, Signoret, Debrulle, Breton, & Bolgert, 1989).

Surprising findings similar to above-mentioned findings in hypnosis are in the study of Kotchoubey et al. (Kotchoubey, Lang, Bostanov, & Birbaumer, 2002). According to them there is evidence from ERP “that many patients diagnosed as coma . . . are able to perceive and process various aspects of their environment, including, in some cases, also semantic elements of human speech.”

Conclusion

The experience of pain in connection with hypnosis, traumatic dissociation and subliminal processes seems to be very interesting for the neurophysiological study of consciousness. Main results at this time show that perceiving pain or other stimuli from an environment may influence information processing in the CNS without awareness however principally it may be recalled later. There is evidence from psychological and psychiatric findings that consciousness is divided (dissociated) into many levels, and those effects similar to modulation of pain in hypnosis due to traumatic dissociation are also present (Butler, Duran, Jasiukaitis, Koopman, & Spiegel, 1996; Frankel, 1996; Agargun, Tekeoglu, Kara, Adak, Ercan, 1998). On the other hand cognitive modulation of pain in hypnosis or due to trauma may leads to hypnotic dissociative state similar to state dependent learning (van der Kolk & van der Hart, 1989; Braun, 1984).

According to Craig (2002) is identification of an entire neural system conceptualized as a representation of the physiological condition of the material body. These multiple re-representations of this interoceptive image include also pain stimuli (Craig, 2001) and pain is a specific somatic distress signal that is integrated within the contexts of current physiological and environmental conditions and past experience.

These findings signify the cortical representation of feelings from the body as the probable basis for human awareness of the physical self as a feeling entity. This association provides a fundamental framework for the involvement of these feelings with emotion, mood, motivation and consciousness. From this point of view degrees of conscious awareness are related to successive upgrades in the self-representational maps (Craig, 2002).

The nature of human consciousness from these findings loses its simplistic character. The subliminal self-representation called “hidden observer” and subliminal perception represent very interesting and complex phenomenon for further study of unconscious metacognitive

processes (Koriat & Levy-Sadot, 2000). Resolving of these problems seems to be necessary for further convergency of neurophysiology and psychology.

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