PAIN, DISSOCIATION AND POSTTRAUMATIC GROWTH

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Abstract

Painful experience involving psychological and physical dimension is most frequently understood as a dangerous signal from physical and social environment. In this context recent psychological research in posttraumatic growth strongly suggests that pain in its consequences must not be only hurtful experience as such but may have a unique psychological dimension for human development and growth. Acceptation of pain experience as not only negative sheds new light to this problem and has important consequences for psychotherapy as a unique opportunity to resolve psychological conflict and intensive inner suffering. These findings are particularly important for human growth and spirituality, and are in contrast to hedonic aspect of our culture that tend to ignore painful experience as a part of human life that can uncover real meaning of personal existence and self-reflection as an essential principle for learning and creative process of understanding.

Key words: Pain; Dissociation; Hidden Observer; Subliminal consciousness

INTRODUCTION

According to recent evidence, neurophysiological processes coupled to pain are closely related to the mechanisms of consciousness. This evidence is in accordance with findings that changes in states of consciousness during hypnosis or traumatic dissociation strongly affect conscious perception and experience of pain, and markedly influence brain functions (Bob, 2008). Modern advances in the study of pain show that processing of feeling pain is based on widely distributed processing in the brain and closely related to mechanisms of consciousness (Coghill, Sang, Maisog, & Iadarola, 1999; Bob, 2008). Pain represents extreme negative emotion that is connected to many levels of psychophysiological processes. 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. It necessary leads to distinguishing of pain and nociception because there is a lack of absolute correspondence between pain and tissue damage (Eccleston & Crombez, 1999; Chapman & Nakamura, 1999; Bob, 2008).

Pain is related to consciousness and at this time is known that it may be modulated by cognition (Bob,

2008). There are many pharmacological mechanisms in modulation of pain as well as cognitive mechanisms such as attentiveness, emotional context, individual attitudes or personal expectations that are able to influence experience of pain. These modulatory mechanisms can lead to an analgesic or an anesthetic effect and alter the perception and transmission of pain. Important attribute represents also a way of cognition and perceiving environment that substantially changes experience of pain. The main cognitive factors that influence the modulation of pain represent attention and emotion (Coghill, Sang, Maisog, & Iadarola, 1999; Eccleston & Crombez, 1999; Villemure & Bushnell, 2002; Bob, 2008). A number of reports show that pain is perceived as less intense when individuals draw their attention away from the pain and other studies show that focusing on pain enhances pain perception. At this time there is important evidence in humans and non-human primates that the responsiveness of neurons in primary somatosensory cortices to non-painful as well as painful stimuli is altered by the degree of attention. These data correspond to psychological findings about analgesia or anesthesia induced by hypnosis, the effectiveness of which also varies with attention (Coghill, Sang, Maisog, & Iadarola, 1999; Villemure & Bushnell, 2002; Eccleston & Crombez, 1999; Petrovic & Ingvar, 2002; Bob, 2008).

On the other hand findings about emotional modulation of pain suggest that emotional manipulations alter the

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subjective perception more than the objective sensing of pain (while attention alters both pain sensation and unpleasantness) and it suggests that different modulatory circuits are involved in the emotional modulatory mechanisms in comparison to the attentional modulatory mechanisms (Villemure & Bushnell, 2002; Bob, 2008). The neural substrate regarding attentional modulation of pain is only partially known and it most likely involves various levels of the CNS (Coghill, Sang, Maisog, & Iadarola, 1999; Villemure & Bushnell, 2002; Eccleston & Crombez, 1999; Bob, 2008).

Recent concepts of attentional modulation are closely related to information processing models that consider attention as a filter, as a resource, and as a mechanism for selection of action (Eccleston & Crombez, 1999). From this point of view pain is understood as warning of danger to an organism from natural or social environment and it interrupts, distracts, and demands attention (Eccleston & Crombez, 1999; Bob, 2008). It implicates wider conception of psychological pain where "nociception" represents traumatic stimuli from social environment, for empirical example see (Singer et al., 2004). At this point it is reasonable to hypothesize that novel painful stimuli will also elicit an attentional shift, particularly after pain onset (Eccleston & Crombez, 1999; Bob, 2008). 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 and that high hypnotizables have a more efficient far fronto-limbic attention system (Crawford, 1994; Eccleston & Crombez, 1999; Bob, 2008).

Recent findings indicate that modulation of attention in hypnotic states is coupled to the global changes in subjective experience and markedly influences regulation and monitoring body and mental state of hypnotized subjects and constitutes awareness and experiencing of the self. These alterations in "self-representation" that underly the changes in subjective experience provide 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, Duncan, Price, Carrier, & Bushnell, 1997; Rainville, Hofbauer, Bushnell, Duncan, & Price, 2002; Metzinger, 2000; Bob, 2008). Hypnotic lack of the self-representation or self-concept leads to the phenomenon of dissociated or divided consciousness (Crawford, 1994; Hilgard, 1986).

HYPNOSIS, PAIN AND CONSCIOUSNESS

Hypnotic alteration of consciousness is a suitable method for cognitive modulation of pain experience and

modulates activity in brain structures involved in the regulation of consciousness and enables to perform analgesia or anesthesia 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 (Chertok, Michaux, & Droin, 1977; Nogrady, McConkey, Laurence, & Perry, 1983; Wolfe & Millet, 1960; Hilgard, 1986). Hilgard (1986) called this subliminal level "the hidden observer". The "hidden observer" manifests as a dissociated conscious state that represents cognitive dimension divided from subject awareness. 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 these reported cases the hidden observer described the experience of pain in such a way as would be experienced by somebody else (Chertok, Michaux, & Droin, 1977; Nogrady, McConkey, Laurence, & Perry, 1983; Wolfe & Millet, 1960). This phenomenon was confirmed also by Levinson (1967) and Cheek (1959, 1964a,b, 1966) also in cases when anesthesia was induced pharmacologically. Similar data to above-mentioned findings in hypnosis reported also several studies of Event Related Potentials in coma (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" (Kotchoubey, Lang, Bostanov, & Birbaumer, 2002).

According to Helen Watkins (1993) these dissociated self-representations emerging as hidden observers represent organized cognitive structural system of segments of the personality (Watkins & Watkins, 1979-80; Bowers & Brecher, 1955; Watkins, 1993; Lynn, Maré, Kvaal, Segal & Sivec, 1994; Merskey, 1992; Rickeport, 1992; Barret, 1995, 1996). Several data also suggest that in the cases of multiple personality often occurs similar entity as hidden observer called internal self-helper that 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; Putnam, 1989; Saley, 1988; Gabel, 1989; Bob, 2004) and similarly as the 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). Although the evidence of the hidden observer is controversial (Lynn, Maré, Kvaal, Segal & Sivec, 1994; Kirsch & Lynn, 1998), these findings influenced the interest about the study of perceiving pain without conscious experiencing of it that was observed also in patients after prefrontal lobectomy (Chertok, Michaux, & Droin, 1977; Melzack & Cassey, 1968). It led to definition of 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). These definitions implicate two levels in the processing of pain stimuli, first that is accessible to subject awareness and the second which is not and exist on the subliminal level. The concept of subliminal pain presents important topic for psychotherapy in the general context of unconscious phenomena based on general postulate that information in the CNS may be processed also without consciousness that is in agreement many findings which study subliminal perception (or perception without awareness) and information processing (Kihlstrom, 1987; Shevrin, 2001; Crick & Koch, 1995; Fernandez-Duque 2003; Marcel 1983; Merikle et al. 2001; Kihlstrom 1987, 2004; Shevrin 2001; Smith & Bulman-Fleming 2004; Summerfield et al. 2002; Rees 2001; Rees et al. 2002).

PSYCHOLOGICAL PAIN, DISSOCIATION AND POSTTRAUMATIC GROWTH

According to recent findings pain is understood also as a psychological phenomenon, which is in accordance with concept of psychological pain where "nociception" represents traumatic stimuli from social environment even without direct or potential nociceptive stimulation. Although predominant view of international pain research community is that it does not distinguish between physical and emotional pain and regards these as metaphors, this view is not always sufficient in psychology and psychiatry. In psychological and psychiatric theory and practice we can find various cases of painful experiences, which do not confirm the definition that pain is 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). A common phenomenon in psychological and psychiatric practice is a subjective pain experience caused by conditions related to goal directed behavior, social loss or frustration, which do not represent any direct potential tissue damage or threatening life situations. In this context, recent findings suggest that psychological pain related to social exclusion, social loss and empathy causes activation of certain human brain areas activated also during physical pain (Panksepp, 2003; Eisenberg, Lieberman, & Williams, 2003; Eisenberg & Lieberman, 2004; Singer et al.,

2004). In this context research of pain experience in connection with hypnosis, traumatic dissociation and subliminal processes provides important data for the study of consciousness with important consequences for psychotherapy. In these conditions dissociative state acts as a defense mechanism that raises pain threshold due to intended hypnotic modulation or threatened life situation that induce dissociation (Butler, Duran, Jasiukaitis, Koopman, & Spiegel, 1996; Frankel, 1996; Agargun, Tekeoglu, Kara, Adak, Ercan, 1998). From this point of view the hidden observer reflects the fact that dissociation between dominant conscious state and other states is not complete and there is meta-interpreter level which reflects different levels of interpretation and creates the base for integrity of consciousness. This is in accordance with understanding of consciousness as a gateway to brain integration that enables access between otherwise separated neuronal functions (Baars, 2002). This hypothesis also corresponds to known clinical evidence which shows that awareness, understanding and acceptance of the experienced traumatic event are able to treat dissociative symptoms and enables integration of dissociated painful memories.

These findings suggest that experience of pain is particularly important for human growth and spirituality that may be in contrast to hedonic aspect of our culture that tend to ignore painful experience as a part of human life. Recent research findings in posttraumatic growth strongly indicate that experience of pain can help to uncover real meaning of personal existence and that the self-reflection is an essential principle for the process of learning and creative understanding. In this context, in psychology and psychiatry is a long tradition to study the response to traumatic stress and its resolution that can enable positive personal changes although personal distress and growth may be coexisting (Yalom & Lieberman, 1991; Cadell, Regehr, & Hemsworth, 2003; Tedeschi & Calhoun, 1996, 2004; Zoellner & Maercker, 2006). These positive changes often include improved relationships, new life possibilities, a greater appreciation of life and spiritual development. Posttraumatic growth have been reported in various conditions such as in people who experienced bereavement, cancer, HIV, heart attacks, rheumatoid arthritis, bone marrow transplantation, sexual abuse or combat and transportation accidents (Tedeschi & Calhoun, 1996, 2004; Calhoun, & Tedeschi, 2004; Zoellner & Maercker, 2006). These data show that individuals who are facing to a trauma are more frequently cognitively engaged with fundamental existential questions about death and the purpose of life and a commonly reported change is ability of the individual to value the smaller things in life with frequent interest in spiritual growth, philosophy and religion (Tedeschi & Calhoun, 2004). More comprehensive study on the posttraumatic growth perspectives is therefore very useful for psychotherapy and stress manage-

ment, and potentially presents important part of various clinical and research programs that can help in self-reflection and deeper understanding of the human mind.

CONCLUSION

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 it may be recalled later (Chertok, Michaux, & Droin, 1977; Nogrady, McConkey, Laurence, & Perry, 1983; Wolfe & Millet, 1960; Hilgard, 1986; Bob, 2008). These dissociated states are related to multiple representations of the interoceptive images of the physiological condition of the material body that include also pain stimuli. Pain from this point of view represents a specific somatic distress signal that is integrated within the contexts of current physiological and environmental conditions and past experience and it suggests wider concept of pain as psychological phenomenon. 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 and degrees of conscious awareness that are related to successive upgrades in the self-representational maps (Craig, 2001, 2002). These self-representational maps correspond to discrete behavioral states (Putnam, 1997) that provide alternative perspective for the understanding of dissociation. Fundamental features of a system of discrete states of consciousness are different state-dependent behaviors in response to the same stimulus. Transition between behavioral states is manifested as "switch" that represents abrupt change in the values of the constellation of state defining variables, for example transition from waking to sleeping or in bipolar illness from mania to depression. This model defines "pathological dissociation" as a trauma induced discrete behavioral states that are widely separated in multidimensional state space from normal states of consciousness and it corresponds to conventional definition of dissociation, which emphasize the separation or segregation of specific ideas or affects from normal mental phenomena. When two types of states are significantly different, then the states are separated by a wide gap in state space that determines pathological dissociative states (Putnam, 1997). Manifestations of discrete behavioral states are limited by self-representational capacities that present some of the mind-brain's inner states as states of its body or identity, while other signals are interpreted as perceptions of the external and internal world. The brain during perceptual processing drive what will be perceived as supraliminal external conscious stimulus and what will be an inner state of the brain and mind on subliminal level. From this point of view dissociated states

due to hypnosis or pathological dissociation are induced by lowering the conscious psychic content beneath the threshold of consciousness (Bob, 2003) as a consequence of attentional and emotional modulation that represent instruments of dissociative mechanism of the brain and mind that drive what will be conscious or not. It means that our understanding of external world is limited by our own capabilities to know our-selves. In this context main criteria for psychotherapy are self-awareness and self-understanding that mediates empathy and can help to uncover the real meaning of life and personal existence.

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REFERENCES

- Agargun, M.Y.; Tekeoglu, I.; Kara, H.; Adak, B.; Ercan, M. (1998). Hypnotizability, pain threshold, and dissociative experiences. *Biological Psychiatry*, 44, 66-71.
- Alison, R.B., A new treatment approach for multiple personalities. *American Journal of Clinical Hypnosis*, 17, 15-32.
- Baars, B. J. (2002). The conscious access hypothesis: origins and recent evidence. *Trends in Cognitive Sciences*, 6, 47-52.
- Barret, D. (1995). The dream character as prototype for the multiple personality alter. *Dissociation*, 8, 66-68.
- Barret, D. (1996). Dreams in Multiple Personality Disorder. In D. Barret (Ed.), *Trauma and dreams* (pp. 68-81). Harvard University Press.
- Bob, P. (2003). Subliminal processes, dissociation and the 'I'. *Journal of Analytical Psychology*, 48, 307-316.
- Bob, P. (2004). Dissociative processes, multiple personality and dream functions. *American Journal of Psychotherapy*, 58, 139-149.
- Bob, P. (2008). Pain, dissociation and subliminal self-representations. *Consciousness and Cognition*, 17, 355-369.
- Bowers, M.K. & Brecher, S. (1955). The emergence of multiple personalities in the course of hypnotic investigation. *International Journal of Clinical and Experimental Hypnosis*, 3, 188-199.
- Butler, L.D., Duran, R.E.F., Jasiukaitis, P., Koopman, Ch. & Spiegel, D. (1996). Hypnotizability and Traumatic Experience: A Diathesis-Stress Model of Dissociative Symptomatology. *American Journal of Psychiatry*, 153, 42-63, (Suppl.).
- Cadell, S., Regehr, C., Hemsworth, D. (2003). Factors contributing to posttraumatic growth: a proposed structural equation model. *American Journal of Orthopsychiatry*, 73, 279-287.
- Calhoun, L.G., & Tedeschi, R.G. (2004). The foundations of posttraumatic growth: New considerations. *Psychological Inquiry*, 15, 93-102.
- Chapman, C. R., & Nakamura, Y. (1999). A passion of the soul: an introduction to pain for consciousness researchers. *Consciousness and Cognition*, 8, 391-422.
- Cheek, D. B. (1959). Unconscious perception of meaningful sounds during surgical anesthesia as revealed under hypnosis. *American Journal of Clinical Hypnosis*, 7, 55-59.

- Cheek, D. B. (1964a). Surgical memory and reaction to careless conversation. *American Journal of Clinical Hypnosis*, 6, 237-40.
- Cheek, D. B. (1964b). Further evidence of persistence of hearing under chemo-anesthesia: detailed case report. *American Journal of Clinical Hypnosis*, 7, 55-59.
- Cheek, D. B. (1966). The meaning of continued hearing sense under general chemo-anesthesia: A progress report and report of a case. *American Journal of Clinical Hypnosis*, 8, 275-280.
- Chertok, L., Michaux, D., & Droin, M.C. (1977). Dynamics of Hypnotic Analgesia: Some New Data. *Journal of Nervous and Mental Disease*, 164, 88-96.
- Coghill, R.C., Sang, C.N., Maisog, J.M. & Iadarola, M.J. (1999). Pain intensity processing within the human brain: a bilateral, distributed mechanism. *Journal of Neurophysiology*, 82, 1934-1943.
- Craig, A.D. (2001). The Neural Representations of the Physiological Condition of the Body: Pain as an Aspect of Homeostasis. *Journal of Physiology*, 536, 93.
- Craig, A.D. (2002). How do you feel? Interoception: the sense of the physiological condition of the body. *Nature Reviews. Neuroscience*, 3, 655-666.
- Crawford, H.J. (1994). Brain Dynamics and Hypnosis. *International Journal of Clinical and Experimental Hypnosis*, 42, 204-232.
- Crick, F. & Koch, C. (1995). Are We Aware of Neural Activity in Primary Visual Cortex? *Nature*, 11, 121-123.
- Eccleston, C. & Crombez, G. (1999). Pain demands attention: A cognitive-affective model of the interruptive function of pain. *Psychological Bulletin*, 125, 356-366.
- Eisenberg, N.I., Lieberman, M.D., & Williams, K.D. (2003). Does rejection hurt: an fMRI study of social exclusion. *Science*, 302, 290-292.
- Eisenberg, N.I. & Lieberman, M.D. (2004). Why rejection hurts: a common neural alarm system for physical and social pain. *Trends in Cognitive Sciences*, 8, 294-300.
- Frankel, F.H. (1996). Dissociation: The Clinical Realities. *American Journal of Psychiatry*, 153 (Suppl.), 64-70.
- Fernandez-Duque, D., Grossi, G., Thornton, I.M., & Seville, H.J. (2003). Representation of Change: Separate Electrophysiological Markers of Attention, Awareness, and Implicite Processing. *Journal of Cognitive Neuroscience*, 15, 491-507.
- Gabel, S. (1989). Dreams as a Possible Reflection of Dissociated Self-Monitoring System. *Journal of Nervous and Mental Disease*, 177, 560-568.
- Hilgard, E.R. (1986). *Divided Consciousness. Multiple Control in Human Thought and action*. New York: Wiley.
- International Association for the Study of Pain Task Force on Taxonomy (1994). *Classification of chronic pain: Descriptions of chronic pain syndromes and definitions of pain terms*. Seattle: IASP Press.
- Kihlstrom, J.F. (1987). The Cognitive Unconscious. *Science*, 237, 1445-1452.
- Kihlstrom, J.F. (2004). Availability, accessibility, and subliminal perception. *Consciousness and Cognition*, 13, 92-100.
- Kirsch, I., & Lynn, S. J. (1998). Dissociation theories of hypnosis. *Psychological Bulletin*, 123, 100-115.
- Kotchoubey, B., Lang, S., Bostanov V., & Birbaumer N. (2002). Is there a Mind? Electrophysiology of Unconscious Patients. *News in Physiological Sciences*, 17, 38-42.
- Levinson, B.W. (1967). States of awareness during general anesthesia. In J. Lassner (Ed.) *Hypnosis and psychosomatic medicine*. Proceedings of the International Congress for Hypnosis and Psychosomatic Medicine, (pp. 200-207). New York: Springer.
- Lynn, S.J., Maré, C., Kvaal, S., Segal, D., & Sivec, H. (1994). The Hidden Observer, Hypnotic dreams, and Age regression: Clinical Implications. *American Journal of Clinical Hypnosis*, 37, 130-142.
- Marcel, A.J. (1983). Conscious and Unconscious Perception: An Approach to the Relations Between Phenomenal Experience and Perceptual Processes. *Cognitive Psychology*, 15, 238-300.
- Melzack, R. & Casey, K.L. (1968). Sensory, motivational and central control mechanisms of pain: A new conceptual model. In D. Kanshelo (ed.) *The Skin Senses*, (pp. 423-439). Springfield: Charles C. Thomas.
- Merikle, P. M., Smilek, D., & Eastwood, J. D. (2001). Perception without awareness: perspectives from cognitive psychology. *Cognition*, 79, 115-134.
- Merskey, H. (1992). The manufacture of personalities. The production of multiple personality disorders. *British Journal of Psychiatry*, 160, 327-40.
- Metzinger, T. (2000). The subjectivity of subjective experience: A representationalist analysis of the first person perspective. In T. Metzinger (Ed.), *Neural Correlates of Consciousness: Empirical and Conceptual Questions* (pp. 285-306). Cambridge: MIT Press.
- Nogrady, H., McConkey, K.M., Laurence, J.R. & Perry, C. (1983). Dissociation, Duality and Demand Characteristics in Hypnosis. *Journal of Abnormal Psychology*, 90, 334-344.
- Panksepp, J. (2003). Feeling the pain of social loss. *Science*, 302, 237-239.
- Petrovic, P., & Ingvar, M. (2002). Imaging cognitive modulation of pain processing. *Pain*, 95, 1-5.
- Putnam, F.W. (1989). *Diagnosis and Treatment Multiple Personality Disorder*. New York, London : The Guilford Press.
- Putnam, F. (1997). *Dissociation in Children and adolescents. A developmental Perspective*. London, New York: The Guilford Press.
- Rainville, P., Duncan, G.H., Price, D.D., Carrier, B. & Bushnell, M.C. (1997). Pain affect encoded in human anterior cingulate but not somatosensory cortex. *Science*, 277, 968-971.
- Rainville, P., Hofbauer, R.K., Bushnell, M.C., Duncan, G.H. & Price, D.D. (2002). Hypnosis Modulates Activity in Brain Structures Involved in the Regulation of Consciousness. *Journal of Cognitive Neuroscience*, 14, 887-901.
- Rees, G. (2001). Neuroimaging of visual awareness in patients and normal subjects. *Current Opinion in Neurobiology*, 11, 150-156.
- Rees, G., Kreiman, G., & Koch, C. (2002). Neural correlates of consciousness in humans. *Nature Reviews. Neuroscience*, 3, 261-270.
- Rickeport, M.M. (1992). The interface between multiple personality, spirit mediumship and hypnosis. *American Journal of Clinical Hypnosis*, 34, 168-77.
- Salley, R. D. (1988). Subpersonalities with dreaming functions in a patient with multiple personalities. *Journal of Nervous and Mental Disease*, 176, 112-115.
- Shevrin, H. (2001). Event-related markers of unconscious processes. *International Journal of Psychophysiology*, 42, 209-218.
- Singer, T., Seymour, B., O'Doherty, J., Kaube, H., Dolan, R.J., Frith, C.D. (2004). Empathy for pain involves the af-

- fective but not sensory components of pain. *Science*, 303, 1157-62.
- Smith, S.D., Bulman-Fleming, M.B. (2004). A hemispheric asymmetry for the unconscious perception of emotion. *Brain and Cognition*, 55, 452-7.
- Summerfield, C., Jack, A.I., & Burgess, A.P. (2002). Induced gamma activity is associated with conscious awareness of pattern masked nouns. *International Journal of Psychophysiology*, 44, 93-100.
- Tedeschi, R.G. & Calhoun, L.G. (1996). The Posttraumatic Growth Inventory: measuring the positive legacy of trauma. *Journal of Traumatic Stress*, 9, 455-471.
- Tedeschi, R.G. & Calhoun, L. (2004). Posttraumatic Growth: A New Perspective on Psychotraumatology. *Psychiatric Times*, 21, 58-60.
- Trief, P.M. (1996). Childhood Abuse and Chronic Pain. Observations from Clinical Practice. *Journal of Interpersonal Violence*, 11, 599-608.
- Villemure, Ch., Bushnell, M.C. (2002). Cognitive modulation of pain: how do attention and emotion influence pain processing? *Pain*, 95, 195-199.
- Watkins, H.H. (1993). Ego-state therapy: an overview. *American Journal of Clinical Hypnosis*, 35, 232-40.
- Watkins, J.G. & Watkins, H.H. (1979-80). Ego states and hidden observers. *Journal of Altered States of Consciousness*, 5, 3-18.
- Wolfe, L.S. & Millet, J.B. (1960). Control of post-operative pain by suggestion under general anesthesia. *American Journal of Clinical Hypnosis*, 3, 109-112.
- Yalom, I.D. & Lieberman, M.A. (1991). Bereavement and heightened existential awareness. *Psychiatry*, 54, 334-345.
- Zoellner, T., & Maercker, A. (2006). Posttraumatic growth in clinical psychology - a critical review and introduction of a two component model. *Clinical Psychology Review*, 26, 626-53.