Usefulness of embodiment in psychotherapy: Dramatherapy applies neuroscience's knowledge about somatic memories

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Director**Abstract**

The usefulness of embodiment in psychotherapy: Dramatherapy applies

Neuroscience's understanding of somatic memories

Kathleen OLIVIER

Somatic psychotherapists intuitively facilitate therapeutic changes with physical, embodied methods. Meanwhile, Neuroscience's research has been making discoveries about the neuronal systems that could help explain and guide these intuitive approaches. It is demonstrated that a large part of memories is stored into those somatic/emotional memories and therefore not accessible in verbal therapy. This research paper presents the current knowledge about the different cognitive, sensory, memory and emotive systems and specifically how they interact. It is such interaction that makes sensory psychotherapeutic approaches particularly efficient in working through somatic/emotional memories.

Psychodrama is presented as a method facilitating the integration of somatic/emotional memories with a cognitive process. Dramatherapy is introduced as a method that enables somatic/emotional changes and thus changes in meaning at a level of consciousness independent of cognitive processing. Case examples of both Psychodrama and Dramatherapy are presented and hypotheses are made about the potential neurobiological changes underlying the psychotherapeutic experiences. There are concrete explanations, based on knowledge derived from neural science, as to how and why Dramatherapy works to promote healing.

Résumé

L'utilité de la *mise en corps* en psychothérapie: la Dramathérapie met en application les connaissances en neurosciences sur les mémoires somatiques.

Kathleen OLIVIER

Les psychothérapies corporelles font intuitivement usage de méthodes corporelles

pour faciliter le processus de changement thérapeutique. Entre temps, les neurosciences poursuivent leurs découvertes sur les systèmes neuronaux qui participent à expliquer et guider ces approches intuitives. Il est démontré qu'une part importante des mémoires est enregistrée sous ces formes somatiques/émotionnelles et donc non accessibles en thérapie verbale. Ce mémoire présente l'état de connaissance sur les systèmes cognitifs, sensoriels, de mémoire et d'émotion et insiste sur leurs interactions. En effet, ce sont ces interactions qui rendent les approches psychothérapeutiques sensorielles particulièrement efficaces pour un travail des mémoires somatiques/émotionnelles.

Le Psychodrame est présenté comme une méthode favorisant l'intégration des mémoires corporelles/émotionnelles avec un traitement cognitif. La Dramathérapie est introduite comme une méthode qui permet ces changements corporels et donc émotionnels et ainsi des changements en terme de sens à un niveau de conscience indépendant des processus cognitifs. Des cas concrets en Psychodrame et Dramathérapie sont présentés et des hypothèses proposées pour expliquer les changements potentiels sous-jacents à ces expériences psychothérapeutiques. Il existe des explications fondées sur des connaissances en neurosciences pour expliquer comment et pourquoi la Dramathérapie fonctionne et facilite une guérison.

Acknowledgements

Writing a paper requires all sorts of support, I am glad to say I have been given more than I expected. I want to first thank Edward Hug for his intellectual presence that gave me the confidence to start writing this paper, for his common passion about connecting neuroscience with the arts and every moment of sharing on human topics. I thank Bonnie Harnden for coming with me in looking at neurosciences from our Dramatherapy perspective and for being the link with the Creative Art Therapies department. I thank Sue Jennings for her critical and constructive feedback. I thank Patricia Tassi for having given me the drive to understand the brain and its ambiguities better and I thank Andreas Arvanitogiannis for feeding my passion about neurosciences. I thank Suzy Lister for reminding me that ethics is a frame for learning not only from people but with people. I thank Yehudit Silverman for her human reassurance. I thank my mother for having accompanied me in this adventure, listened to my crazy enthusiasm and kept me going when I wanted to give up. I also thank my grand-mother, sisters, father and friends for reminding me to transform my theoretical wonders into more concrete and useful reflection. Finally I thank the people I use as examples in my paper as they give me the desire to understand humans better.

Table of Contents

Appendices

List of figures

Introduction: Connecting knowledge in neuroscience with psychotherapy

Here is the letter my former neurobiology supervisor wrote to me when I offered he gives feedback on my paper: “When I read something in neurobiology, I look at it from a scientific perspective. Dramatherapy adopts a humanistic perspective. The former perspective is extremely limited in scope whereas the latter is all-encompassing so as to be of direct relevance to the human condition. Neurobiology has not directly informed psychotherapeutic interventions simply because the state of empirically-derived knowledge is still at a rudimentary state to be of much relevance... This of course doesn't make neurobiology trivial. Alternatively, the psychotherapies are based on purely theoretical and sometimes practical considerations that have little to do with science. So you will say, isn't it about time we merge the two? I will have to read you to see how but my initial reaction is to say that this would be impossible. Not without making unjustifiably huge leaps from "little" findings to "big" assertions or hypotheses, a tactic espoused by the humanities but falling outside the limits of science.” (Arvanitogiannis, personal correspondence, 2006). I find this letter is a good description of the current desire to merge neuroscience with psychotherapy even though they are still two very separated fields.

Freud, in 1895, attempted to tie his theories about the unconscious with a ‘neurology of the mind’ in a book called “Project for a Scientific Psychology”. In fact, in the opening line in his introduction Freud wrote: "The intention is to furnish a

psychology that shall be a natural science: that is, to represent psychical processes as quantitatively determinate states of specifiable material particles, thus making those processes perspicuous and free from contradiction". Cozolino (2003) hypothesizes that the incompatibility between psychotherapy and neuroscience dates from the time when it was believed brain cells could not regenerate: this was not very compatible with the efforts therapists were putting towards an optimistic view of improvement of the person. In the seventies it was discovered that brain cells could be regenerated in the adult brain but people would not believe this discovery and took it as an artifact of the research techniques. In the nineties it was observed that there were specific parts of the brain where this regeneration was happening, specifically in areas related to memory, like the hippocampus. “Things that we do can actually affect the architecture and functioning of our brain”, stated James Vicker in his interview with Mitchell (Cozolino, 2003).

It seems natural that such learning from sciences would influence the way actors of therapy decide to orient how they practice: “When I am interacting with a client, not only do I have all these metaphors of mind and psychotherapy that I have been trained to use but I am also envisioning a brain …so it provides me another matrix of conceptualization that I use in applying different techniques” (Cozolino, 2003). Pally (1997-1998), a psychoanalyst, has written intensively on psychoanalysis and neuroscience. Several art therapists (Kaplan, 2000; Malchiodi, 2003; Menzen, 2001 as cited in Lusebrink, 2004; Jennings, 2005) have pointed out the need for creative art therapists to become familiar with the basic brain structures and functions that support art therapy expression and may direct interventions. Riley is an art therapist who says that “when the concepts of neuropsychology guide the treatment, the road

map is not hard to follow and (her) clients and (herself) travel it together (Riley, p.187, 2004). Few creative art therapy training programs actually offer teaching about the discoveries of neuroscience (exception is Israeli course at Tel Hai College). The complexity of terms used in neuroscience may contribute to a reluctance to read about it. One of my goals in this paper is to bring knowledge and appropriate vocabulary from neuroscience literature together with concrete therapy examples, allowing therapists to learn and use this knowledge. Furthermore, it is clear that practitioners in therapy intuitively (Rothshild, 2000) use approaches with an implicit understanding of the human constitution. For example, therapists intuitively feel when a client is detached from the present or when the reaction is overly strong to a given situation; they "know" how to use such clue to guide the treatment. Human experiences in psychotherapy may give the neuroscience practical examples of human functioning. The difficult complexity of linking knowledge derived from "hard" science (often done on animals in laboratories in the most precise and quantitative ways) with the more intuitive practices necessarily used with humans in psychotherapy, creates an other impediment to bridging the two fields. However the practical utility that can be derived from such collaboration of knowledge and practice makes it worthwhile to attempt a better dialogue between neuroscience and creative art therapies, specifically Dramatherapy. I hope both fields benefit from better knowing what they are and how they can complement.

I am aware many consider that approaching the human being from a neurological perspective is reductive and feel that we are "much more than a bunch of cells", as I often hear. It is a fact that understanding the human functioning is much more complex than understanding the cerebral functioning. Many other approaches are

necessary to complement this knowledge and understand the human being in all its dimensions. But neuroscience combines with social sciences, clinical psychology, cognitive psychology, philosophy and even the arts to look at the human from many points of view. Neuroscience are particularly useful to observe humans'evolution through time (in their life span or throughout generations) because with the help of new tools such as Pet scan or fMRI we can now make real observations of internal biological changes. Contrary to the belief that this approach reduces the human to a biological machine, it is actually very respectful of each human taken with its unique and individual properties. Neuroscience has been more and more able to understand each one's personality and disorders based on individual brain observations. For example, in the famous case of Phineas Gage as related on the website, a brain traumatism in the frontal lobe resulted in radical change of personality: from very kind, he became quite aggressive. This case illustrates how neurobiological areas are a site for personality traits and when anyone with a similar brain damage would have suffered similar kind of personality changes, there remain individual particularities. We will read in this paper how each brain is actually very specific in terms of recording each person's history and internal and external experiences. Hippocrates describes each of our individual moods , "pleasure, merriment, laughter and amusement, as of our grief, pain, anxiety and tears , is none other than the brain" (In De Caro & Kaplen, 2005, web). Each brain speaks about one's individual human journey from the very beginning that he appears in life. Neuroscience needs particular cases to guide the research.

Ramachandran is for me one of the greatest examples of scientific curiosity whose research is fed by human encounters, he says:

> **“**There are two problems which are sometimes confounded. One is if you reduce everything to neurons, like falling in love, or ambition, or pride, or joy, or the self - my God does that mean there’s no love? And that’s a fallacy because you know explaining something doesn’t mean you explain it away. So for example – supposing two people are making love and a crazy scientist comes along and says “look, this is just neurons in the septum and neurons in the hypothalamic nuclei, these are all the neurons that are firing away, that’s all there is to it”. And then the lover turns to his girlfriend and says “you mean that’s it, it’s just chemicals, it’s neurons firing away, you’re not really in love?” She could then argue “no, on the contrary this proves it’s all real, that I’m not faking it”. “Look, look at the pattern of activity, it shows it’s real.” (Ramachandran, as cited in Mitchell, 2005)

We are born with a neuronal luggage that was influenced by the human evolution and by our own genetic ancestors. In its first part, this research paper will describe the processes by which each individual neuronal tissue depends on the person’s experiences and how these experiences, through neuronal changes, influence the person’s perceptions and reactions to the world. Specifically, this paper will attempt to show that the large part of experiences is recorded in the form of unconscious memories but that behavior is strongly influenced by those unconscious recordings. To do so we will describe how those memories, called “*somatic or emotional memories”* in this paper, are created and act upon one’s everyday life. Such

knowledge will lead the reader to understand the importance of psychotherapeutic approaches favoring a sensory and experimental perspective. In the second part, we will refer to therapies that work with somatic emotional memories and we will expand on their clinical implications. We will describe the therapeutic process of "*corrective emotional experience*" through which a new meaning can be given to a previously difficult situation. This resumes the observable facet of the changes in emotion occurring in psychotherapy. Psychodrama and Dramatherapy will be introduced from this perspective. Finally, in the last part, examples of corrective emotional experiences supported by psychodramatic experiences will be described and the possible neurobiological (and less visible) changes occurring during those experiences will be discussed. We shall conclude with a discussion on the potential and motive for working at a metaphorical level in psychotherapy that demonstrates the specific import of Dramatherapy to foster changes. This paper emphasizes that it is necessary to focus on feeling and not only understanding to achieve change in psychotherapy. In sum, this paper presents concrete explanations, based on knowledge derived from neural science, as to how and why Dramatherapy works to promote healing.

I. Examples of Psychodrama and Dramatherapy's experiences demonstrating the use of embodiment to work with emotional memories.

The following examples are given to illustrate corrective emotional experiences (see III, 1, b) using embodiments (see III, 4, a). We shall see how the individual goes through a process of sensory and emotional changes. The four first examples describe changes observed on themselves by classmates enacting Psychodrama. Then I refer to

Dramatherapy's observations from my Dramatherapy practicum. Here are only descriptions of the experienced changes , we shall come back to these examples in part IV where I make links with the possible neurobiological changes. Pay attention to the emotional, sensory, behavioral and perceptual changes.

1) Psychodrama.

These examples are extracted from responses to an interview I gave classmates about nine months after our Psychodrama workshops ended.

Example 1. Eva.

"[…] I was at first overwhelmed with emotions as I always was in conflicts with my father. A mix of sadness and anger that I don't dare to express in front of him […] And powerless. Throughout the Psychodrama enactment, […] I took some distance from the scene. Little by little, I was able to laugh about the situation, and then to let go of this issue[…].

Example 2. Michele.

"There was a great feeling of catharsis as I played out my story and felt as if I had come to insights and conclusions inside of myself through the psychodrama. […]"

Example 3. Fanny.

“At first I was nervous. I thought about controlling what would happen. As I started to play I could not think of any defenses anymore (like controlling the situation) because I got emotionally involved right away. […] So there was anxiety in the beginning, then my actually feelings came out: shame, confusion, anger, sadness, feeling powerful and independent. After that emptiness, calm, self-love. I was exhausted!”

Example 4. Sophie.

“At the time, the moment was full of self-consciousness, so there was a hyper-vigilance. Within that was a secret enjoyment, a sort of illicit pleasure, which arose from how much the psychodrama act matched a fantasy.”

2) Dramatherapy

The two following extracts are observations of a moment of change I could observe in Dramatherapy sessions, I will present the whole contexts and make hypotheses about the neurobiological changes in part IV.

a) Lucy

[…] The roles had been distributed to enact the party and the music was chosen as well. However, at the moment we were going to start enacting the scene and asked for a review of the roles, Lucy suddenly gave a whole new distribution of roles, and a new story emerged. Lucy decided she was four years old, and the other teenagers and myself were also four. She had stated that my co-therapist would play her mother. Lucy directed the scene as follows: the kids are playing together when the mother enters and the kids hide. The mother comes in with a birthday cake and congratulates her daughter. The whole scene was improvised and everyone participated to the action […].

b) Dorothy

[…]The next time, she makes a puppet representing herself with two long braids. I ask her to place the two characters in position one comparatively to the other and she places the puppet of herself on the top of the hill and God below. I don't say anything until I ask her to make the characters behave and she clearly refers to the puppet of herself as to the God's puppet. When I make her realize she has taken the other puppet, she does not look so surprised and interchanges the characters without any comment […]

We could notice in these different examples that some changes occurred in the way the person is relating to a specific issue. This changes can be behavioral, emotional or even cognitive, all can be observed . These are changes therapy targets. We shall now try to uncover what underlines those "visible" changes, what are the hidden, biological and specifically neurobiological changes that may be occurring

during the therapeutic process.

II) Embodiment facilitates the process of working with emotional memories.

1) What is memory and how it impacts and is impacted by new experiences: memory is learning.

Memory is what places one in history and in time. To see how people who have lost their memory interact with the world is to understand memory's precious value. Memory has been described in numerous ways but can be seen as a representation of prior experience that can be reactivated for use in the present (Pally, 1998).

An interview with several specialists in the program "Gray Matters: Learning Throughout Life" (2005), gives us different scientists' points of view. Memory is the place where past experiences influence the present and the future, the combination of all what has been learned by the biological system. Reactions in the present are clearly influenced by past experiences. "Learning involves producing changes in synaptic connections of the brain (see figure 1, 2) and memory storage involves taking those changes and making them more permanent" (Kandel, 2005, as quoted in Gray Matters). When a client comes to therapy, it is with the essential belief that it is still possible to change ways to understand the world, and therefore learn a new way to respond to situations.

Learning has been the evolutionary key for survival, the inherent capability of the

living being to adapt to the environment. New and ever more efficient responses were invented to deal with events that may have otherwise led to extermination. Theories of evolution and the biological Darwinism (Darwin, 1859-1872) talk about the selection of the solution that best coped with the external danger. The living being that did not experiment, learn and register those coping skills would naturally disappear.

While learning has for a long time been considered as an activity targeting the youth, who were supposed to naturally integrate new knowledge or new ways to act, we now know that adults and seniors also learn and 'unlearn'. Gage in the "Gray Matters"' interview refers to the "nurture" part of learning that depends on physical activity, rich environment, continued stimulation and complexity. As for chronic stress, it has been recognized has having a negative impact on neurogenesis. Drugs and alcohol are certain influences too. What is known about the neurological basis of learning validates the efficiency of psychotherapy to 'teach' new ways to react (Cozolino, 2002).

a. Plasticity: description of neuronal tissues, synapses. Notion of critical period.

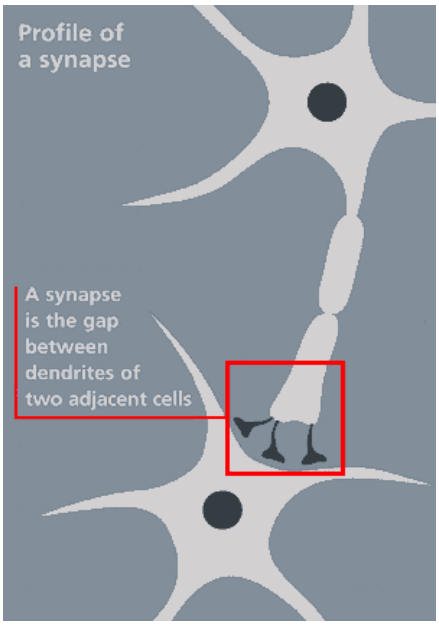
For a long time it was believed that neuronal tissues could not regenerate and that the natural process only led to a degeneration. More recently, it has been demonstrated that neuronal tissues such as axons, dendrites and synapses can regenerate and even new neurons can be created (a process called sprouting) in an adult brain (Gage, 2005, as quoted in Gray Matters; Gould, 1999). The phenomenon of biological changes that occur in the nervous system as a result of experience is

called *plasticity* and it concerns most biological tissues. Observations were made in living tissues, mainly in animals but in humans as well (Gage, 2005). Changes were observed in terms of density and width of neuronal circuitry such as dendrites and axons (see figure 1). The size of the cellular membrane (myelin) covering those circuitries was shown to widen, leading to an increased speed of conduction and therefore to an increased speed of communication. Finally in the synapses themselves, changes occur in terms of the width of the membrane and the number of neurotransmitters (see figure 2 & 3).

We discuss how plasticity in the brain remains with age. However, it is demonstrated that the younger the person is, the more malleable the neuronal tissue is (Lewis, 1992; LeDoux, 2002). There are *critical periods* when specific experiences have the most impact on neuronal tissues (Schatz, as quoted in Gray Matters, 2005). Stress has been demonstrated as having a great impact on plasticity through the mediation of the neuro-hormone cortisol. It was shown that while a low level of cortisol increases plasticity in the hippocampus, a high level of the same hormone decreases the plasticity. This is one example to explain dramatic deficits in children who experienced trauma, lack stimulation or live a deficient attachment at an age when most neuronal connections should be made.

Gage, of the Salk Institute, has made observations of the growth of neurons in the dentate gyrus, a part of the hippocampus which controls learning and short term memory—as we shall see later. This was shown in mice placed in a *enriched environment* (Hebb, 1949). An enriched environment is an environment where the individual has interactions with other pairs or constantly has to react and learn. (Black, 1990)**.** Such knowledge about cerebral tissues informs therapists that sensory stimulation that partakes to an enriched environment may actually help the tissues

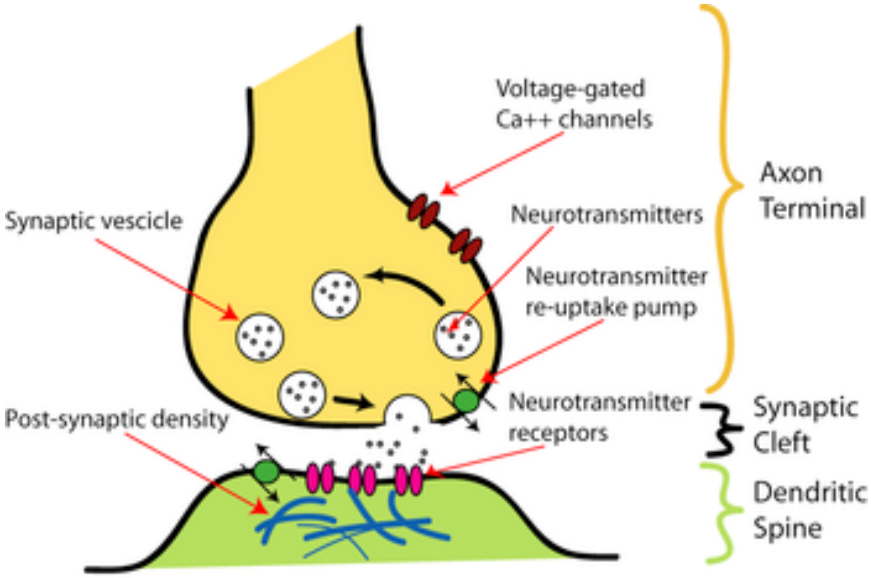
regenerate. Fuster (2003, in Lusebrink, 2005), an art therapist, alludes to the use of visual stimulation in her work with brain injured patients to facilitate neuronal plasticity.



http://www.aqr.org.uk/indepth/summer2005/synapse.gif

Figure 1. Neurones and synapses

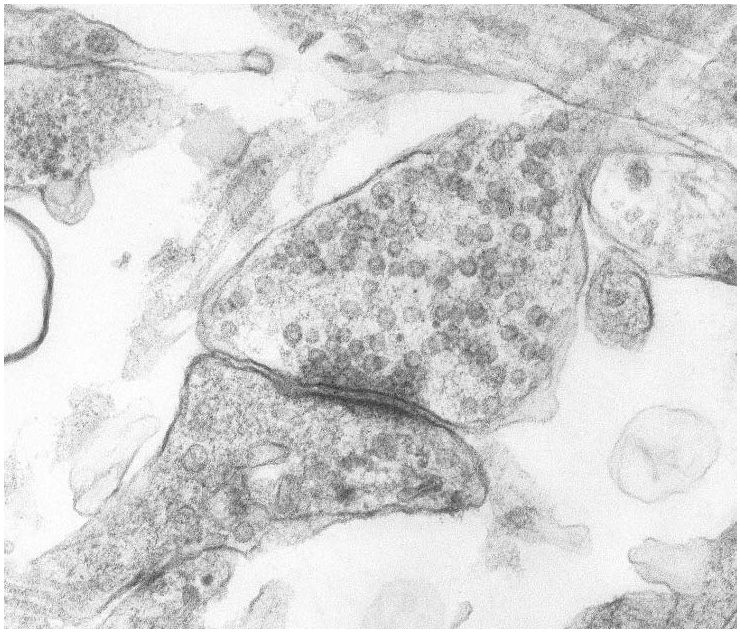
Plasticity is referring to the biological changes that occur in the neuronal tissues. Size and quantity of the circuitry (axons and dendrites) can change but new neurones can also be created. This has a direct impact on neuronal efficiency.



http://upload.wikimedia.org/wikipedia/en/thumb/4/46/SynapseIllustration.png/350pxSynapseIllustration.pg

Figure 2. Synapse and neurotransmitters

Plasticity also refers to the changes occurring inside the synapse in terms of number and types of neurotransmitters,the neuronal tissues' messengers**.**



http://www.univ-orleans.fr/neurobiologie/IMAGES/GALERIE/synapse.jpg

Figure. 3. Synaptic plasticity

Imagery enables to observe the synaptic activity and biological changes.

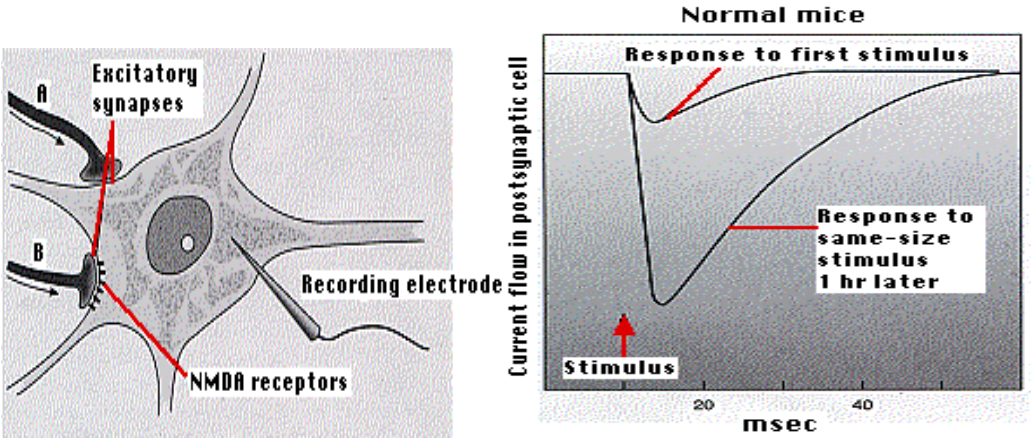
b) Short-term memory to long-term memory. Sensitization and long-term potentiation

The brain does not retain all the information that passes through it. Hopefully! Only parts of the event remain in memory for a long term. Information in short-term

memory needs to be *encoded* into a message that fits the neuronal system and then is *consolidated* to remain in long-term memory. It is Hebb who, in 1949, was aware of this important process, and Baddeley (1992) did a lot of work to understand what influences this storage. Repetition of an external stimulus is an important factor for learning, for short-term memory to become long-term memory. The process of creating some internal representation of the external world (*the memory*) depends upon the pattern, the intensity and the frequency of neuronal activity (Perry, 1995; Siegel, 1999). This process is called *sensitization (*Schizgal, S. & Arvanitogiannis, A., 2003*)*. For Perry, this is how momentary *states* become long lasting *traits* in the person. Observations of neuronal tissues show that synapses become increasingly sensitive. This means that for a constant level of pre-synaptic stimulation there is a larger post-synaptic output. It is also observed that there are additional synapses between the pre-synaptic axon and the dendrites. More receptors have been created too. These changes at a neuronal tissue level result in the alteration in pattern and quantity of neurotransmitters that are the messengers of the neuronal tissues (Sutherland, 1950). This was mainly demonstrated in the cerebellum, necessary in balance and conditioned reflexes (Toni, N. & al., 1999) and in the hippocampus, a key part in memory (Squire, L. & Kandel, E., 2000) but also in the amygdala and in other parts of the limbic system. In this way, the more a piece of information needs to be treated, the more the system is ready to treat it.

These biological changes result in behavioral changes that make the system more sensitive, more receptive to similar information (see figures 4 & 5). One can observe how sensitization to drugs in animals leads to an increased reactivity to the intake (Schizgal,S.; Arvanitogiannis, A., 2003). The neurotransmitters will impact on 2nd and 3rd messengers. Through very complex, numerous and repeated interactions,

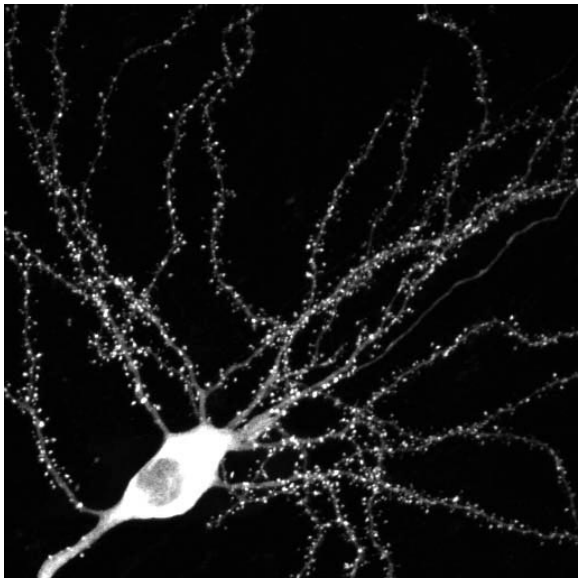
these 2nd and 3rd messengers may have an impact on gene transcription (Rodbell, 1980; Krauss, 1999). We can already appreciate how learning can become evolutionary if the genetic material is changed. But this type of change is to be considered over generations. At an observable level, it informs us why the psychotherapist needs to repeat the same intervention many times before any real change in the person can be observed. The longer a trait has been a core in a person, the longer it will take for it to change. This adaptive system becomes more sensitive to information that has been selected to be relevant on the basis of being frequently perceived: exposure to advertising is a good example. Other studies (Castellucci, 1978) demonstrate that learning does not always lead to sensitization. The system can also get used to a specific stimulus and responds less to the same level of stimulation. This *habituation* to phenomenon is what happens when we no longer perceive a sound that was upsetting to us or when a client becomes so used to a negative situation s/he does not perceive it anymore! In therapy, this points to the difficulty in creating a new learning when an entire neurobiological system has been taught to respond in a specific way to particular stimuli. This last part explains how repetition influences learning. The importance of the event and its impact on the neurobiological system will be presented in the following part.



http://users.rcn.com/jkimball.ma.ultranet/BiologyPages/N/NMDA_Rs.gif

Figure 4. Long-term memory, Long-term potentiation

Intra-cellular measures allow to observe the changes in amplitude of response to a same stimulus after numerous repetitions: it is the process of long-term potentiation involved in learning.



http://www.brain.riken.go.jp/images/b/figures/y_hayashi_l.jpg

Figure 5: synaptic changes-long-term potentiation

The use of electronic microscopes makes it possible to observe synaptic activity during long-term-potentiation, there are biological changes occurring during learning.

c) Emotions impact on memory: trauma and relationships

We just described how repetition and time are necessary for learning to occur. A one-time event can also have a definitive impact on one's memory when it is emotionally strong. This can be used to facilitate learning by giving an affective value to a topic. It is always easier for students to learn when they are personally touched.

One may unwillingly recall memories of events or facts when they are colored with some emotional atmosphere. Positive as well as negative emotions have an affective impact. Most people can recall past with most of happy moments. Lovers recall their first evening together and parents very well recall the birth of their children. However for the purpose of therapy, we shall focus on memories of difficult events that influence our present.

A traumatic event is one that has such emotional value that it definitely impacts the person. “Trauma is caused by a stressful occurrence that is outside the range of usual human experience, and that would be markedly distressing to anyone” (Ogden, 2003). According to Herman (1992), these events overwhelm the ordinary adaptation to life. Terr, in 1994, describes two types of trauma: (1) the repetition of traumatic events or (2) the exposure to a one time traumatic event that results in psychobiological effects. There is a physiological effect of a traumatic event characterized by two major neuronal adaptive responses: *hyperarousal or dissociation*. This is observed in the case of post-traumatic stress disorder (PTSD) - defined in the fourth American Psychiatry Association manual (1994)- when there is a persistent and profound alteration of stress hormones , neuronal structures, sensations and memory processing (Kolb, 1998).

Hyperarousal, is when “the event is persistently re-experienced, there is specifically a physiological reactivity on exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event” (APA). In memory terms, one symptom is hypermnesia where every detail during the trauma is recorded and precisely retrieved from a small cue: like the details of a wall, or a smell. Just thinking or dreaming about it can reactivate the trauma. We can recognize here the process of sensitization. This is an evolutionary response that allowed the system to

protect itself by becoming more sensitive to environmental cues which remind us of the original danger. This sensitization of the brain stem and midbrain may also mean the other critical physiological, cognitive, emotional and behavioral systems will become sensitized (p.9, Perry, 1995). The whole system is reactivated. In normal experience, the normal level of stimulus would lead to habituation little by little; in PTSD, there is no habituation.

If the threat continues, it may lead to *dissociation*. This is another symptom of PTSD where there is " persistent avoidance of stimuli associated with the trauma and numbing of general responsiveness" (APA). Dissociation is a reaction that allows the organism to detach from the real world so that the normal physiological, emotional or cognitive reactions do not correspond to the actual exterior stimulus anymore. There is a "feeling of detachment or estrangement from others" (APA). The reaction of the victim is to be first immobile, then dissociate and eventually faint (Ogden, 2003). These symptoms are often observed in cases of PTSD. It is understandable that the system would learn to dissociate in order to protect itself from being overwhelmed. Contrary to hypermnesia, excessive stress can also have the opposite effect on memory, causing hippocampal atrophy and impairing memory encoding- where one may completely forget the traumatic event. Chronic stress inhibits the effect of adaptive stress and results in a desensitization to external stimuli. Such learned reactions to trauma often bring a client suffering from the symptoms into therapy. The person lives as though they are removed and insensitive to the world.

The impact of a traumatic event on learning in such short a period can be used as a reverse effect and explains how psychotherapy can sometimes be efficient in a few sessions. Experimental data in human beings support the idea that values such as motivational salience influences neural selective mechanisms and modifies neuronal

structures even though the presentation is very short (Pally, 1998). Indeed, psychotherapy can have a reverse effect on a person even though the negative situation lasted for a long time if the affective value is taken into consideration. Schore (1994) describes an especially sensitive period when the infant interacts a lot with the caregiver and argues that this interaction induces sprouting (growth) of dopamine-releasing axon terminals (dopamine is an important neurotransmitter in emotion). This has an effect on the person's ability to regulate the affect state later in life. Abuse and neglect have tangible consequences on the brain development through the effect of cortisol and adrenaline (De Bellis, 1999). This also explains why relationships, and specifically close relationships that carry the most emotion, strongly influence how a person interacts with the world. Also, a child has few alternative cognitive pathways - and therefore essentially an emotional treatment. The traumatic experience - but therapy as well - has even greater impact at that early age. Relationships have such a strong impact on the neurobiological system that some authors and researchers study specifically the neurobiology of relationships (Shankoff, J.P. & Phillips, D.A., 2000). In psychotherapy, it also explains why the therapeutic relationship is one of the most influent factors in treatment.

d) Experience impacts memory

Another factor that has been recognized as important in impacting learning is the experiential factor. It has been observed that learning only intellectually is often not enough for a long-term memory to be formed and that direct experiencing has a much stronger action. In the same way that evolution required the person be able to learn how to respond to a danger with only the slightest cues, the system is made so that the

person can learn many actions without having to go through the cognitive process of understanding (see II,3,b). Once again our system knows how to save energy. A type of long-term memory called procedural memory is a long-term memory built only on experience. We are all witness to its effect. Who had to understand theories in order to ride a bicycle? Such observations can and should be transferred to education and to therapy. Llinas, (2001) describes experiences in which subjects wearing inverted lenses adapt their vision over time if they were able to walk with these lenses while the individuals who did not move with the lenses did not adapt their vision. It is interaction that modifies biological structures (Hubel, 1988). The way people learn is by moving (Van der Kolk, 2003). In rats, Kolb and Wishaw (1998) demonstrated that a complex environment, which pushed the animals to action, helped them recover much better after brain damage. Studies demonstrate that an enriched environment where the individual is stimulated to learn through experiences induces thickening of cerebral cortex that can compensate for some congenital deficits (Black, 1990).

The individual can be active, but it can be a *spect-actor* too. Indeed, it was demonstrated that visualisation has the same effect on brain activation as when the action is actually done by the person. This has been demonstrated in sport and in therapy or in social change action methods (Boal, 1994; Fox, 1994). We have to mention the existence of *mirror neurons* here (see III, 4, b & c)). These neurons are the ones involved when the person witnesses another in action (Ramachandran, 2006).

2) How the different neuronal systems interact to create memory

To better understand how the brain supports different functions, researchers have

studied animal brains. One approach is to inject substances that can be localised (after the brains are removed. and observed) in the brain locations where they were used. In humans, various imagery devices such as Pet scan, fMRI or Spect (Frith, C. & Friston, K.; 1997, Heeger & al, 2002, Kosslyn, 1999) allow observations *in vivo* of the brain's areas that are stimulated during a specific task. In so called "lesion-studies", discoveries were made by "chance" when a person suffered a specific brain injury or disease that resulted in the loss of a specific brain function (Ramachandran, 2003; Sacks, 1987). After their deaths, researchers could examine the damaged neuronal tissues to infer what areas were in charge of the lost function. Today, the trend is to study neural *systems* instead of structures (Gazzaniga, 2002). Functionally, the cerebral cortex may be seen as divided into two parts: the anterior (prefrontal and motor cortices) for executive networks and the posterior (occipital, temporal, parietal and somato-sensory cortices) for perceptual networks.

a) The cognitive system. Decision and attention.

The cognitive system is the one we are most conscious of, the one that allows us to make decisions, to select, to think. This is the system that prepares the person to act. When this area is damaged, one becomes unable to make choices. To understand cognition and decision-making processes, one often refers to attention systems. These are the systems that select the specific external and internal information to decide on the most appropriate response to a particular situation. Posner (1990, 2005), explains how attention is even involved in empathy because brain imaging demonstrates an important activity of an attentional system, the cingulate gyrus, when having to pay attention to the distress of others. In terms of treatment of the information, the left

hemisphere is mostly involved in analytical and sequential processes and the right hemisphere in intuitive and syncretistic processes (combination of information). In a normal functioning brain, there is integration of those left and right cognitive functions (Gazzaniga, Ivry and Mangun, 2002). Some researchers refer to *cognitive flexibility*, a function that accommodates multiple solutions, even mutually exclusive ones (Crawford, 1989). We can see that the cognitive system creates functions so as to be adaptive to the actual complexity of situations.

b. The sensory system

We react to the world in response to what we perceive from external and internal stimuli. We are aware of several of these sensory systems. Visual, auditory, olfactory, taste, touch and proprioceptive systems allow us to interact with the surrounding world. But our perception of the stimuli is not the exact reproduction of the outside world. All information that goes through a sensory system is connected to other neuronal systems and treated before it becomes what we actually perceive. Somatosensory information from the body travels through the dorsal column of the spine via the medulla and midbrain to a specific nucleus in the thalamus and to the primary somatosensory cortex (see figure 7). The thalamus is a relay station that receives information from different sensory systems which it relays to the corresponding projection areas in the cerebral cortex. Sensory information goes to the neo-cortex part of the brain and therefore has to go through six different sensory cortical layers. This is true for all senses except olfaction; this oldest sense goes directly to the old cortex (see II,2,b)- giving us a hint about the reasons why smells have such a directly potent effect!

According to Fuster (in Lusebrink, 2003), sensory information is processed on three hierarchical levels of perception: (1) the primary sensory cortex analyses and maps the elementary sensory features of perception, (2) the unimodal association cortex analyses associated features of complex stimuli in the given sense modality, and (3) the transmodal or multimodal association cortex integrates percepts across several sensory and non-sensory modalities (see drawing 6). Cytowic, in 1995, refers to this multimodal sense association process that can be manifested in some persons in a symptom called *synesthesia*. For example, the famous writer Nabokov would perceive colors in the shape of letters, each letter having an appropriate color. The neurobiological basis for *metaphors* is supposed to be related to the angular gyrus that connects touch, hearing and vision (Ramachandran, 2005).

Most of the perceptual information is processed unconsciously and in parallel with other processes. The sensory system treats and conveys the information, it is also where the information starts to be recognized. Somatic markers would indeed be created so that the body knows how to react when confronted with a stimuli it encountered previously. This *somatic marker hypothesis* (Bechara, A. & Damasio, H., 1997) supports a theory that was elaborated by Lange one century ago (1885-1912). A very surprising but however verified fact is that it is not because we feel an emotion that we have physiological reactions but it is because we have a physiological reaction that we feel (see II,2,c). And this physiological reaction is triggered when the sensory context retrieve the somatic markers-memory. The somatic markers affect the behavior without awareness (Bechara, 1997). The conscious part of perceptual processing is guided by selective attention, a cognitive function that determines the course of categorization. The basal ganglia and thalamus form a pathway between the motor association cortex and the somatosensory

association cortex necessary for sensory reflexes. But there are direct transcortical thalamus pathways which link sensory inputs to the frontal cortex which reprocesses information, as a supervisory system that allows cognitive treatment to adjust the reaction.

Lusebrink discusses the interactions between the brain systems and the possible functional consequences. She asserts that the interactions between systems explain how tactile media are likely to stimulate emotions (Lusebrink, 2003). For her, the activation of the unimodal primary sensory cortex seems to be especially important in the exploration of symbolic aspects of memories as well as emotional elements that may have been repressed or dissociated. (p.131, Lusebrink). That the exploration of emotion can be facilitated by sensory approaches is of most importance in the psychotherapeutic approaches of interest to our paper.

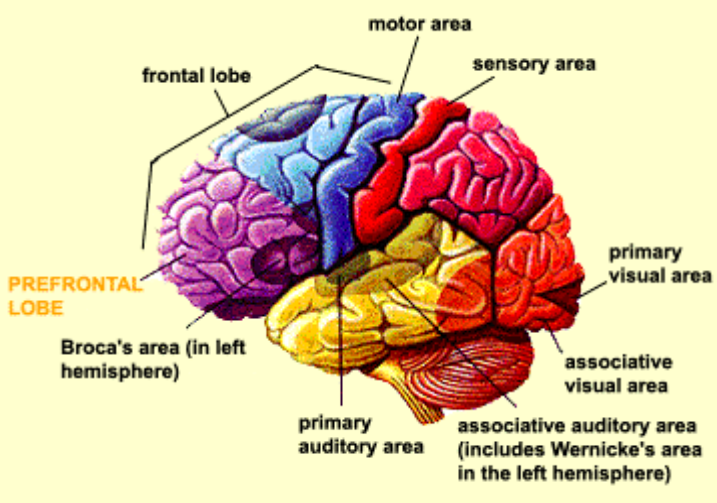


Figure 6: Sensory system (from McGill Brain images)

Sensory areas are specifically delimited and imagery tools are used to get to always better know the specific function of each of them. One can observe how there are primary sensory areas and associative sensory areas where the different modalities may meet and create our sensory perceptions

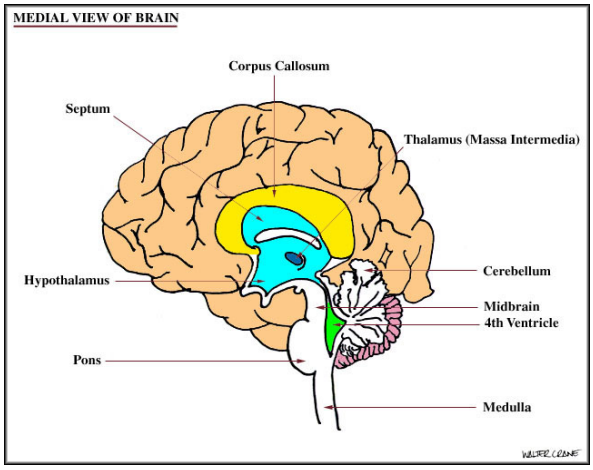


Figure 7. The thalamus.
This complex structure serves to process all sensory input (except olfactory) to the cortex, but it also has profound influence on motor (via input from basal ganglia and cerebellum) and cognitive function.

c. The emotional system: limbic system and interactions. Physiological reactions.

What is an emotion? When we think about it, we think of a whole pattern of pre-programmed physiological reactions to a stimulus (Damasio, 1994). It was confirmed by functional neuro-imaging in 2004 (Critchley, H.D., or Craig, A.D.) that the physiological changes occurs before the emotional state can be perceived. We react before we know we react! Indeed, regions associated with interoceptive representations (relating to stimuli arising within the body and especially in the viscera) are stimulated before the region of the right insula is involved in emotional

processing. It is a set of hormonal and nervous reactions that allow the individual to respond to the environment. The importance of emotions is being more and more recognized and it is now evident that despite our cerebral cortex and cognitive abilities which differentiate us from other species, “it is the limbic system that plays a role in the evolutionary survival and eventual success of hominids (Eccles, 1989, p.97). Cytowic (1995) explains how “while the cortex contains our model of reality and analyzes what exists outside ourselves, it is the limbic brain that determines the salience of that information” (p.156). “The cerebral cortex has more inputs from the limbic system than the limbic system has coming from the cortex”(p.161).

The limbic system is the old cortex. The cerebral tissues, or neocortex with four lobes (frontal, parietal and temporal and occipital), envelops the limbic system. Its composition varies depending on the authors but it is generally recognized to gather the different structures that play a role in the emotional life. Guyton (1996, p.752) defines the limbic system as the “entire neuronal circuitry that controls emotional behavior and motivational drives”. On the other hand, LeDoux (1996) and others have stated that many emotional systems in addition to the limbic system may exist in the brain. It is located on both sides of the brain midline, in the medial temporal lobe, underneath the thalamus and includes (for most authors) the anterior thalamic nuclei, the hippocampus, the amygdala, the olfactive system, parts of the hypothalamus, and the basal ganglia. There are also the cingulate gyrus, the septum and prefrontal cortex that are strongly connected to the limbic system. Connections are made between the different structures and determine the influence of each on the other.

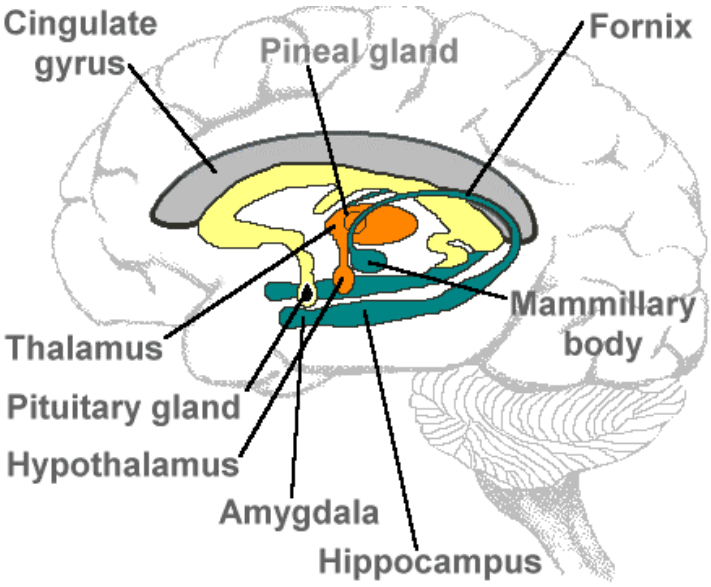
The hypothalamus is mainly concerned with homeostasis regulating all vital functions such as hunger, thirst, response to pain, level of pleasure and sexual

satisfaction, anger and aggressive behavior. It also regulates the parasympathetic and sympathetic nervous system through which it impacts pulse, blood pressure, breathing and arousal. Through its connections to the pituitary gland, it directly regulates hormones that contribute to growth and metabolism. Hence the direct effect of emotions and affects on physiological reactions.

The hippocampus is instrumental to convert information into long-term memories and also in contextual memory. Damage to the hippocampus prevents new memories from being formed but does not impact old memories. The central nucleus of the amygdala is engaged for expressing fear and the anterior cingulate cortex of the limbic system is activated during irritation and anger (Carlson, 2001). The amygdala is recognized as necessary for the integration of emotional components, specifically its role has been recognized in coupling emotional reactions of fear with learned sensory stimuli. Touch and other haptic perceptions activate emotions because the amygdala receives information from the somatosensory primary cortex (Carlson, 2001). The amygdala is strongly connected to the hippocampus which is how sensory inputs control the autonomic system and the hormonal and nervous reaction (see figure 8). When the amygdala is stimulated electrically, animals respond with aggression. If it is removed, they do not react to stimuli that caused rage or fear and also become indifferent to stimuli otherwise evoking sexual response. The amygdala is also involved in mood and the conscious brainstem autonomic centers. We alluded to the specificities of the olfactory sense. Indeed, the primary olfactory cortex is part of the limbic system and the target of the olfactory tracts which is how the sense of smell is interconnected with the limbic system. The cingulate gyrus is a part of the cerebrum that provides a pathway between the thalamus and hippocampus, and therefore accounts for the association between memories, pain and smells.

Basal ganglia receives information from the frontal, parietal and temporal cortices. This relates to how emotion is important in planning and executing movements (Carlson, 2001). Emotions are predominantly processed in the right hemisphere. A lateral difference has been observed in terms of the value of the affect, and the right hemisphere seems particularly active for negative emotions like sadness and fear. One can observe arousal of the right frontal region in reflective awareness, depression and withdrawal while there is arousal in the left frontal in alert expectation and approach (Heller, V. & al., 2003). Similarly, the left amygdala is involved in reward processing and right amygdala in aversive processing (Pizzagalli, in Lusebrink, 2004). One can foresee how each specific brain damage has different functional consequences. The corpus callosum links left and right hemisphere, integrating emotional and cognitive aspects of experience (Siegel, 2004).

The ventral tegmental area and its connections to the nucleus accubens seem responsible for pleasure. It is dependent on dopamine and lesions seem to interfere with getting pleasure: people with excessive dopamine receptor sites in the nucleus accubens tend to turn to alcohol, drugs, sweets and gambling. The prefrontal area, in addition to its role in cognitive thinking and decision making also play a role in pleasure as it seems to be part of this same dopaminergic system. One can already foresee how decisions may closely relate to emotions. It was hypothesized also that those connections explain pleasure derived from problem solving and lesions resulting in lack of motivation (in Lusebrink, 2004). Up to now research has been made mostly in the area of fear. We can yet foresee how a better knowledge of the functioning of the systems involved in affective processing may help psychotherapists better target their treatment.



normandy.sandhills.cc.nc.us/psy150/limbic.gif

Figure 8: The emotional system

What are the cerebral areas involved in emotion is still a wide research question. However many areas have been shown (through brain damage or animals studies) to be involved in emotion. Some call it the limbic system but this remains a controversial topic as it is not so easy (if not impossible) to determinate parts involved only in emotions.

d) The memory systems: sensory memories, working memory, long term memories. Notion of verbal and non verbal, conscious, unconscious and somatic memories.

There exist many different classifications of memory depending on the approach and the application. We will discuss memory using classifications that have been generally accepted. This will serve us to understand better the link between neurobiological facts and the use of this knowledge in therapy. We already discussed how information is selected and processed before it can become a memory. More processes are needed before a short-term memory becomes long term.

At the level of the sensory systems, there is a very short-term memory (some seconds), called the *iconic memory*, that only retains the sensory information long enough to be sensory treated (see figures 9 & 10). Most of this perceptual memory is implicit or non-declarative (Fuster, 2004). *Short-term memory*, also called working or executive memory, is the memory we use to store information for the period of time we use it. It remains after the stimulus is not present anymore. Information from long term memory can also be retrieved into short term memory in order to be used. This memory type is probably a cortical phenomenon and does not necessitate the hippocampus. It is located in the parietal cortex. It was shown to contain up to seven elements. It is the memory we use to make a phone call for example. While executive memory is stored in the frontal cortex, the prefrontal cortex performs the integrative functions of working memory as well as attention, inhibition and therefore selection of the information to be used for the specific task. This is transitional between short term memory and long term memory.

Long-term memory is the memory we mostly refer to, the one that gets encoded and consolidated. Memory requires neuronal plasticity (see II,1,a). It was shown that long-term potentiation in long-term memory necessitates protein synthesis. The integration of sensory information takes place in the hippocampus which is active in

the formation of long term memories but does not store them. Long term involve two brain areas: the left hippocampus and the left prefrontal cortex. Long-term memory requires an elaborate encoding in the temporal lobe. If there is a lesion in the prefrontal lobe there are difficulties with this encoding. This area is not quite developed before three years of age which explains why one cannot recall facts earlier than this period. *Semantic memory* contains facts, concepts, figures or names and is a long-term memory: it is the one involved in meaning making. *Episodic memory* is the memory one has about personal event. Both are commonly said to be declarative memories (see figure10). It is the hippocampus that allows the episodic memory to be formed as it associates different contextual information. Case studies show that semantic memory is usually spared in dementia in contrast with episodic memory (Kosslyn, 1999). Procedural memory gathers actions, habits or skills and is also a long-term memory. Motor memories of concrete and stereotyped sequences of actions are stored in the basal ganglia. There are connections from the sensory cortex to the hippocampus and again from the hippocampus to the sensory cortex. This loop involves how the body learns to recognize specific sensory stimuli and how sensorial stimuli facilitate the retrieval of memories. The *somatic marker hypothesis* (see II,2,b) describes how physiological reactions are associated to sensory stimuli so as to trigger a reaction to the environment before any emotion or decision is taken (Damasio, 1994).

Another important concept about memories is the notion of *explicit and implicit* memory. Shachter and Tulving gave the names to those memory forms in 1996 but the term has been used since in different respects. For Schacter, memory either involves awareness of the memory, memory that can be expressed explicitly with words (thanks to connections with Broca's area) or otherwise it is recorded implicitly.

That means that there are signs that the person has learned from the experience even though there is no explicit recognition of it. Experimental subjects exposed at an subliminal level to hostile words would later perceive more negatively a neutral individual than subjects who were not exposed even though explicit recognition of the hostile words was at a chance level (Schacter, 1987). These emotional memories are essential in psychotherapy and we will give the topic a whole section later. For Shachter, it is important to specify that an implicit memory is not a repressed memory as Freud had described. The lack of words is not a proof for a need to forget. For some authors, consciousness has a direct impact on memorizing and deep encoding is facilitated by thinking and making conscious connections between new information and old information (Kosslyn, 1994).

An other memory category to be mentioned is the difference between *field memory and observer memory* (Schacter). Field memory is memory in which someone can see oneself in the picture ,whilst in observer memory, only external elements are seen.

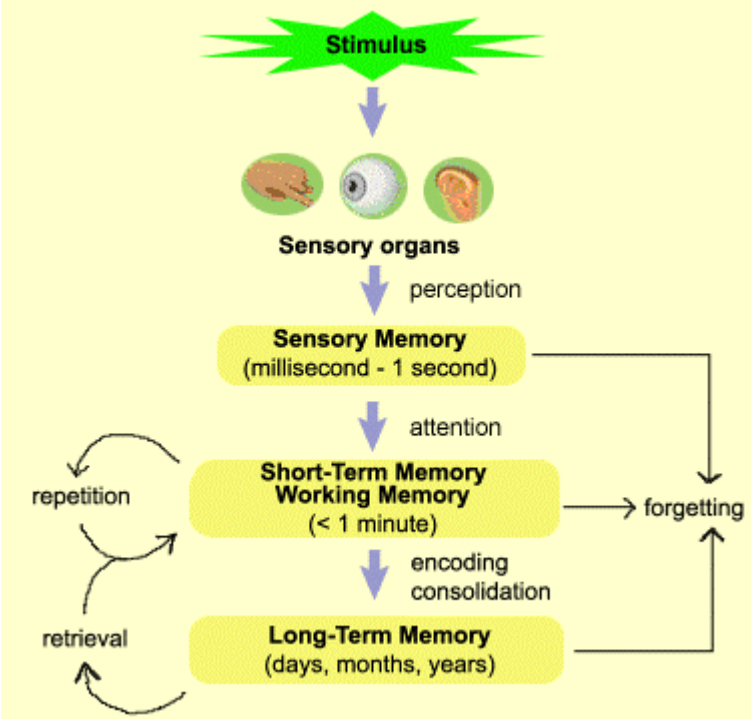


Figure 9: Memory systems (from McGill Brain images)

Until an event or an information gets recorded in long term memory, it needs to be treated by sensory memory first, then by short-term memory and finally, through repetition of the event or information it gets consolidated and stored in long-term memory**.**

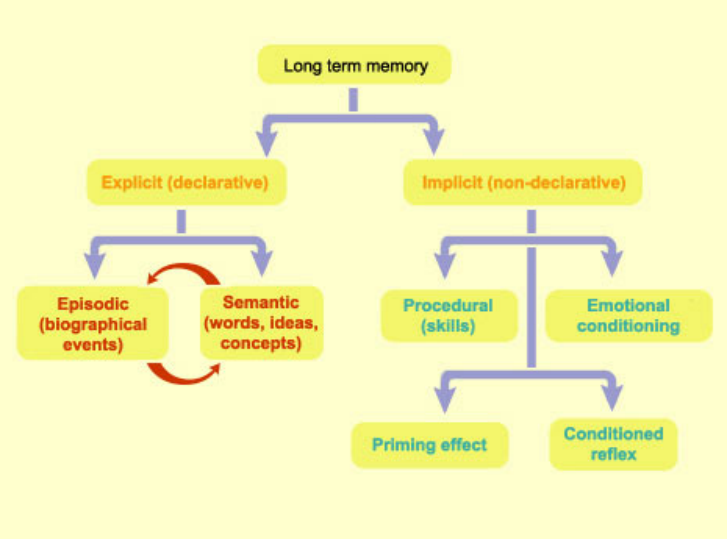


Figure 10: Long-term memory types (from McGill Brin images)

Long term memories can be explicit but implicit (unconscious) as well. It is those memories that impact on our reactions and behaviours independently from our consciousness**.**

e) Interactions between the systems create the memory

Memory is an associative function and involves the formation and activation of different areas of cortical networks. In simple animal systems, there are three forms of learning. We described sensitization and habituation; the third form is called classical conditioning and links a sensory information to a behavioral response. (Hawkins & al, 1998). In humans, associations are much more complex (see II,2,c & II,2,d). When a

memory is retrieved, it is not only the areas associated with memory treatment that are activated. This is why the notion of system is so important. Indeed, as we have already shown, each function depends on the other. The memory that is activated at a specific moment depends on the impact of cognitive, sensory and emotional systems upon it, and memories will in return impact those different systems. We discussed how the cognitive system selects the information, external and internal, to be retrieved and used for a specific purpose. We also described how memories are closely connected to sensory systems and how sensory stimuli recall memories and memories are accompanied by sensory retrievals. Emotions involve patterns of nervous autonomic activity and hormonal and cortical responses. There is no need for emotions in order that sensory stimuli be associated with memory, and most cognitive experiences of conditioning do not rest on emotional experiences. A case in point is mnemonic techniques in which it is the association with sensory cues that makes the retrieval of memory easier. This concept of state dependant memory is the one students use if they eat the same chocolate during an exam as they did while studying. However, emotional memories are easier to recall than non-emotional ones (LeDoux, 1996; Fuster, 2004).

The affective value of an experience makes it interesting for learning and this process occurs without our efforts. LeDoux observes that a particularly great number of inputs activate working memory in the case of an emotional stimulus. Lesion studies taught us that the integration of these different inputs takes place in the amygdala (see II,2,c). While a lesion to the hippocampus prevents the memory association between a specific stimulus and the global event, a lesion of the amygdala prevents the behavioral reactions based on biologically significant events with affective properties (Mc Donald & al., 1993). The impact of emotional arousal on

encoding is mediated by stress hormones (cortisol, epinephrine and norepinephrine) which are liberated by the amygdala as a signal to other areas like the hippocampus that the information is worth encoding (see figures 13, 14 &15). Studies show that the degree of activation of the amygdala by emotional arousal during encoding correlates highly with subsequent recall. The amygdala modulates the hippocampus storage (Mc Gaugh, 2004; Richardson, 2004). It was shown that the amygdala also stores some memory (Richter-Levin, 2004).

The hippocampus receives and processes information from sensory association areas in the parietal lobe as well as from the amygdala, the basal ganglia and other subcortical areas. The hippocampus contextualizes the information, creating a cognitive map that allows for categorization of the experience and its connection with other autobiographical information (Van der Kolk, 1994). In this process, the hippocampus forms associations between the representations and relays them back to the association cortex where the memories are stored and modified (Carlson, 2001, Fuster, 2004). Associations between representations are dependant on individual experience and treatment: those associations will link different information together and therefore create meaning. Ramachandran (2005) refers to this interaction of different informative components as to the possible neurobiological basis for a metaphor. A metaphor is the synthesis of sensory, emotional and verbal aspects of an object. Cytowic in 1995 was describing synesthesia as the confluence of different senses. *Source memory* (Squire, 2002; Shimamura, 1995), located in the prefrontal cortex, is the when, where and who aspect of memory and refers to the observation that children until adolescence remember life episodes with no certainty about the location, time and people involved. You may have examples of children around you who have recreated a memory where they make an action happen in a place where it

did not. The connections between the different information may be unclear in this young brains.

The event is treated with reference to the affective history of the individual. The information goes directly to the neocortex or indirectly via the thalamus to the orbitofrontal cortex involved in regulating emotions, and to the prefrontal cortex which is dealing with affective working-memory anticipating consequences of positive and negative emotions (Davidson, 2000). Bechara (1997) gambling experiments demonstrate how there is an evaluation of the possible emotional consequence at a somatic level. Reactions to a situation (also the emotional physiological reactions) are judged as adequate or not before they actually occur and become conscious because a memory of the emotional reaction is actually already stored. It is the dorsal striatum that is involved in the formation of such reinforced stimulus-response associations (Mc. Donald & White, 1993). When the response is judged as being appropriate in repeated circumstances, the encoding is deeper. Finally, it is important to remember that once an event is integrated it is not accessible as a separate, immutable entity but distorted by prior experiences and the emotional state at the time of recall (Van der Kolk, 1994).

3) Many memories are not accessible to verbalization

a. Right and left hemispheres take care of different information: right hemisphere is more conform to reality

We discussed how researchers have distinguished the cortical and subcortical parts of the brain in terms of functions (II, 2). Studies have demonstrated that the two

lateral parts of the brain take care of different tasks as well (Damasio, 2000). One has to remember that the attempt to attribute functions to brain areas is a great simplification of the actual complexity of the brain functioning.

The right side of the brain actually develops earlier and has been recognized to be the side that takes care of the primary monitoring and regulating body functions. It is this side that is able to recognize faces and the center of attachment and emotion. Also the right side takes care of implicit memory. It understands body language, emotions and interpersonal connections and specializes in visual-motor tasks (Gazzaniga, 2002) and in *body memories* (Hug, E., personal communication, 2005). The left hemisphere is the side that takes care of active reasoning, problem solving, planning and temporal ordering. It specializes in language speed and interpretive processing (Gazzaniga). It is also the center for explicit memory. Broca's area (involved in verbal expression) and Wernicke area (involved in verbal understanding) are both located in the left hemisphere. Siegel (1999) specifies that the right hemisphere is involved in the non-verbal polysemantic meaning of words which makes it the center for understanding of metaphors, paradox and humor.

Both hemispheres have conscious experience and are capable of language - however, they have two different views of a same experience. Gazzaniga (1978) has been the principal investigator to present the striking studies done on split brain patients that demonstrate this important difference in the way the brain hemispheres perceive the world. He studied patients who had their Corpus Callosum (the link between right and left sides) cut to treat epilepsy. Researchers could observe how the experience was treated by each hemispheric. The left side appeared as the reflective side. It has the function to name the experience and it constructs explanations for the action being done. In those split-brain patients, a same instruction could be visually

given to the two different sides of the brain (each visual field connected to the opposite brain side). It was given too quickly for the patient to consciously treat the information. While both sides could understand and obey the instruction, the left side would always find a rational explanation for the behavior. For example, if the right brain was given the instruction " smile", the patient would smile, but when the left side was asked why he was smiling, the client would find a good reason for doing so "I smile because you're funny" even though he was simply following a visual (implicit) instruction. Ramachandran (1998) describes the case of a man suffering from emotional Capgras Syndrome who could recognise his mother as physically similar to his mother but would call her an impostor. His emotional system was deficient and he could not therefore feel the emotions usually attached to the view of a mother. So he had to find a rational explanation: she was an impostor because she looked like his mother but did not feel like her! Therefore, both sides are able to understand and act but it appears that when the left hemisphere is more inventive and interprets, the right may be a more reliable expression of experience and even emotion (Gazzaniga, 2002). The left side is responsible for creating the autobiographical narrative memory (declarative memory) of the person. It creates a logic that is acceptable by the person and makes the person acceptable socially.

In cases of traumatic experiences, the right-left cerebral connection is interrupted and the client may therefore implicitly remember (with the right side) the experience the way it was and suffer the consequential symptoms, but the left side, the 'spin doctor' (Gazzaniga), will create the story that provides the least pain. Gazzaniga says it in these simple terms: "the left hemisphere interpreter affects memory" (p.30, 2002). Mac Namee, an art therapist, works with scribbles in order to capture the truth of the right brain side's images, metaphors and feelings and this helps the verbal

process. Remember how sensory and memory systems are connected (see II,2,e). “It is important that the non-verbal process driving the verbal process is facilitated in therapy” (Mc Namee, 2004). Edward Hug (2005), in his chapter on post traumatic disorder specialists, reminds us of the importance to use art or dance to explore the emotional expression of experiences that can still be accessed through those expressive forms that rely on the right side of the brain while the left, verbal side has been disconnected from the traumatic experience.

http://207.7.139.2/cmp/exhibits/c/colored_words.html

Figure 11. Right and left hemisphere’s differences in a Stroop test

The right hemisphere appears to me more truthful to the sensitive experience while the left hemisphere makes sense of the situation and can even invent a logical narrative.

b. Evolutionary need: the body learns physiological reactions bypassing conscious processing. The example of fear. “True emotional memory”.

We just described the hemispheric differences in terms of memory types and saw how the experience can be stored explicitly (left hemisphere) or implicitly (right hemisphere). Other studies give explanations about why it has been necessary to store in different memory forms. In 1889, Janet made the observation that an intense emotional reaction caused memory to be dissociated from consciousness and stored as visceral sensations and visual images- Freud talks about the “physical fraction of trauma” and Pavlov observes “defensive reactions”-.

Recently, LeDoux demonstrated that factual kinds of memory storing are different from emotional kinds of memories storing. *Factual memory* can be defined as the memory type that is most intellectual/cognitive and that can most of the time be recalled verbally. It is mainly supported by the left hemisphere and the cortical part of the brain and can be facts or knowledge. It can even be the knowledge one has about his emotions: I know I am scared by snakes. It is an explicit memory close to episodic memory (remember that classifications are not so strict). *Emotional memories* are types of memory that are charged with an affective value about an event - or a relationship, or even associated with a knowledge that had a personal significance for the person so that it was recorded with an emotional value. It is an implicit memory. It is said to be stored mostly in the right hemisphere and the subcortical parts of the brain.

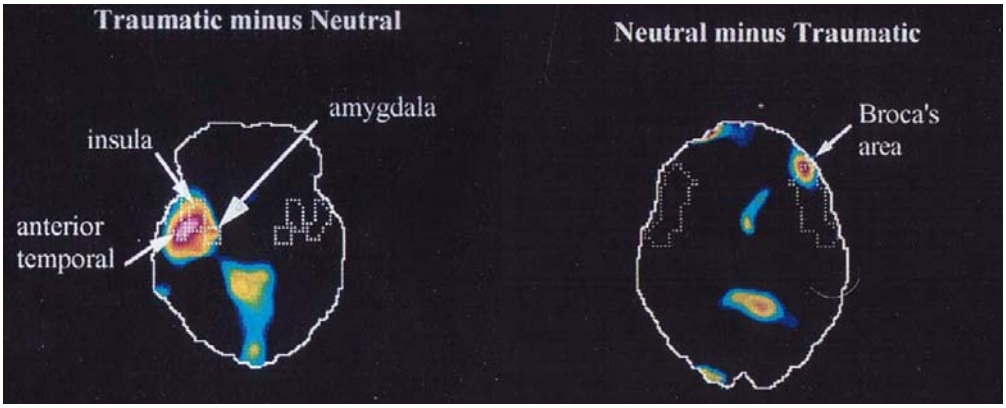


Figure 12. Cerebral activity in trauma (in Rauch, 1996)

RMI shows how the amygdala is involved in the fear response while the verbal area (Broca's area) is hypoactivated in trauma.

The dissociation between these two different memory systems was made evident after some research and studies of lesions. Bechara worked with humans (1997) and LeDoux (1990, 1996) chose fear because almost any kind of species shows a physiological reaction to a threat. By studying the effects of lesions, LeDoux and his colleagues could determine what brain area is responsible for this fear reaction which is how the amygdala was recognized as necessary for the fear response. Smaller lesions even showed that there are different sites within the amygdala that specify in different fear reactions. It was shown that the amygdala first receives information from the thalamus for a quick answer and then the information from the cortex that takes the time to analyze the real situation and decide if the reaction was appropriate or not.

Libet (1983) and more recently Ramachandran (2003) demonstrate that while we believe we take decisions before acting on them, we actually act before the brain makes a conscious decision that coincides with the reaction that was taken in the first place! The same way we saw how emotional feelings follow emotional reactions, cognitive awareness of those reactions is even later. The amygdala mediates emotional memory. For LeDoux, it is the link between sensory systems and fear response systems (see II,2,c & II,2,e). Under stress, the level of the hormone adrenaline increases and hypo-activates the hippocampus while hyper-activating the amygdala (Rauch, 1996 and figures 12,13 & 14). LeDoux explains how this results in a memory stored under the influence of fear without the individual's consciousness and therefore without capturing the experience into words or symbols. This experience was termed the "*speechless terror*"(Van der Kolk, 1988). The immaturity of the hippocampus in early years is also an explanation for the lack of explicit memory with no need to invoke the concept of repression! For LeDoux, such memory is a "*true emotional memory*" since the external stimuli are assimilated as such without cognitive integration.

Integration is a natural process for humans who need to make sense of all the information they have about the world. Humans can even give an affective value to an apparently neutral event. First, there is memory about an event, then emotional memories give an emotional quality to those explicit memories and the brain fuses the two so it seems like the emotion comes from the event. The amygdala stores "free floating feelings of significance to sensory input" which are later elaborated and imbued with personal meaning by the neocortex (Van der Kolk, 1994). Schacter (1996) theorizes that some emotional memories are detached from the context resulting in emotional symptoms in the here and now not related to the event. Those

emotional symptoms can “haunt” unrelated situations. This is common in PTSD. Therapy can help by associating the emotional state back to a specific event and context. The client is freed from inefficient emotional reactions and can answer to new situations adequately to the actual circumstances and with the actual possibilities.

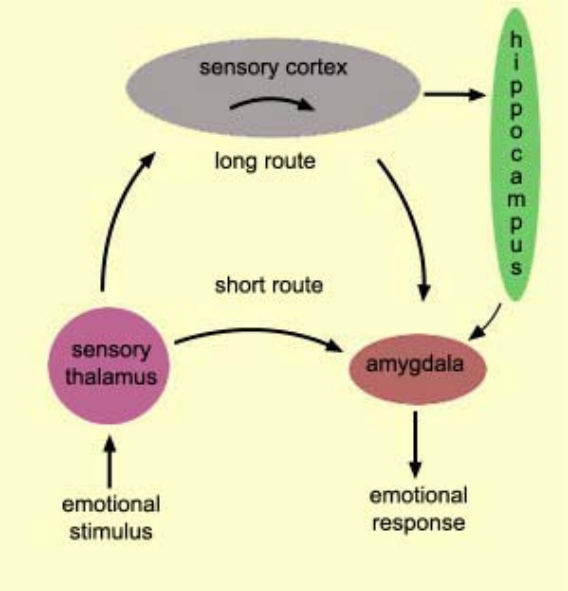


Figure 13. Emotional reactions bypass cognitive processing (from McGill Brain images)

Here is an example. Suppose you are walking through a forest when you suddenly see a long, narrow shape coiled up at your feet. This snake-like shape very quickly, via the short route, sets in motion the physiological reactions of fear that are so useful for mobilizing you to face the danger. But this same visual stimulus, after passing through the thalamus, will also be relayed to your cortex. A few fractions of a second later, the cortex, thanks to its discriminatory faculty, will realize that the shape you thought was a snake was really just a discarded piece of garden hose. Your heart will then stop racing, and you will just have had a moment’s scare. But if your cortex had confirmed that the shape really was a snake, you probably would not have just been startled. You would probably have taken off with all the alacrity

c) Conditioning, generalization of the physiological response and somatic memories. The stress response

Pavlov's *defense reaction* –the reaction following the stimulus- is presented in his theories and experiences on conditioning. In such case, perception of a dangerous situation is immediately followed by a pattern of physiological reactions (see figures 13 & 14). This is an evolutionary result easily explainable by the need to react emotionally before understanding, in the interest of speed. The perception of the stressful stimulus is followed by two major neural adaptive responses: *hyper-arousal* or *dissociation* (see II,2,c). Hyper-arousal leads to a *flight or fight response* where the whole sympathetic response system (locus coeruleus, pons, VTN, norepinephrin, noradrenergic) is awakened. During these stress responses, there is an increase in catecholamines originating in the brain stem, an increase in epinephrine and associated stress steroids. The vagal tone (connected to the heart) increases and there is also an increase of importance in dopaminergic systems primarily mesolimbic and mesocortical. The dopaminergic system is linked to the reward system and in some cases to the opioid system involved in altering perception of painful stimuli, sense of time, place and reality. This explains why some clients after a trauma seem to have a distorted perception of reality. Noradrenalin impacts the hippocampus in the form of an inverted U, which explains why stress can result in amnesia or hypermnesia (see figure15).

All those physical reactions intervene unwillingly and get learned by the system so that it spares the energy of information processing the next time the individual is confronted by a similar situation. However, there is a natural way to reduce the

immediacy of the stress response: serotonin regulates the activity of the hippocampus, inhibits it and prevents the emergency response until the situation is more clear (Van der Kolk, 1988, 2005). It gives an opportunity to assess the actual situation before the stress response overcomes any new possibility. Van der Kolk insists on the importance to understanding the role of neurotransmitters and hormones in those learned reactions: a psychopharmacological treatment can have a direct impact on the reaction. At that moment when the sensory system is hyper-activated, it also registers other external or internal cues such as visual objects, noises or internal sensation. This associative learning has evolutionary utility to save time in the next similar dangerous situation but it will also be reactivated by cues or thoughts and dreams of the situation. There is generalization of the response. LeDoux (1996) used the *classical fear conditioning paradigm* where he pairs a tone or a light with a mild electric shock until the rat only reacts to the tone or the light with the same physiological reactions as to the shock. In this way, there is learning of the association between the actual dangerous stimulus and surrounding stimuli. The hippocampus is involved in this associative learning process. It is the hippocampus as well that determines how the events are associated with reward, punishment or novelty: it associates value to the event. Not only does the neuronal system react faster to slighter stimuli, but " this sensitization of the brain stem and midbrain may also mean the other critical physiological, cognitive, emotional and behavioral systems will become sensitized (p.9, Perry, 1999). It is very efficient for the reaction to be triggered faster but this may also bring pathological behaviors. For example if the individual is hyper-stimulated by the slightest cue or if the association gets made with wrong cues to the point when wrong cues trigger a flight response as in post traumatic disorders or phobias (LeDoux, 1996, 2002).

If the threat continues past the point of flight response, the individual might react with *dissociation*. At first remaining immobile, then dissociating and possibly fainting. Freezing is an adaptive response allowing keener senses, camouflage, decreasing cognitive processing to organize quickly how to respond. Such knowledge has a clinical implication: some caretakers still interpret the lack of reaction of the traumatized child as if he were untouched by the event, resilient (Perry, 1999) and in no need for a treatment! Detachment can actually be a sign of traumatism where the dissociation symptom has become generalized. Too much stress can result in neuronal tissues death (see figures 15 &16). Conditioned cues can be cognitive but most of the time are sensory information. This is how a specific gesture, or an environmental stimulus triggers the retrieval of a reaction and therefore the associated emotion (see II,3,c). This is what we call a *body/somatic memory*. For Ogden, “somatic memories are implicit memories which lack narrative and verbalization (based on Rothschild definition of implicit and explicit memories, 2000), encoded in forms of vivid images and sensations”.

Psychosomatic symptoms are sometimes explained by such generalization of somatic memories. The physiological reaction is associated with the slightest perception of the external danger. The need is therefore to learn to get in touch with the actual perceptions, with reality. For Lyons Ruth (2001), the body can learn, and has to relearn to make changes in procedural memory and change reactions to environmental stimuli. This involves a process of desensitization and is used a lot in post traumatic rehabilitation. However, one may remember that there is not only emotional memory but also factual memory (see II,2,b). A person may still recall explicitly being afraid in the situation *after* the physiological symptoms have been extinguished (LeDoux, 2003). The client needs to be consciously treated too. This

knowledge has to be used in therapy.

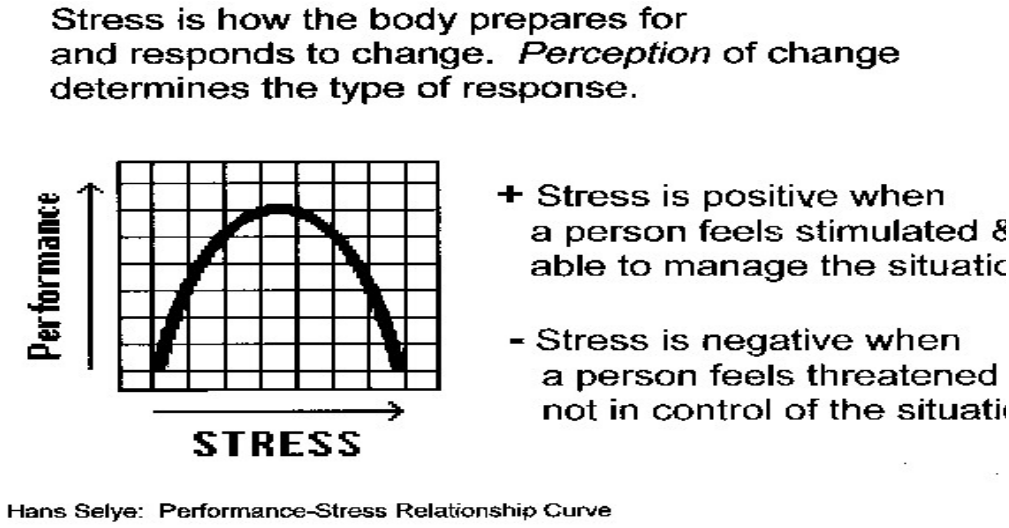


Figure 14. Stress response

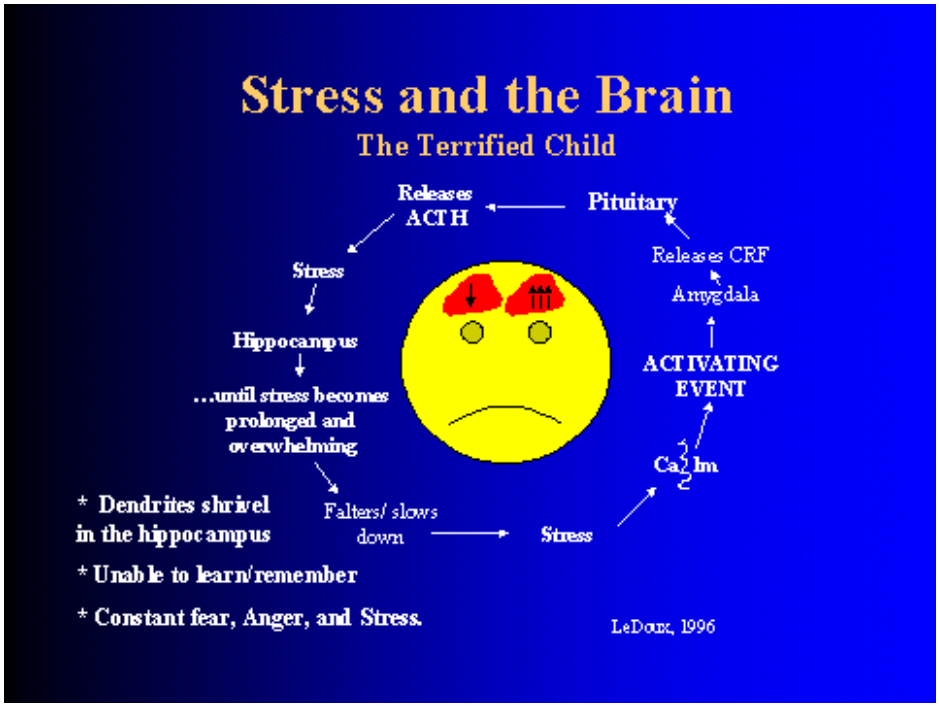
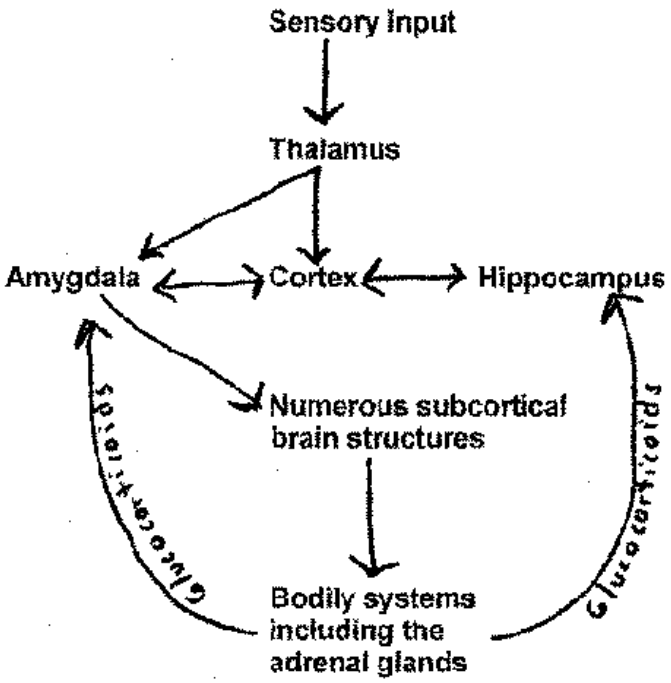


Figure 15: Interaction of memory and emotions

When the stress level is too elevated, physiological reactions impact on the amygdala and hippocampus and can have an impact on memory recalls. Too many situations of trauma may bring a generalized traumatized, distressed state.



http://www.u.arizona.edu/~vanpettc/326/stress.html

Figure 16. Interactions in the stress response.

The amygdala gets fairly raw sensory input from the thalamus, input that isn't fully processed yet. This is sort of an "early warning system" - at this point, the brain may not distinguish a twisted branch on the ground from a snake, but better safe than sorry - the amygdala can get an early start on the "flight or fight" response. The hippocampus gets more detailed, fully-processed information from the cortex, which eventually reaches the amygdala too.

Note the feedback loops above. Once the stress response gets going, the adrenal glands dump glucocorticoids into the bloodstream. Both the hippocampus and the amygdala are sensitive to glucocorticoids.

We talked about strengthening of synapses as the neural basis of learning. Synaptic strengthening in the amygdala and the hippocampus is stronger than normal when glucocorticoids are present. So, learning can be more effective during a stress response. BUT, there can be too much of a good thing - high levels of glucocorticoids cause wear-and-tear on neurons (think of this as burn-out) - cells can actually DIE after prolonged exposure to glucocorticoids.

4) The need for physical therapeutic approaches

a) Sensory stimuli trigger emotional responses and facilitate work with difficult emotions

Sensory stimuli and environmental cues seem to easily stimulate the retrieval of sensory memories -i.e. somatic memories- and therefore emotional memories through the intermediary work of the hippocampus and amygdala (see II,2,c, II, 3, b). Implicit memory, non-conceptual and non-verbal, is difficult to explore in psychoanalysis (Pally, 1997). A sensory approach in therapy might therefore help to work with emotions that would not otherwise be tractable. In a New York Time article describing reactions of Alzheimer's patients to painting (2005), Sacks tells us how he observed with his patients that music and arts could engage parts of the brain that remained intact long after the onset of dementia and at a time when they were scarcely responsive to words. He believes this has to do with procedural memory. Damasio (1994) explained this phenomenon with "the somatic markers hypothesis":

emotions are conceived as immediate bodily reactions and sensations to environmental stimuli. Most of these reactions are genetically preprogrammed or learned through experience (Caldwell, 1996; Damasio, 2000; Ogden, 2001).

The emotions are sensed as pleasant or unpleasant through internal representations that are continuously updated in the sensory regions of the brain (see II,2,e). The emotion gives a valuable meaning to the sensed situation so that the person knows how to react the next time. It works both ways, when in the presence of sensory cues, the person will feel the emotion, but the emotion can also trigger the sensory response. Traumatic memories are stored through the amygdala in the somatic memory system (Ogden, 2001).

This is named “muscle theory’ by Bodenhamer (2004) and Hall (2001) who say that the “muscles remember how to run the pattern”. In order to react differently, the person needs to ”reframe” or heal the emotions and the physical symptoms will disappear. They describe the example of stuttering or shy bladder symptoms that naturally disappear when the person experiences new kinds of emotion about a previously traumatic situation. Sensory stimuli can be used to recall and work with emotions in the therapeutic context. Art is a particularly sensory stimulating activity as it involves visual, auditory senses and touch (Sacks, 1987, 1995). Listening to music is also a way for people to get in touch with traumatic, sensory memories (Punkanen, 2004, in Ogden 2001, 2003) and even feel connected to what is going on around (Tomaino, 1999). When stimulated through the senses, the person gets in touch with the targeted emotions and from there the work can be done to reinterpret the current sensory stimuli differently and therefore give it an other emotional tone. Jennings discusses the importance of sensory play with children and babies with special needs (Jennings, 1998, 1999).

b) Physical approaches to circumvent cognitive censors and respect the natural defenses

We presented numerous tricks the body uses to only treat a situation at a sensory and emotional level. The body has learned how to respond and while some clients may actually say and believe they do not feel anything, they will react to a sensory stimulus that reminds them of the situation. There is a rational for this. The physiological reaction intervenes before it can be treated cognitively to spare time and also because a cognitive treatment for such traumatic situation may overwhelm the person (see II,3,b). The splitting between factual and emotional memories protects the ego from factual information that the person could not deal with (i.e. not consonant with the ongoing self-narrative). This natural protection has to be respected when the client comes in therapy. There is a need for trauma specific-psychotherapy (Ogden, 2001). When a sufficient level of stress can be used to facilitate brain stimulation and changes, too much stress can have damaging effect (see II,3,c). A client is most at risk of becoming overwhelmed or retraumatized when the therapy process accelerates the cognitive treatment of the information faster than what can be contained. This can happen when memories are elicited into consciousness through the images and thoughts from the music and body sensations in physio-accoustic methods.

Humans have created rationalization so as to protect themselves from emotions that may be too hard to deal with because it interferes with their ego identity (see II,3,a). It is for this reason that working directly with the emotional recording of the event without having to deal with it intellectually may respect the natural defense that was made of the event. Moreover, the person does not have to deal with the truth of a

difficult past event and try to understand it. The work can be done about the difficult emotions associated with a sensory situation to find a more positive meaning to it. Sensory stimuli do therefore support the client in the effort to connect with an emotional memory. Music and other arts have been shown to bring strong emotional memories (see II,4,a). Through experiencing new sensory stimuli one may attribute new emotions and a new value to the event. Most of the time, therapy happens later in life when the client may be more able to deal with the associated emotion like fear or anger than at a younger age. When the client is experiencing the traumatic emotions during psychotherapy, new reactions and therefore new emotions and ultimately new meaning can be associated with the situation. Siegel (1999) proposes that the traumatic imagery and the associated somatic memories shall be retrieved and experienced in the safe atmosphere of therapy. Then, they can be reintegrated in the here and now with the new strengths the person acquires.

c) Psychotherapy is not only de-conditioning and reconditioning: it is to propose alternative emotional experiences to the situation. The motivational reward system

Emotional memory is the type of memory that psychotherapy targets most of the time. It is the difficult emotional coping that can trigger suffering in the person. Psychotherapy targets meaning. What psychotherapy changes is not the memory of an event and even less the event itself- it is the *interpretation* one makes of this event and therefore the *meaning* that the event takes for that person. Pally (1997, 1998) explains how psychoanalysis and retelling of the story in a therapeutic situation alters the memory of the events with the inclusion of aspects of the therapy.

Classic cognitive-behavioral conditioning uses the fact that a reaction is associated with a stimulus through learning. In such cases, therapy consists of de-conditioning and reconditioning. In some hospitals, addicted patients get to associate their addictive behaviors with negative responses. Part of trauma-therapy is based on the idea that traumatic symptoms are a pure behavioral physical reaction to a stimulus that has become inappropriate (Van der Kolk, 1994). However, humans cannot be considered as such simple associative machines. It is the meaning attributed to a situation that is the cause of pain and the target of psychotherapeutic work. The objective is to offer the client a new experience, tainted with a new affective value in a situation that was colored with a negative value. We do not try to change the past event or the memory of this past event. The work is done in the present so that a new affective value can be experienced by the client and added to the emotional experiences the client had.

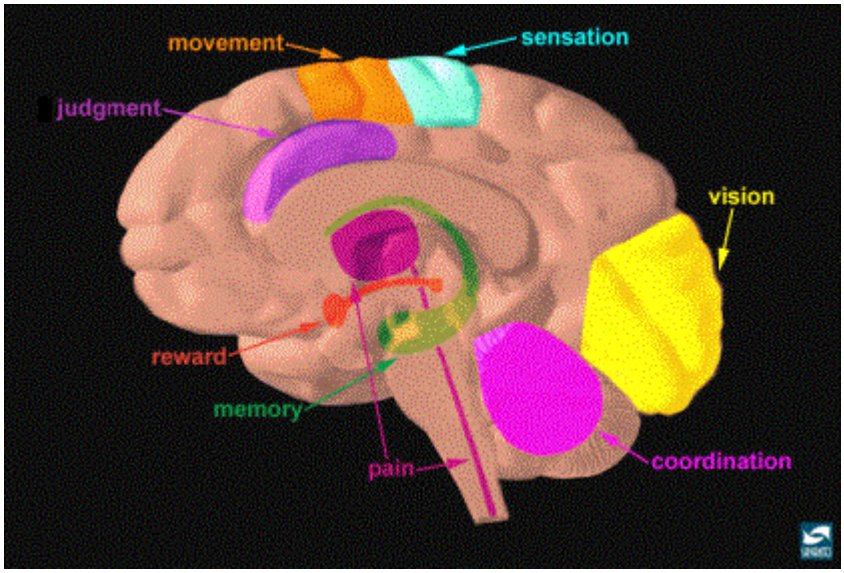
While the left hemisphere (Ramachandran, 2005 in Mitchell, N.) goes on making meaning of all sensory inputs by ordering them in a coherent belief system, the right hemisphere revises this belief system when inconsistent information reaches a sufficient threshold (see II,3,a). This is how new experiences in therapy allow change. At a neuronal level, it is a Darwinian selection process, which was framed as "neuronal group selection" by Edelman (1987). Neuronal systems evolve in order to respond to actual experiences. Researchers say that at birth the system is ready for any experience and the connections will get wired depending on those experiences. If the child only knows one type of experience, only this type of wiring will be made. The system will only detect what it has been repeatedly constructed to detect. Therefore, new experiences, if they occur only slightly and rarely will not make a change in the system. Hopefully, as an evolutionary system, it will remain available

for change (see II,1,a) depending on an adequate value system. Such a system makes it more open to change when it encounters an experience that is more valuable that the one it experienced before. The person can learn that a specific repeated negative situation may be experienced differently, if more positively.

How do people change to an other way of doing things? How do people prefer one behavior to another? One refers to the *motivational/reward* systems to explain this. Even though it is a research topic full of paradoxes and unknowns, it is based on the old hedonic concept that living organisms will direct the behavior towards survival: pleasure and pain having long thought to be the indices for choice to continue or to stop a behavior (Epicurians; Spencer, 1880). This is the concept of *beneception* (Froland, 1928). It is now evident that the phenomenon is much more complex and many situations show that humans do not always choose the most appropriate behavior (as in depression, at-risk behaviors, addictions, etc). However, there are neurobiological systems which are now understood to be responsible for those normal or pathological behaviors: specifically both the ventral tegmental area (VTA) and the nucleus accumbens have been recognised as the main contributors of the pleasure systems (Bozarth, 1994). This is the mesolimbic system where dopamine is the main neurotransmitter involved (see figure 17.). They are involved in normal appetitive behaviors (such as eating and sex), as well as in dysfunctional behaviors (when a normally aversive stimulus loses its negative value or when a drug overcomes natural stimulant). Also, what needs to be remembered is that despite the general belief, the subjective feeling of pleasure is not necessarily what guides the behavior. Indeed, this emotional system (pleasure is an emotion) is different -even if it certainly strongly interacts with it- from the reward system (appetitive behavior). The question remains about the degree to which sensations of pleasure are

determinant in behaviors or concomitant to the activation of the reward system recognized to be involved in motivation.

A good therapeutic experience will certainly impact this reward/motivational system and influence toward the most beneficial behaviors. How healthy appetitive behavior will compensate for unhealthy previous ones is not so evident, and the subject of much research. One may for example wonder how a positive affective environment can influence addictive behaviors (Olivier, 2002). Also, Mitchell (1990) observed that, when hyper-aroused, animals return to patterns they know and not to the most pleasant ones! It takes time for a person to decide to change a situation even when extremely difficult. The pleasant experience has to be repeated enough so as to encompass the more habitual one. Also, notions of *immediate reward and delayed reward* have to be considered. Our value system is not only rational and many emotional factors contribute to the choices (Mac Clure & al, 2004). The therapeutic approach is made to facilitate a new experience where emotions, timing and practical aspects facilitate learning.



ibgwww.colorado.edu/ cadd/a_drug/essays/essay4.htm.

Figure 17. the motivational-reward system

The ventral tegmental area and the nucleus accumbens have been recognised as part of the reward /motivational system involved in normal (feeding and reproductive) and pathological (addictions, risk-taking) appetitive behaviors. Changes in this dopaminergic system enable changes in behavioral choices. The subjective notion of pleasure has to be distinguished from the reward system even though they are related.

III) Corrective emotional experience, the foundation for body oriented psychotherapies

1) Definition of the corrective emotional experience

We said that the person's ways to respond to the environment and life events are learned through previous experiences and that they were the most efficient responses to the events at the time. A client comes to psychotherapy when life has become unsatisfying, when the emotional reactions become unbearable and prevent from living adequately with the environment and inner thoughts. Indeed, in PTSD, there are inappropriate responses to situations when big reactions are triggered by minor stimuli (Hartman, 2004). Some people appear to react with emotions of fear, anxiety or even anger that are not answering the developmental needs for such reactions. It can bring them to feel fear in social settings, in particular places, with no visible reason. They can become over-reacting to some specific topics or comments made to them. In the cases of dissociation following traumatic events, the primary response that was at first necessary and an adaptive survival strategy may become debilitating over the years when the person detaches and repeatedly escapes from the actual events that appear to difficult to deal with. These reactions become independent of the person's will. "The dissociative state allows for reactivation of traumatic memories, in hyperaroused anticipation, without the potential for processing and controlling them."(p 37, Hartman, 2004). The client comes to therapy to find a new reaction that would be satisfying, especially when the individual feels out of control.

a) What is therapeutic?

There are cases in which people describe experiences when the emotions and perceptions about a specific situation appear to have changed after Psychodrama: “There was a great feeling of catharsis as I played out my story and felt as if I had come to insights and conclusions inside of myself through the Psychodrama.” (Michele, Psychodrama ex.2). The feeling of relief and enlightment seems to occur even before the person can explain what happened: “So there was anxiety in the beginning, then my actually feelings came out: shame, confusion, anger, sadness, feeling powerful and independent. After that, emptiness, calm, self-love. I was exhausted!”(Fanny, Psychodrama ex. 3), as if the emotional change did not require any explicit understanding. This realization supports the idea that a successful psychotherapy is not necessarily based on cognitive understanding of the issue but rather on an emotional coping with this issue. This does not necessarily remove the need for cognitive understanding to complete the emotional work but defends an integrative perspective. Emotional coping appears to be the secret for mental health and well being. However, this perspective rejects the view in which only a cathartic exposure of one’s emotions is enough for healing. Therefore, the psychoanalytic view that the therapist supports the client in recalling past and reviving the emotions does not appear sufficient for an efficient approach.

Historically, if we go back to the first theories of psychotherapy, Freud proposed that the therapeutic principle was based on an emotional recalling of past events, relationships and other difficult experiences. It was at the time when self-censor and denial had been explained by a need to forget past events and emotions

that were too difficult for the person to deal with at the time. People had survived through forgetting or transforming the past event in their memory (Freud & Breuer, 1895). At first, Freud and his associates only tried to have those memories reappear - even in an unconscious state - sometimes triggered by hypnosis (Freud was a student of Charcot who was an exponent of hypnosis) and often recalled though dreams. But they realized that not every person could be hypnotized. The belief was then that verbal recall was enough for getting rid of the negative emotions and symptomatic consequences associated with such past memories. The technique of verbal free-association and the “talking cure” was born. The therapist’s goal was to interpret the clients’ discourse and help them remember forgotten events. The therapist had to be supportive enough so that the client felt confident to deal with difficult memories. The cathartic effect was to make the trauma conscious again. Therapy became then a search for understanding of the origin of the suffering, an intellectual quest where the client and therapist would both be searching for the” true reason” why the person suffered and make an etiological explanation for it. However, one could not be sure that the memory was real. The quest took the risk to become a search for an objective truth forgetting the primary goal which was the client’s mental well being.

Our approach is based on accepting whatever story is real for the client and the work is based on that truth, with the belief that this has an impact on the person’s relationship to the world. Moreover, many clients having found explanations for their trouble, still suffer from this past event, and sometimes, their pain is even aggravated by recall. We can observe that our society has become very cognitively oriented and that people try to find explanations for everything, which only reinforces the natural neuronal processes for lying to ourselves (II,3,a). However, effective psychotherapeutic work is not necessarily linked to a perfect understanding of the

situation. On the contrary, such an intellectual quest can be the perfect way for the client to escape the emotional aspect of the experience which can be much more difficult to deal with. Moreno (1987) gives a new way of understanding catharsis when he introduces Psychodrama and expression by enactment and play. Tisseron (1996) alludes to a catharsis that would encompass the whole experience and allow a " senso-affectivo-motor symbolization of the experience" in the social context. Isn't it what Michele refers to when she says: "There was a great feeling of catharsis as I played out my story and felt as if I had come to insights and conclusions inside of myself through the Psychodrama."?

b) The corrective emotional experience

All those arguments make us prefer a therapeutic approach focused on the emotional experience rather than ideas about the specific situation. The goal is to introduce the client to a more acceptable way to respond to the situation. Already in 1924, Ferenczi and Rank, contemporaries of Freud, advocated that the emotional experience should replace the search for intellectual reconstruction. This psychotherapeutic action was called "*corrective emotional experience*". It is attributed to Alexander who was aware of the need for the client to experience a new set of emotions about the problematic situation. "Merely remembering an intimidating or demoralizing event does not change the effect of such an experience. Only a corrective experience can undo the effect of the old." (Alexander, 1946). Alexander even believed that the memory of the past traumatic event was only recalled after the client had already got control over this otherwise too difficult situation. Even though the term "corrective" can appear quite reeducational for a psychotherapeutic

approach, it also confers all the real efficacy of such an approach and the perspective of a real change. “Corrective emotional experience” refers to the possibility of offering a new alternative way of feeling (and possibly thinking) about a situation that has become a reduced way of responding, thus creating the pathological situation. It proposes an alternative turn to the end of the traumatic story, “Ruth now felt different” (p.160, Rothshild, 2000). Corrective emotional experience becomes the basic principle of a psychotherapy which offers the client an opportunity to experience a situation in a way different from the usual ways. The apparently simple acts of being listened to, accepted and cared for could confer a completely new experience for a client. The client’s self-perception, perception of the world and reactions to the situation can be influenced by this new way of being in a situation. The psychotherapeutic contract then becomes to offer the client the positive experiences missed in former development as a person, or to offer new alternative responses. The objective is that the client transfers this unique experience from the psychotherapeutic context to real life.

Of course, discussion and understanding of the reasons why the person was suffering can add to the treatment for those who need cognitive reassurance,. However, I shall focus on the emotional experience for the purpose of this paper. The corrective emotional experience comes to complete the client’s life experiences. This can be conceived as a laboratory experience since it is created in the therapeutic context. But it does however truly happen. And if the client experiences it as a real life experience, it will interfere with other problematical experiences and impact on his learning about how to react in the world. According to Alexander (1946), the most basic therapeutic principle was to ” re-expose the patient, under more favorable circumstances, to emotional situations which he could not handle in the past, and to

repair the traumatic influence of previous experiences with the intervention of a corrective emotional experience"(p.66). Hartman & Zimberoff (2004) consider corrective emotional experiences as offering the possibility to "reclaim" one's qualities, such as worthiness, personal power or self-reflective identity" (p.7) that may have been negatively affected by previous experiences. They observed different forms of corrective emotional experience and have extracted general processes that were the arts of this experience. They noted that this process consisted among others in "legitimizing the experience, learning appropriate and realistic self-expectations, re-parenting the inner child, learning to discriminate between past and present, reforming and repatterning the experience, reconnecting memories and emotions to events, practicing being in the here and now, giving meaning to past events that were experienced as bewildering".

For a corrective emotional experience to happen, it is suggested that the person is taken 'back' to the difficult emotional state to start from that place for change. It is indeed the emotions, thoughts and reactions associated with the specific situation that have to be targeted for change so that the person can have other emotions, thoughts and reactions to that specific situation in the future. Foa (1997) suggests that there is emotional engagement with the traumatic memories, that there is a special processing of the traumatic memories to organize, streamline and articulate them and that there are adjustments in the person's core schemas, or beliefs about the world being unsafe and oneself as incompetent. Hartman (2004) even states that being in the same state of mind as existed at the time of trauma -that is intensely emotional and dissociated- facilitates access to the potential to change the original programming.

2) Body therapies

Observations that verbal therapies were often insufficient (because the client could not easily verbalize the experience), and after positive experiences of clients in physical therapies, a whole core of so-called *body therapies* emerged. These are very different and based on different theories and currents, but there are some common characteristics and I will present the rationales that can be applied to Dramatherapy and Psychodrama viewed as Body therapies.

a) The *expressive body*

There is a need to pay more attention to the physical communication in therapy: "the body sensed from inside, the body perceived from outside, the body in action in movement and non-verbal expression, the body in contact with an other body" (2003, Leijssen, p.2). In 1982, Murphy insisted on the importance of analyzing movement and free association in the body to complete an analytic therapy. The story is not only contained in the words but a big part, if not the biggest part, is to be observed and worked through the body. The creative arts therapies and psychosomatic approaches pay attention to meanings that are attributed to the body (Grainger, 1996). It is the history of the body that confers its specific meaning and emotional reactions are markers of those body stories. In this current of thought, a physical symptom is *talking for* the person. As if the past event had been stored in the body when it could not be stored cognitively (see part on dissociation; II,3,b). There is no need for discussing the physical reactions but the therapist can analyze the corroborating evidence of after-effect of traumatization: emotional, behavioral, and somato-sensory responses such as conditioned startle response, anesthesia and freezing, dissociation,

and sensory-level re-experiencing of the event (Nijenhuis & Van der Hart, 1999). Lyons-Ruth (2001) insists on the importance of context of communication more than the content. This approach suggest becoming very aware of the messages the body is saying and interpret what was not said verbally.

Those stories that have been stored may have been so to protect the mental health of the person at a time when it was too much to deal with, but the consequences are still present and can be the direct source of the suffering in psychosomatic ways. At least it can be the key to understand why the person is suffering. A study shows that women suffering from somatic symptoms naturally come to physical therapy, as if they had the intuition it was what they needed (Price, C. 2004). If the body has recorded stories that the person cannot recall intellectually, the psychotherapist needs to help the client contact those physical memories (see example of Dorothy). As I discussed earlier the goal is not to retrace the pain history but to start the therapy in places where the pain lies so as to change it. Body awareness is a first step toward interpreting somatic memory. Rothshild, (pp.100-102, 2000) advises bringing the client to be self-awareness of expressions and sensations. Mary Sykes Wylies (2006) describes how the simple fact of bringing a client to pause, breath and pay attention to the feelings can help to touch the core of the anguish and have a dramatic impact on the therapeutic experience. Other talk-therapists naturally became aware of the potency of “presencing” (Dougherty P., Hendrick in Rothshild, 2000) when nothing seems to move beyond cognitive recognition. Dramatherapist Penny Lewis uses guesses at the counter-transferences issues that can be worked with through embodiment (in Lewis & Johnson, 2000).

b) The *sensitive body* - stimulate memories. Anchors.

Many therapies that are named “body therapies” involve body stimulation. We saw how experiences are recorded in sensory memories. Everyone has an experience of having memories come back when exposed to a specific sensory context. Smells are strong memory retrievers. This is explained by the fact that smell is the oldest sense and the only one to be directly connected to the thalamus (II,2,b) and the old brain. Smell is the most “visceral” sense. Music is being studied broadly as it is seen as having the potential to place the person in a certain mood state (Martin & Metha, 1997). Memories can be associated with specific musical experiences. The physical state is directly influenced by the physical aspect of music (see Gray Matters: Music and the brain, 1998). Hale (1990) explains how music’s ability to stimulate specific images comes from the overlapping of the auditory cortex with parts of the visual cortex that deals with visual associations. Visual arts influence the mood as well (Lusebrink, 2004). Arts are used to give a special atmosphere to a place and arts used for therapy have been recognized to bring the person to places of well-being. Moreover, visual arts therapists observe that through visual sensations, clients could come to some emotional places where they would not go through talking or thinking. The person would be attracted to specific stimuli associated with particular past emotional experience that still have to be worked through. It is the context of therapeutic use of arts “without interpreting or judging the images and recoveries out from the dark cave within”(Hale, p.274) that allows the person to use the art medium to go to those places. Touch and movement stimulate physical memories as well. The question of touch in therapies, and specifically trauma therapies, is in question. It was observed how strong emotional memories can be associated with direct touch to the person (Rothshild, 2000). In arts therapies, some media have been recognized as

being a strong retriever of emotions. Media associated with water such as clay or fingerpaint (in Lusebrink, 2004) are specifically said to be used with caution. The combination of visual sensation and touch makes it potent. Dance therapy and other movement therapies engage the muscles and kinesthetic senses and are stimulators of emotions as well. Body engagement may lead the person directly to places where the issue lays: in the case described by Vaysse & Boinon (2003), the client 'touched' a suffering place where she felt unable to go further before being able to overcome this state through the use of Dance therapy. I want to emphasize that sense stimulation can bring unpleasant memories back, but that the opposite is true too. It is a proper knowledge and use of those sensory stimulation and the specific client composition and story, that makes the therapy effective and not potentially re-traumatizing.

Some trauma-therapists use this concept with the notion of *anchors*. Anchors are sensory stimuli that have been chosen, together with the client, to bring them back to positive sensations and emotions. Rothshild uses the safe place as an anchor. It was also used by Jorgensen who says that it is preferable to be an "actual, earthly location the client has known in life with somatic resonance in the memory of it such as sights, smells, sounds" (1992). For example, one can repeat the action of touching the nose, or other sensory parts, if this action soothes. Psychodrama and Dramatherapy are strong therapeutic approaches that use the body engagement- *embodiment*- and other sensory cues (visual in the setting and costumes, voices and music) to work with sensory experiences associated with emotions and past experiences. All those physical therapies using sensory stimuli have the capacity to strongly involve the client. "Creating atmosphere that nurture memory is one task of expressive therapists" (Hale, 1990, p. 274) and sensory awareness brings the client to the here and now. Movement makes the client empowered in the action and therefore engage more in

the therapeutic experience. Rothshild (2000) alludes to the importance of giving control to the client when possible: creating the physical atmosphere is a way.

c) The *changing body*- give new experiences

We understood how past experiences, especially when they were traumatic, get recorded into somatic emotional memories (II,2,d & II,3,b). This becomes an issue when "internal sensations become associated with past events, and current reality is evaluated on this restricted information" (Rothshild, 2000). Such people seem unable to respond to the actual situation and their perception is disconnected from the here and now. All their attention is turned towards certain internally selected stimuli. The client becomes an object of sensory stimulation that trigger reactions uncontrollably. Rothshild reiterates a term coined by Van der Kolk, McFarlaene and Weisaeth (1996) referring to this inability to be sensitive to external stimuli and overwhelmed by internal ones. They refer to the *experiencing self* who is the object of feeling all the sensations and emotions associated with stimuli, whereas the *observing self* is aware of new external stimuli and information that can be treated and added to the history of experiences. Trauma therapy should attempt to reconcile both type of awareness - sensations associated with past experiences and actual stimuli - so that the client can address the trauma with the feeling that the present environment is trauma-free

(p. 131, Rothshild).

Many learned reactions disappear naturally when there is no need for them anymore or when the system is able to react differently. Some traumatic somatic memories are deeply engrained and will not fade by themselves. This is when therapy becomes necessary. Certain postures remain as somatic memories, embodied

throughout life, until the foundation trauma is resolved and until the postures are identified and re-patterned (Emerson, 2002 in Hartman, 2004). Then, there is a change in procedural memory (Lyons-Ruth, 2001). Hartman (2004) refers to the possibility to reconnect present emotions to the present situation thanks to embodiment. He talks about reconnecting current emotional experience with its source, redirecting the person from disconnected emotion to connected motor circuits, through cathartic energy release methods such as yelling, throwing a pillow, hitting a punching ball (Hartman, 2004). Rothshild refers to connecting body awareness to emotions. The cathartic physical expression was already suggested by Wilhelm Reich (1949) who proposed breaking down muscular defenses and disinhibiting physical expressions with yelling, grunting and other explosive physical release. However such approach may not be suited to everyone. It is important however to remember the reason for somatic memories. The somatic memory system serves the purpose of maintaining memory while preserving other functions. It is all a matter of economy of energy that one should trust.

According to Pesso (2006), the body also remembers what did not take place and wants to fulfill unmet needs. Following body impulses, the body can answer sensory and emotional drives. Pesso' method is "a complex orchestration that includes memories of the literal past, linked to the present symbolic scene which is presented as part of a hypothetical past. All this, coupled with emotionally laden tactile, auditory, and visual input, gives the client the stuff out of which one can construct new positive images of oneself and the world. These experiences and images enter the psyche at a core level and produce psychological/neurological reorganization"(see Pesso's website). For example, Pöllman (2004) describes the changes in body-image that occurred through therapy in people with psychosomatic conditions. But there is a

pace to respect; the window of tolerance between under-aroused and hyper-aroused has to be preserved, otherwise the client is disconnected from the here and now and taken back directly in the experience of trauma (flashback). Hug (2005) insists on the importance to self-soothe so that the amygdala and the stress hormone cortisol are not overly stimulated taking the person back to the emotional experience of trauma (see II,3,c). The technique of *anchoring* to a positive emotional experience - to give positive value while working through a difficult situation - allows one to offer a new emotional experience to the client (Ogden, 2003). For example, each time one feels anxiety is coming back, one imagines being next to a best friend (Rothshild 2000). The anchor can be real and then become internalized little by little so that the person just has to imagine feeling the positive affect.

d) Body and thoughts - Integration

Only remembering is a cognitive experience, while re-experiencing is an emotional experience. Current body oriented approaches support the value of reflecting upon what one is feeling. For Hug (2003) or Pesso (2005), psychotherapy is about integration and not catharsis. The goal is to facilitate the evolution of affect from its primitive form of largely body manifestation into subjective states that can be verbally articulated. Taking current sensory stimuli into consciousness is our primary link to the here and now. In trauma therapies, Rothshild (2000) refers to “connecting body awareness to cognition”. The use of verbalization is another subject of debate see III, 4, b). For Rothshild, language is necessary and trauma therapies should integrate both verbal and body psychotherapies. The idea is to help the client feel and think concurrently about the traumatic events and make a cohesive narrative of the

sensations, emotions and behaviors associated with the event. Rothshild makes an important point when she explains how the belief system may have actually been changed in the after trauma context. She describes how she works with events following the actual traumatic event and discovers with the client that it is at this time that new associations were made in the meaning system. New statements can be made about the way to view life.

This conscious re-experiencing is the basic foundation of the Therapeutic Spiral Model (Hudgins, 2002). Ogden (2003) and Van der Hart (2000) insist on the need to consciously re-experience the trauma but in a tolerable way. The *containing double* of the Therapeutic Spiral (Hudgins) offers this safety net wherein the second person "holds" the person who had experienced the trauma and is contained emotionally while taking body information into cognitive treatment. It allows the left brain to 'talk' while experiencing the reality of the right brain (see II,3,a). The Eye Movement Desensitization and reprocessing technique (Shapiro, 2001) is an integration technique that is more and more commonly used. The goal is to guide the client to "release blocked emotional experience" and integrate past traumatic events within the present situation by alternating recounting of the event and positive sensations. This integration is stimulated by visual (or audio) stimuli alternating the right and left side and therefore fostering integration of the two hemispheres.

3) Psychodrama.

a) A corrective emotional experience.

Psychodrama is a form of corrective emotional experience combined with reflective awareness. Moreno (1889-1974) started imagining Psychodrama when he was observing children reenacting life events in their plays. He felt the children were actively taking control over their life experiences and playing with the meaning of the situations, replaying them in order to understand them better, or transforming the story so that it was acceptable for them.

Moreno recognized the importance of this physical therapeutic method and the corresponding need to use "spontaneit*y*". The release of spontaneity and creativity is the goal of Psychodrama. In her website, Schutzenberger writes that "playing roles in a safe context reactivates the underlying feelings, gives the person freedom to act and the creative spontaneity necessary for any social adaptation to emerge" (Schutzenberger, A, 2006). Spontaneity is defined as an adaptive response to a new situation or a new response to an old situation (Moreno, 1987; Klein, 2005). Psychodrama is a re-constructive work, an opportunity to experience a situation that was not experienced in the real life, or a way of experiencing an event differently. Psychodrama offers a safe space where the stage is "bigger" than in real life and offers experiences life could not offer. Therefore it offers an opportunity to correct the developmental evolution of the individual where deficits or traumas were suffered (Dayton, 2005).

Psychodrama's early approach to trauma was the re-experiencing of the traumatic situation with the concept of cathartic psychodrama (Moreno, in Fox, 1987). Physical techniques that help the client be in contact with physical sensations and emotions are

a big part of Psychodrama techniques. However practitioners witness the risks of re-experiencing a situation which could re-traumatize a client. Hudgins (2002) makes a point on the need for this type of Psychodrama to be modified, to offer more control to the client. Techniques of *soothing* are therefore necessary to complete the physical stimulation. An important contribution of Psychodrama is to work both on the sensory and the cognitive levels of the issue by the client, and the integration of both. There is a dual awareness facilitated by the other actors and the therapist through techniques of *aside, soliloquy, doubling, mirroring and role reversal*.

When it is the client who proposes the story, it is the director who helps and guides towards experiencing a new ending. However, such practice can be discussed and Hartman & Zimberoff (2004, p.17) find it inappropriate to try to reshape the client's past and play a relationship that we know is contrary to the reality. This may just promote confusion or increase the negative emotion about the relationship: "As I reflect on the moment now, I feel a lot of sadness that such a simple moment only exists in play, and not in reality" (Sophie). Instead, the corrective emotional experience can be about the same type of situation but with a different person. It is the meaning of the situation that matters more than the actual individuals involved.

b) Psychodrama techniques and purposes - Integration

- Physical embodiment, concretization.

In Psychodrama, the protagonist is asked to set the scene up. The protagonist decides on the "where and when" it is to be played, and anchors the scene in time and space; the action will be spoken as if in the present time (Garcia, A. and Buchanan, D.R. in Lewis & Johnson, 2000). The protagonist is the one who

carries and moves the objects around and also describes to the other participants the visual and other sensory aspects of the setting. This is a way to warm the body up, to give the power to decide on the situation and help contact sensations and memories associated with those sensations. At the end, the protagonist is also the one to undo the scene. All this implies personal engagement which is a necessary factor for change. It puts the "mind in action" (Klein, 2005). During the enactment, the director brings the protagonist to be in the physical situation as much as possible so as to stay in the here and now of the experience. One is asked to touch the objects, uses props to emphasize a situation (flexible 'sticks' to kick, musical instruments). At times, other participants intervene to place the protagonist in a physical pause to sense better a conceptual image: this is a c*oncretization*. The protagonist may be pulled by the two sides to feel unable to choose between two possibilities, have to carry a weight to feel the idea of a too difficult situation, have to pull an other person who is dependant or run away from a dangerous situation. The *doubling* technique (where another participant mirrors or simulates a somatic or affective perception) is a technique to foster more contact with the physical reality. The use of psychodramatic methods can complement verbal methods in facilitating the analysis of the many different dimensions of emotional problem solving (Lebovici, 1957).

- Soothing

In Psychodrama the other participants are present to support the protagonist when the situation is too heavy. They can physically, concretely, come to confront a situation together. This is the *soothing double*. They can also be in the place of the central character and experience the difficult situation while the protagonist observes

the scene. They can enter the scene (at the director request) to comfort the protagonist the way a relative of the main character might have done. Before all, Psychodrama requires a context of trust to allow the protagonist to let go of much self-consciousness.

- Cognitive awareness

When the protagonist seems to be experiencing the situation without being conscious of what is going on, the director and other participants intervene to make the situation more evident. This allows incongruities to be made apparent between what is said and what is embodied, and to help explore the meaning of the non-verbal expression (Blatner, A., 1988). The peers can mirror the situation, allowing the individual to actually see others' perception. Participants can also double the protagonist and say the ideas they feel the protagonist may be having without daring to say or may propose a way to perceive the situation the protagonist did not see before. The director can also ask for a *role reversal* so that the protagonist sees from the outside the situation while it was impossible when in the action. *Soliloquy* is used to bridge reflection with action, it is a process similar to free association but the protagonist is moving while speaking.

- Integration

Finally - but importantly - the director brings the protagonist from experiencing the action to reflecting about the situation alternatively. *Mirroring, doubling or role reversing* techniques can have the effect of making the protagonist aware cognitively and consciously while feeling and experiencing a physical situation, allowing for an integration of both experiences. The technique of *aside* consists in asking the person

to speak what is thought and not said. It is directly inspired by theatre and used when the protagonist appears distant from the scene, lost in thoughts and when the affects seem incongruent with the words. At the end of the Psychodrama, participants share about their own experience. It is a time to integrate real life stories as experienced by diverse persons and the enacted situation; it is a time to think about the different alternatives and also to think about the experience that just happened on stage from an audience's position. Hug (2005) emphasizes the importance of this type of reflective Psychodrama in opposition with a cathartic Psychodrama in which the protagonist revives the events but does not make the connections back between the feelings and the thoughts about it.

- Surplus –reality - Imaginary scenes in Psychodrama

Most of the time, scenes are inspired by real situations which the participants experienced in their lives. The transformation relates to relationships, situations and concepts that are perceived as coming from actual past situations. Future scenes, that are the ones to be imagined naturally following the present situations, can be enacted as well. They are very biased toward reality with characters taken from real life. In Psychodrama, imaginary events can also be played out. Moreno (in Fox, 1987), and later Blatner (1988), explain the purpose of such *surplus-reality* scenes. " (…) The modality of play is a powerful and, at times, essential vehicle to provide some distance and ego protection to change the attitudinal set, to function as an intermediary between the polarities of fully committed action and passive reflection – between subjectivity and objectivity, between the aesthetic and the pragmatic, between spontaneity and calculation - And especially, through use of imagery, play serves as an avenue for entrance into the complex world of feelings, mythologic

complexes and spiritual dimensions." (Blatner, A., 1988).

We will now describe a method that fully uses imagined characters, situations and stories. Dramatherapy is an action method where transformation occurs in the imaginary story.

4) Dramatherapy

a) Embodiment

The core principle of Dramatherapy is to identify "repetitive phenomena and developmentally associated roles" (Lewis, 2000). These patterns are the consequences of past experiences on the individual. The therapy "techniques of inner drama, redramatization of object relationships, psychodrama dreamwork, as theater, sand play embodiment, dramatic improvisation, songs, movement and drama are used in combination to resolve and clear these habitual patterns" (Lewis in Lewis & Johnson, 2000, p.157).

Jones (1996) insists on the need for embodiment in therapy for the purpose of a *here and now* encounter in order to deepen the experience, to explore and transform it. One can remember how embodiment facilitates sensory mobilization and therefore emotional retrieval. Johnson's (2000, pp. 89-90) method of developmental transformation is before all an "embodied process in which whenever possible the body is kept in motion through movement, gesturing or speaking". His approach consists in taking the "Body as Other to Body as Presence". The individual does, little by little, re-own one's body from an object being manipulated by the world to a subject that can act upon this world. Johnson relies on the understanding that the

bodies are filled with past experiences influencing the encounter; his approach consists in filling the ”dramatic playspace” with reference to the feelings and perceptions in the moment. Little by little, the person withdraws impressions and feelings influenced by past experiences and is able to experience the present situation. Sue Jennings (1998, 2001, 2005), is a dramatherapist who is particularly interested in techniques using embodiment for facilitating developmental evolution. She created a method called EPR (Embodiment, Projection, Role), where she sees embodiment as the first step for the person to enter a healthy way of being. For her, the body is the primary means of learning, and traumatized people need extended physical play to rebuild health and a confident body. In her conceptualization, based on Piaget’s views of development (1972, 1990), most of our early physical and bodily experiences come through proximity of others. From a state of “body consonance” to “body echo” and “mirroring”, the infant embodies with the mother, detaches and becomes. In her approach she integrates “body massages, body care, appropriate touch and trust, techniques of embodiment such as movement, sensory stimulation, singing and rhythmic games and stories with moving as nurture of the body”. Lewis (2000) mentions this developmental re-dramatization of the mother/child embodied relationship by the client and therapist as a sine qua non for transformation. Jennings (personal notes, 2005) particularly describes the use of body sculpting with women having been abused or prostitutes. It enables them to sculpt the new body as well as the old body and through exaggerating to transform them. After the person has been able to embody, projection techniques can be used, where the story is projected upon an external object. Finally roles are played out. We can see how dramatherapists intuitively use embodiment for developmental change by getting rid of old reactions and being more reactive to present situations.

b) A matter of consciousness.

- Unconscious physiological change?

When there is a traumatic situation, there is a fight/flight autonomic response, the verbal Broca area is inhibited and everything gets stored in the right hemisphere and sub-cortical areas (II, 3, b). The traumatic event and memories are stored unconsciously and will be retrieved unconsciously. Many therapies are based on the theory that there is a need to develop a more elaborated narrative of the trauma (Cozolino, 2003). Questions of consciousness are often raised about memory types and we remember psychoanalysis discussing its efficiency by a leading to consciousness of unconscious knowledge and emotions. A whole area of research and controversies is about the neurobiology of consciousness (Tassi, 2001). For LeDoux (2005), feelings are what happens when an emotion system, like the fear system, is active in a brain that can be aware of its own activities. Would feelings therefore require conscious awareness? Damasio (2000), and Panksep (1992), believe that feelings are due to more primitive activity in body sensing areas of the cortex and brainstem. Is it feelings and conscious awareness of the emotions we are targeting in therapy, or can we only work and foster changes at a sensory level? In behavioral therapy, the work is to teach new physical reactions to usual stimuli and thereby sensory memories are transformed. There are numerous cases of blindsight, anosognosia or hemineglect (Ramachandran, 2003) when patients do have an unconscious, sensory knowledge but do not consciously recognize what they know. If the system of emotional memories is actually separate from the intellectual memory

system (II,3,a & II,3,b) it can be hypothesized that the whole therapeutic process could be at the level of those emotional memories and around the sensory and affective value given to events. Split brain experiences demonstrate how the left hemisphere is actually creating excuses by avoiding to see the real context and by keeping away evidence as long as possible. This would stop people from changing! But when the client's words suggest that unawareness, there are physical symptoms showing that the body knows! So, the body is conscious and does not lie about what is happening! If the body can learn about the trauma, it can learn again to feel better and little by little the person does not demonstrate physiological signs of trauma anymore. For example, a woman who was attacked in a specific street may have fear reactions just being in the street, with time and new experiences when she feels secure in this street, the fear reactions can decrease. However, one may keep the intellectual memory of the past negative reaction (if the woman remembers she is afraid of the street) and therefore a negative approach of the event as long as the work is not done at an intellectual level as well.

- Awareness for complete change

We have seen that practitioners in Psychodrama - researching in the field of neurobiology - propose a dual integrative work that is facilitated by Psychodrama techniques (Hug, 2005). They propose to first work with emotional memories attributed to an event and then complete the work with a cognitive processing of the emotional changes that occurred. Hartman (2004) takes this position when he states that semantic (narrative) memories, remain unconscious and are highly influential throughout life-span until they are brought to consciousness and changed (Hartman,

2004). Pally (1998) in her attempt to bring psychoanalysis and neuroscience together, uses what is known about memory and consciousness to explain how memories are symbolic constructions and how bringing memories to consciousness as scenes and words allows us to rework those memories. Many therapies use verbal approaches to be sure the client is aware of the change at a conscious level. However, it is crucial not to confuse non-verbal and unconscious! Verbal therapies base their thesis on the need to talk about the issue so as to make it conscious! In Gazzaniga's (2002) experience, a split-brain woman is presented a nude man's photograph (in her left field of vision and therefore right visual cortex). She says she did not see him. However, her physiological reaction showed she saw the man! Pally (1998) hypothesizes that her brain split prevented the transfer into the left hemisphere (verbally conscious). She had effectively experienced the situation but could not tell it happened to her. These examples demonstrate how changes can actually occur without apparent consciousness. The left hemisphere allows a verbal recognition of the change. However, we have a unique and revolutionary adaptation –dramatic ability – that distinguishes us from other animals , and is not dependent on language (Whitehead, 2001).

- Awareness is a sensory consciousness – presence in time

Consciousness does not need to be verbal. "Consciousness essentially refers to awareness and the building up of mental representations with or without possibility of verbal report" (Tassi, p.15, 2001). When one engages actively in therapy, one is conscious of what one is doing. It is the intention that defines the consciousness of the event. Other studies (in Tassi, 2001) demonstrate that consciousness is the effect of a

sensory perception different enough from what was expected so as to allow the neural system to consider it. When a client experiences a new alternative perceived through the senses, there are patterns of neurons that are put into use and the feeling of consciousness arises,- the "aha" effect. Llinas (in Pally, 1997) explains how *total consciousness* is the conjunction of the content and sensory aspect of consciousness. For Van der Horst (in Tassi, 2001), consciousness is the ability to reflect upon one's position in the world, to order and define impressions from the environment and therefore to locate oneself in time. Consciousness does not have a specific cerebral location, rather it is certain types of interactions between different neural systems that define it. The temporal context of the content is carried by the intralaminar system in the thalamus. It is the experiential aspect that gives a place in time to the conceptual aspect. In this perspective, one is conscious of change through sensory awareness. The difference between consciousness and awareness can be summarized as: "consciousness is the awareness that we are aware" (Whitehead, 2001) and emphasizes the existence and importance of sensory awareness. Embodiment and feeling in the here and now become a way to consciousness and hence to change. What needs to be emphasized are the different states of consciousness (Tassi, 2001).

- States of consciousness: self and other-consciousness. Mirror neurons.

Consciousness has been recognized as a variation from unconscious to full consciousness with all intermediate states of consciousness in between. But humans are also capable of meta-consciousness. For example the difference between feeling fear and being conscious that one is afraid of something (Damasio, 2000). This second ability is termed *self-consciousness* by Edelman (1989) who describes it as the

ability to symbolize interactions and free them from the present. For Niedermeyer (in Tassi, 2001), to be conscious is to be aware of things and the things may be outside ourselves. The person can conceptualize the event and the interactions between the objects of this event. Oneself becomes an object interacting with other objects. With self-consciousness, one is able to own an event, and most importantly to manipulate it. Words are symbolic representations of an event, its interactions and other objects. By talking, one can manipulate and change the order given to the event. In verbal therapies and Psychodrama, the goal is to re-order the meaning given to one's interactions with the world: words and their meaning support this work. We can hypothesize that work with narrative memories is what is done in Dramatherapy but at a further self-conscious level. Whitehead (2001) expresses this non-intellectual value of words when he says that "even when we do think verbally, our words are seldom if ever disembodied". The person is actively and consciously working the event with a narration having more or less *distance* with the dramatic event.

Here enters the notion of *self-reflective consciousness* or *other consciousness*. Before becoming conscious of one's own existence, the infant observes and learns the world through others, specifically the mother and then puppets. One can see the external world and its interactions before actually internalizing them (Jennings, 1999). Whitehead (2001), in his *social mirror theory*, explains that "self awareness depends on social mirrors and shared experiential worlds [and] we cannot have mirrors in our minds unless there are mirrors in society". It is the same process that allows learning through visualization, for sport or in therapy, through the use of *mirror neurons* (Ramachandran, 2005). It is the process that makes Dramatherapy specifically efficient too. The client works with the issues and finds alternative solutions on a projected medium, the puppet, the story and even the character being

enacted. The action is consciously treated but at a level distant from self-reflection and therefore bringing fewer personal emotions.

c) Distancing & metaphors

For Lewis (2000), embodiment is perhaps one of the most powerful art techniques to recall memory. But she also suggests the use of distance and containment, through drawing for example. Lewis does not believe in re-experiencing the trauma but in "the relationship between the theme and the related child-self of the person"(Lewis, 2000). This approach is very close to trauma-therapist Shore who considers that the treatment does not need to address the trauma itself but the way to regulate it (Schore, 2003). Lewis suggests that in order to transform, the client and therapist must enter the bipersonal field of the imaginal realm in a fully embodied, enacted manner, in this realm between real and unconscious. The idea of playing distanced roles in Dramatherapy is specifically noticeable since an important paradox is exploited here: the ability to come closer to the experience by being more distanced (Jennings, 1998)! Mirror neurons (Ramachandran, 2005) is the neurobiological structure that makes change possible in the individual witnessing a situation. There is an involvement by resemblance to one's one situation.

We can hypothesize that working with stories that bring strong emotions into a person and making links between elements in the story raises the emotions associated with the situation and allow them to evolve through the story. When words are used they do not have to be self-centered but relate to the objects that are symbolized and manipulated. In Dramatherapy, words are not rejected but the priority is not given to them, they often emerge to follow a sensory-emotional work. Riley (2004),

emphasizes the importance of working on this integrative level. In her work, she combines the sensory aspect of projecting an image, a right hemisphere process, and contemplating the meaning of that image, a left hemispheric activity. For her, this can lead to new creative choices when the client can work over and change the meaning given to an image. The use of words is not at a cognitive level but at a meaning level (Riley, 2004). Metaphors can be considered so, as they use words and enter the meaning framework of the person without having to be talking about oneself. In therapy, one can work with the meaning and emotions associated with the word and thus pacing the client according to the needs. In Dramatherapy, we may say that we trust sensory and emotional changes that occur at a conscious level that does not have to be cognitive. “Maybe we have to learn to bear not knowing; to stay with the chaos and allow the meaning to emerge” (Jennings, 2003).

IV. Embodied Psychotherapies give examples

1) Psychodrama

I chose to use Psychodrama examples because one of the core principle of Psychodrama is to actually bring the person to experience corrective emotional experiences. The person starts from an actual personal real situation (or sometimes imaginary) and the psychodramatist guides the action to places of emotional trouble. The Psychodrama approach appears as an intuitive method to offer a new enacted experience where the person had experienced difficulties. Moreover, there are specific Psychodrama techniques that are used to increase sensory and emotional experiences (see III,3,b). With examples I hope to describe how those techniques

facilitate the corrective emotional experience, specifically, how they facilitate sensory stimulation and sensory memories retrieval; how these retrievals are accompanied by emotions; how the action and the opportunity to experience new alternatives may help to transform the emotion and how this therapeutic experience definitely impacts the somatic memories of the person and therefore the meaning attributed to the previous difficult experience. These examples are taken from a survey I gave classmates (both Dramatherapy and Art-therapy students). We had experienced Psychodrama as a group during our training for about height sessions. These five following open questions were given six months after the last Psychodrama session. I asked it to be short. Classmates were only given the title and purpose of my research paper.

a) Survey questions and examples

1. Was there any strong moment you remember?
2. Describe what if anything helped you BE in the situation
3. Could you describe how the emotion evolved during this Psychodrama experience?
4. Did you observe any change relating to the situation and what changed after the Psychodrama
5. Why do you think the specific situation played in Psychodrama emerged?

Example 1. Eva.

Question 1. “In the Psychodrama, I was working on my past relationship with my father. On the fact that he wasn’t present when I was little and therefore doesn’t know me as much as a father could know his daughter […]. At a certain point, I was asked to play myself as a little girl and sit on my father’s laps. I did it […] but I felt so uncomfortable. As if I didn’t want to release my weight on him. […] I realised the metaphor that I was “a weight for him”.

Question 2. “In an other Psychodrama, I suddenly stood up in the role of the father […] and defended my daughter. I hadn’t learned to do it in my own life […]; it gave me a practice. I don’t feel I was completely changed about how I am in a conflict but it surely took part in a long and subtle change that emerges in me[…].”

Question 3. “[…] I was at first overwhelmed with emotions as I always was in conflicts with my father. A mix of sadness and anger that I don’t dare to express in front of him […]. And powerless. Throughout the Psychodrama enactment, […] I took some distance from the scene. Little by little, I was able to laugh about the situation, and then to let go […]. In my own life, I realised I had to let go of this issue.”

Question 4. “A bit later, as extraordinarily as it seems , I observed that my father changed […]. “

Question 5.” The situation was enacted because it was what was making me worried at the time. […] Sometimes inside me, I was at a place when I had to take some

distance from this. This is what Psychodrama did […]. During the workshop, I did it through a fictive situation, but the internal journey was true. […] We play, but the emotion is completely realistic and true."

Example 2. Michele.

Question 1. " […] There was an "argument" scene in my drama in which the therapist embodied the other person and concretized the desires I had towards him. The therapist and I engaged in a physical 'battle' using soft cushion bats fighting against each other (in play) and I got a physical/somatic sense of the emotional battle I faced inside."

Question 2. "The concretization of feelings, seeing them externalized, having my peers respond to me and challenge me 'as if' they were the other people in my story. The 'therapist' moved me along through a dramatic experiential representation of my life, from scene to scene. […] It was a very powerful experience. "

Question 3. "There was a great feeling of catharsis as I played out my story and felt as if I had come to insights and conclusions inside of myself through the psychodrama."

Question 4. "This helped me to gain a better understanding of my response patterns, fear of confrontation, and opportunity to change my attitudes, and ultimately my behaviours in my particular situation. I think back to my experience in Psychodrama often, I felt a real shift in my attitude towards my relationship after I participated and played out scenes from my life. The areas where I was blocked or stuck in my

relationship became clear as they were externalised. I realised that I had more power in my situation, in my attitudes and responses towards others, and the beliefs I had constructed in my mind about my relationship. […].”

Question 5. “The situation was immediate in my life, but the underlying difficulties and blockages I faced in that particular story came from other more serious and deep issues that I tend to avoid dealing with.”

Example 3. Fanny.

Question 1. “A strong moment for me was when I did the scene where I was confronting my dad. I was sitting down with him talking about how I felt about our relationship and how I am changing. “

Question 2. “The fact that I set the scene prior to starting to play, the fact that I directed my colleague on how to play the role of my dad helped me be in situation.”

Question 3. **“**At first I was nervous. I thought about controlling what would happen. As I started to play I couldn’t think of any defenses anymore (like controlling the situation) because I got emotionally involved right away. […] So there was anxiety in the beginning, then my actually feelings came out: shame, confusion, anger, sadness, feeling powerful and independent. After that emptiness, calm, self-love. I was

exhausted!”

Question 4. “Yes, I realize where I was, what I still wanted to work on, I also was surprised to see how much I had changed. I also realized that I could not change others, only myself in relation to them. I felt more confident and less angry.”

Question 5. “Because it was my prevalent conflict. […] “

Example 4. Sophie.

Question 1. “[…] One group member played a 'mate' and came home to meet my family/ father”.

Question 2. “[…] .Sometimes I wanted so badly to BE in the situation, but a life-time habit of being very self-conscious kept me from it. Sometimes, I suppose, I got caught up in the movement of the moment and was really there. I think having a lot of movement helped: walking and talking, not just standing.

Question 3. “At the time, the moment was full of self-consciousness, so there was a hyper-vigilance. Within that was a secret enjoyment, a sort of illicit pleasure, which

arose from how much the Psychodrama act matched a fantasy. The emotion is still evolving. As I reflect on the moment now, I feel a lot of sadness that such a simple moment only exists in play, and not in reality."

Question 4. "Increased awareness of a dream; acknowledgment of the circumstances […]. I can't make direct links from the situation I played out to life situations that followed."

Question 5. " […] I think it's because it is the saddest part of my life, and people were really opening up in our class, so maybe I wanted to disclose as well. Plus: It is often on my mind."

b) There is an inherent need for change.

Based on these descriptions of experiences, one can notice that the situation that is enacted in Psychodrama answers an emotional need: "The scene emerged because it was my prevalent conflict" (Fanny); "The situation was enacted because I was what was making me worried at the time."(Eva), "It is the saddest part of my life" (Sophie). The person refers to a problematic situation in real life that has been going on for a long time, from childhood. The person seems "blocked" in a type of reaction to a situation. This is not satisfying: « the underlying difficulties and blockages I faced in that particular story came from other more serious and deep issues that I tend to avoid dealing with" (Michelle). In neurobiological terms, we can recognise the learning

process where the child has learned a specific behavioral and emotional reaction to a specific situation that was repeated in the childhood (II, 1, c, & II, 3, c). At the time, the response was the most appropriate for the child's possibilities. There was consolidation of the physiological response in long term somatic memory. At a neural level, we can imagine how specific neural patterns, synaptic reinforcement and some type of neurotransmitters get sensitised (II, 1, b) so as to react quickly when the person is in the situation. This type of physiological reaction is so quick that the person does not decide and is preceded by the emotional reaction: "I was overwhelmed with emotions."(Eva). Later in life, when the person has to respond to a situation, the reaction is not adapted anymore since it prevents the person from acting (II, 3, b, II, 3, c) and also triggers unease and negative feelings. The body knows a change has to occur so that the person finds a new way to respond. In a natural situation, the individual that does not find a new way to respond may disappear!

c) From non-verbal to verbal.

At the time of the traumatic events, the child may have been unable to understand and verbalise the issue: "A mix of sadness and anger that I couldn't express to him" (Eva). This emotional reaction is recorded unconsciously and may not even be expressed verbally (II,2,d). It gets stored in memory areas independent of verbal, left-brain hemisphere- encoding (II,3,a & II,3,b). During Psychodrama, it feels as if the event can be verbal again, as if there is an integration of the emotional experience with verbal understanding: "This helped me to gain a better understanding of my response patterns, fear of confrontation, and opportunity to change my attitudes, and

ultimately my behaviours in my particular situation"(Michelle). There was an " increased awareness of a dream, acknowledgment of the circumstances"(Sophie). There is a left-right hemisphere integration (III,3,b). At the end of Psychodrama, this verbal process is strengthened when the individual is given the opportunity to discuss what happened.

d. Sensory stimuli retrieve somatic memories.

Psychodrama techniques seem to help the recall of sensory and emotional memories: "The therapist and I engaged in a physical 'battle' using soft cushion bats fighting against each other" (Michele). Sensory memories are stimulated in the here and now and the sensation is as strong as if it was really happening in the moment: "I suddenly stood up in the role of the father and defended my daughter. I had not learned to do it in my own life; it gave me a practice" (Eva). This is an opportunity for the individual to use the sensory stimulation and sense the situation in a new way and for somatic memories to be transformed. For some, left-brain rationalisation has been so strong that it becomes almost impossible to feel anymore, Psychodrama techniques help to overcome this pattern: "I wanted so badly to BE in the situation, but a life-time habit of being very self-conscious kept me from it. […] Sometimes, I suppose, I got caught up in the movement of the moment and was really there. I think having a lot of movement helped: walking and talking, not just standing" (Sophie). When the body is in movement, every muscle, the nervous and the hormonal system are put into use for real and are recording the action that is happening: « It was play,

but the emotion was completely true and realistic" (Eva). The sensory system stimulates the limbic system and physiological reactions get recorded in that moment (II, 2, e). The feeling of safety for example will be recorded, the feeling of power as well. Evaluative systems will analyse if the new answer is more valuable than the previous one (II, 4, c). Memory systems will record it in short-term memory at first and when it gets repeated and confirmed, when the body learns that this new reaction is adaptive, the somatic response will get registered in long-term memory (II, 1, b). Memory will not record the new response in itself: with the involvement of the hippocampus, it will record the whole context of the situation.

e) It is all about meaning. Generalisation of the affective value

We described that somatic responses can be transformed and new, more adapted reactions can replace previous ones. However, the process is far from being a passive learning process or reflex conditioning: "I was exhausted" (Fanny). The individual is active in choosing the subject to work on. The work is on issues in an "imaginary" situation with colleagues that represent people from real life: "having my peers respond to me and challenge me 'as if' they were the other people in my story". (Michele). The person can play in the scene as if it was in real life because the experience is generalised from context to context (II, 3, c). It is how a present experience can also have links with past similar events: "The situation was immediate in my life, but the underlying difficulties and blockages I faced in that particular story came from other more serious and deep issues that I tend to avoid dealing with." (Michele). So, when the person is working on a present situation, it is influencing

every other situation that has similar value. The same way the person chose the characters and set the setting in a way inspired by the personal experience, cues are taken from this therapeutic context back to the external world. It is the affective value, the meaning of the experience that can be transferred to other situations. For example the meaning of “feeling empowered and independent” (Fanny) is transferred, and not only to the person that was played in the enactment, but to other people as well. The power can be transferred from the particular situation to other similar situations in her life. At a neuronal level, we can hypothesise that its is the interaction of systems that allows such transfer (II, 2, e). It is the general feeling of power connected to the sensory and emotional context of confronting others that is transferred. If the affective associations remain only connected to the actual events, the person risks remaining with a feeling of disappointment since a real past event cannot change: “As I reflect on the moment now, I feel a lot of sadness that such a simple moment only exists in play, and not in reality.” (Sophie). However, we can impact on the affective value and on the meaning we give to the situation. This observation reminds us about the interest to work with situations that do not appear directly connected to real life: this is what Dramatherapy does!

2) Dramatherapy- real transformation in an imaginary scene. Lucy

a) Past experiences and the therapeutic experience

Remember Lucy’s example I presented at the beginning. This example of a corrective emotional experience occurred when we least expected it. I had been

working in a home working with ‘at risk’ young girls for over six months; the group’s composition had changed and this group was the third one. The young girl I am going to talk about, (I will call her Lucy), had been coming to the Dramatherapy sessions from the beginning. From what I knew of her history, she had been taken to this home because her own mother had been recognized as unable to take care of her daughter. The mother has apparently psychological difficulties and Lucy had had to take care of her. Finally, for reasons unknown to me, the court had asked the mother to choose between staying with her partner or keeping her daughter: she had chosen the partner.

Lucy had appeared to be very sensitive to others’emotions and reactions and even wanted to leave the group when an other girl had been removed. She, most of the time, was very tied to one of the other girls who had a dominant personality and Lucy was supportive of what the other girl wanted. Her dynamic in the group appeared to be both very influenced by others but also to be concerned about the group well-being and cohesion.

During the first group, for the purpose of a short video, she had been enacting the role of a teenager wanting to become a singer and getting rid of an uncaring boyfriend. In the second group, for a game around characters inspired by Landy’s list of roles (1991), she had to choose roles among a list and enact them. These are the roles she chose: “who she is”: “coward”, “who she is not”: “selfish person”, “who she does not know if she is”: “a child” and “who she would like to be”: “a lover”. In this second part of therapy she was mostly turned towards the other participants and mostly enacted supportive roles, she specifically insisted on the fact that she felt she was not selfish. In the third group, for the purpose of an improvisation scene, she had chosen to be a teenage girl inviting friends to a party where they would dance, have fun between friends and flirt with boys. The rule was to improvise within these

selected topics. The roles had been distributed to enact the party and the music was chosen as well. However, at the moment we were going to start enacting the scene and asked for a review of the roles, Lucy suddenly gave a whole new distribution of roles, and a new story emerged. Lucy decided she was four years old, and the other teenager and myself were also four. She had also stated that my co-therapist would play her mother. Lucy directed the scene as follows: the kids are playing together when the mother enters and the kids hide. The mother comes in with a birthday cake and congratulates her daughter. The whole scene was improvised and everyone participated to the action. Lucy clearly demonstrated enthusiasm and a very playful engagement in the enactment. She never commented on the scene she had asked for.

b) A somatic need for change

We enacted the scene and Lucy was apparently thrilled. She, who had been reluctant to playing many times and who had always let herself be a second role suddenly chose to enact the main role. Moreover, she asked my co-therapist to play a very sensitive second role, her mother. She was very clear about who was who and how it had to be played. It was as if she intuitively knew the actions to fill a gap in her emotional experiences. How did it happen that she suddenly felt like playing a four year old girl? We can hypothesize that the therapeutic atmosphere had become safe enough, that she felt the therapist could take care of the group and she did not need to. She could finally let go of that role and play a new role that was waiting to be enacted. How did she choose the story and the characters? She intuitively chose a moment that was symbolizing her mother in a very caring moment: offering the cake, and showing her she could be a small child. When one takes into consideration

developmental stages, it appears clear that Lucy had lacked the stage when she could be cared and protected by her mother. She had not been able to be in the role of the child, the role that she "does not know if she is". In her embodiment, she offers her whole body, senses and emotions and creates the opportunity to be the child and have a mother congratulate her for being so- wishing her a happy birthday! In previous sessions, Lucy had always remained in her role of the care-taker, the one she had learned how to be: she was taking care of her mates, she was taking care of the safety atmosphere of the therapy. For sure, she was not "selfish". It is as if she had correlated the role of the child, the one to be protected and cared for with the selfish one that she did not want to be. The idea of "being a child" may have been associated with negative emotions such as guilt. In the video-clip in which she was a singer, she had already experienced being in the main role, being applauded and the center of attention. She had verbalized how her character would not be dependant on a boyfriend who did not really love her: she made a comparison with her mother and her boyfriend. Lucy had had great pleasure in sending this boyfriend away. The work only lasted six months, but we can see how she gradually enacted roles that she did not play much in her real life, how she little by little became the center of attention, and the one to be cared for.

c) What happens in neurobiological terms?

Lucy had not discussed her need to be a child and there are is a good chance that she cognitively was not aware of this need. This can be explained both by the fact that human left-brains find rational explanations and excuses to make sense of all the behaviors and reactions they have even if they are not appropriate (II, 3, a). We know

that Lucy had been experiencing a constantly emotionally uneasy situation . Even though she might have suffered from it as a child, the brain can dissociate so that the negative experience does not reach cognitive elaboration (II, 3, b). However, her right brain and emotional memory systems brought her back to a time when something may have been missing. In the enactment, Lucy really experiences the situation of being a four year old child congratulated by her mother. At that same moment, her senses record the feelings of a child's body (II, 2, b & II, 2, d). Her whole body plays the child, her voice is that of a child; the sensory memories are retrieved of the child she was. Her desires, her joy, her naivety are similar to that of a child too. In the limbic system, neuronal systems (the reward system, see II, 4, c), neurotransmitters (dopamine and/or oxytocin) and hormones (adrenaline) are activated for joy (II, 2, c). Since the experience remains positive in the context of the therapeutic experience, the cerebral areas used for giving affective value to a reaction are stimulated. A whole pattern of sensory stimuli and physiological reactions giving the emotional value are stimulated and recorded in that moment, there is a conscious sensory change (III, 4, b). Those sensory activations and emotions get recorded as a global situation thanks to the hippocampus (II, 2, e). From now on, Lucy's neuronal system has recorded that sensory situation of being cared for and it can be associated with positive emotional response. For this positive pattern to be strengthened and to counter the learning of negative emotions associated with being a child, the positive experience has to be repeated (Freud called this "working through"). At a neurological level, one may refer to *long-term potentiation* leading to long-term plastic changes of the wirings (II, 1, b). At a molecular level we can imagine that there will be changes in the type of synapses and neurotransmitters used so as to affect the emotional neuronal substrate that takes care of giving a positive emotional value (II, 1, a).

How does the brain know what experiences have to be repaired? It will need much more research to answer this. However, we can observe that the body knows how to repair itself after a lesion. Tissues repair themselves naturally. The body knows what should be where. Experience demonstrates that there are hormonal and nervous systems that serve to indicate the map of the body to be made in the embryo in development. This information is certainly noted at a genetic level. The same may be true to insure that the person develops emotionally well too! Resilience (defined by the APA) refers to this natural capacity to find adaptive answers to traumatisms of life.

3) Dramatherapy-projection; consciousness from a distance, Dorothy

a) History: life and psychotherapy experiences

This client is a fifty years old lady who is brought to me in the psychosomatic ward. She has been seen by many different physicians for her skin disorder. She has a strange condition where her skull skin grows over her hair. She is also scratching her skin a lot and has quite extensive injuries on her cheeks and neck. She has been treated for depression repeatedly. She feels quite powerless. In our sessions, she quickly comes to a topic that is still quite important in her life. She tackles with the existence of God or at least questions that he listens. In her childhood she indeed strongly believed in God and called him each time she felt in distress. She describes a childhood with an abusive mother and an under-protective father. She felt she had to be the best to be loved but it was never enough, she says only her brother was loved by her mother. She now feels that God did not intervene enough when she was in

need. Catastrophes in the world do also make her doubt the existence of God or at least that he listens. After a first marriage with a man that she divorced, she has been living with a woman for many years.

During the first Dramatherapy sessions, Dorothy builds a theater stage where her brother first and then herself are the only character. She gives her brother and herself similar clothing. Describing the scene, she brings pictures and objects from her past among which a picture of herself with long hair from the day of her wedding. Talking about her past, she particularly describes a scene where she is in her bedroom as an eight years old child calling for God who does not listen. Dorothy describes herself at the time with long braids and tells me her mother was purposefully hurting her when braiding her. I bring craft materials and ask her to create a character of her story. She makes God and specifically insists on plugging his ears so that he can not hear. She also covers him with a plastic sheet where he is split from the world. Dorothy insists on making the character of God with lots of short hair even though it is not an easy task. She places him on a sort of podium, where he dominates the other characters. The next time, she makes a puppet representing herself with two long braids. I ask her to place the two characters in position one comparatively to the other and she places the puppet of herself on the top of the hill and God below. I do not say anything until I ask her to make the characters behave and she clearly refers to the puppet of herself as to the God's puppet. When I make her realize she has taken the other puppet, she does not look so surprised and interchanges the characters without any comment. Some sessions later, she has cut her hair and states this action is a meaningful event towards her freedom.

Figure 18. Projection in Dramatherapy

Dorothy creates a representation of herself in this puppet that she can manipulate. Notice the importance of the hair. She also made a puppet representative of God. She transforms her story through transformation of the interactions between her puppet and God's puppet.

b) Manipulating objects- Transforming the meaning

We did not directly address the meaning of hair for her; but it seems that long hair were the representative of her femininity and her lack of liberty. She clearly made a link between her long braids being painfully tied by her mother and the long hair of her day of wedding. We can hypothesize that hair had a taken the meaning of lack of power, lack of freedom, and even pain. Twice she apparently unwillingly confused

the masculine roles of her brother and God with her own character. The role of the man being associated with being loved and having power and success. For her, interchanging the two puppets may have been a way to experience being powerful, free.

This experience can give her the courage to try to have more power over her own life without expecting more from others. We can connect it to her life choices: separated from a man who was preventing her from having an independent life, she is now living with a woman. The concept of femininity appears to be strongly connected to the long hair. We have the case of a psychosomatic symptom where her physical condition represents the painful symbolic of her hair. The painful emotion is generalized to any context including hair (II, 3, c). Through this physical symptom, she had her hair covered by skull skin and therefore invisible and then, she had to cut very short for medical reasons. Through her disease, she was finding her freedom. In the therapeutic situation, we can observe the intuitive need to experience the central and powerful position.

In neurobiological terms, we can hypothesize that the sensory (visual, and tactile) and symbolic notion of 'hair' have been associated with emotional negative reactions such as lack of power (II, 2, e). It is important to note that research is in progress on the neurobiological basis of the metaphor (Rohrer, 1995; Ramachandran, 2005) . Metaphors may be a link between the sensory aspect of an object, the verbal and the meaning (affective value) for a particular person (III, 4, c).

c) Projective change induces neurobiological change

Why use projection and not enactment? First, the room we were using was really

small and did not allow much movement to embody characters. As I said, I felt that using craft material might be safer to tackle such topics as her relationship with God. In this case, I distanced the client from her emotions (III, 4, c). It was just an intuition but I hypothesized that enacting herself would bring her too close to her actual feelings and then would not offer to experience a new situation (II, 4, a & b). Enacting God to whom she had given so much power may have been a very strong sensory and emotional experience, and it may have been interesting to reach this level of experience if it had been possible. It appears that in creating, she actually created God and created Herself: this is a very powerful action. In creating, there is also a very strong sensory aspect of making (III, 2, b). She showed pleasure and care in making the hair of both characters. We can hypothesize that this sensory experience helped her get in touch with the emotional memories/ somatic memories associated with the hair. In projection, there is visual and sensory stimulation as she looks at the creations and can move them around. It is the same process used in visualization where it was shown that neuronal activation is the same as in actual action. The mirror neurons are possibly responsible for allowing to feel as if for oneself just by looking at the projections (III, 4, b).

Conclusion: A story-a neuronal wiring

Throughout this paper it is demonstrated that experiences interact with the human biological systems. Experiences impact individuals and change their emotional, cognitive and meaning-making ways to perceive the world. The first paragraph describes the neurobiological changes that make the internal individual system change in response to environmental events. Changes at the level of synapses, of

neuronal systems and in their interactions and changes in chemical balances are what influence the individual to react in one way or an other to a specific situation. But it is these same individuals that feel the need to create experiences and transform their perceptions. We have the possibility to directly impact our vision of the world!

Perceptions of an event are seen as a combination of the physiological responses, the cognitive interpretation and the affective value given to the event. All these appearing in conjunction in order to make the event meaningful. *Somatic or emotional memory* is the term given to this associative formation. This means that there is a direct interaction between senses, emotions, and perception about a situation. And all of it can be affected by cognitive processes. We therefore can change our perceptions through different approaches and the somatic approach seems to be under-esteemed.

Some events are treated by unconscious processes for adaptive purposes: to be able to react quickly and also to survive difficult situations. However, even if unconscious, the changes due to these events continue to impact the system and explain many symptoms (psychosomatic) that bring clients to look for help. If the memories are treated unconsciously, intellectual processing cannot reach them either. This stresses the importance to use somatic psychotherapies to complement an intellectual approach.

Also, verbalising is not necessary for change, but *awareness* of the change appears necessary to complete the transformation of perception. Consciousness is not verbalisation! Awareness means that the individual in therapy really *senses* what is going on in the moment and place (III, 4, b). This is facilitated by action in therapy. Awareness also implies that the person is able to distance from the situation and understand it in an objective manner. This means that instead of focussing on the

particular story, the work is to change the perception of the situation in general. Meaning is generalised to other contexts with the help of neurological systems such as the hippocampus (II, 3, c). Verbal therapies use words as distanced objects. Projective methods - like Dramatherapy - uses stories, puppets, characters to distance the client from the personal story and enable consciousness. It is not the actual meaning (intellectual) of words but its symbolic that matters in creative arts therapies (poetry). Metaphor appears as a way of understanding that is not intellectual, but rather sensory and emotional (II, 2, e). Future research on the topic may give answers about our to reach those unconscious memories.

Action is necessary for change but research does also demonstrate that the action does not need to be real. Mirror neurones may be responsible for learning that occurs through watching an action (III, 4, b). One is able to change even from a distance! This actually bypasses the resistance one may have about a certain issue. Imagining may involve the same processes and this can be a road to explain the use of visualisation in therapy and even a hope for people very restricted in terms of mobility. Future research can hope to demonstrate the activation of these mirror neurones in therapy as it is done in sport research. Such findings may even allow us to better understand neuronal conceptualisation of the Self : what circuitries are stimulated when one pays attention to one's own image!

Most of this paper is about speculations based on current findings. We might hope that neural imagery and other new tools may enable us to see better in time what happens in the brain when an individual is experiencing a therapy situation. Specifically , we can imagine future imagery research to demonstrate the differences in activity of emotional memory areas between a subject considering a same issue in verbal therapy or in the different creative art therapies. Could we create a test

evaluating the changes in emotional memories before and after the different types of psychotherapeutic experiences?

Hypotheses and curiosity are the necessary starters for findings and while neuro-research is going on, therapists can use interim knowledge to guide their approaches and may come out with observations confirming or disclaiming research but always offering material to guide a better understanding of human functioning.

Finally, I hope my paper is an example of how neurobiology findings do actually give the most importance to each individual unique experience and how each story is actually a new example of the extraordinary human biological and meaning-making coping to life. I have to admit for myself that it is the particular examples of each of the persons presented in my paper that has guided my questions, research and hypotheses. For example, some questions emerged that will certainly guide my future inquiries into neurosciences: Why is Sophie feeling frustration when she experienced a story in Psychodrama that is so different from her real life? Will it contribute to trigger change, and how, in terms of motivations and impact on the reward system (II, 4, c)? What is the emotional state that brings together the necessary conditions for a corrective emotional experience naturally happen as in Lucy's experience. Is there a particular state (and therefore hormonal and neurotransmitter balance) that allows change to occur? How does the projected representation of herself directly impact on Dorothy self perception? How does this relate to the neuronal basis of Self?

Finally, I wonder. Did my action and repeated emotional involvement in writing this paper change my own perceptions on emotional memories? For sure, remaining seated all along with reflections on the topic gives me the drive to go to action and apply all what I learned myself…And evidently get new questions from future encounters and experiences with clients!!

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Appendices

Concordia
UNIVERSITY

Summary Protocol Form

Date: 21/06/06

What type of review do you recommend that this form receive? Expedited or Full *

Part One: Basic Information

1. Names of Researchers:

Principal Investigator: Kathleen Olivier
Department/Program: Department of Creative Art Therapies, Dramatherapy option
Office address: Department of Creative Arts Therapies, 1455 de Maisonneuve Bvd west, S-VA 264 Montréal, Québec H3G 1M8:
Telephone number: (514) 848-2424 ext.5214 E-mail address: cats@vax2.concordia.ca

Names and details for all other researchers involved:

Bonnie Harnden, on site supervisor harndenbonnie@hotmail.com
Edward Hug, external supervisor edwhug@verizon.net
Sue Jennings, advisor, reviewer drsuejennings@hotmail.com
Patricia Tassi, advisor, reviewer tassip@evc.net

2. Title of Research Project:

Usefulness of embodiment in psychotherapy: Dramatherapy applies neuroscience's knowledge about somatic memories

3. Granting Agency, Grant Number and Title OR Contract and Contract Title (if applicable.):

4. Brief Description of Research:

My research will involve two parts.

- I will use observations I made during my second year practicum as a Dramatherapy student and make connections between my theoretical hypotheses and these observations.

- I will gather answers to a questionnaire I made so as to collect practical examples on Psychodrama experiences. These answers will be used to support my theoretical paper.

This project is to give theoretical information from neurosciences to Dramatherapists so as to facilitate its application in practice. Practical examples will serve to substantiate theoretical hypotheses.

5. Scholarly Review of Proposed Research:
Complete the Scholarly Review Form (SRF) if you are conducting non-funded or contract bio-medical research or any other non-funded or contract research involving more than minimal levels of risk.

Part Two: Research Participants

1. Sample of Persons to be Studied:

- I selected 2 participants among 6 potential ones from my second year Dramatherapy practicum from which I had obtained consents to use information for educational purposes.
- The other examples are given by previous Dramatherapy and Art-therapy classmates who participated to Psychodrama courses during the Master program. I use the 4 responses I received back among 9 potential responses.

2. Method of Recruitment of Participants:

- Practicum clients over than 16 were all proposed to sign a consent form during

the course of the practicum. One who was younger had her guarantor sign for her.
- Students from the Psychodrama class were all sent an email asking for their involvement in my paper through their responses to the questionnaire. The questionnaire was joined.

3. Treatment of Participants in the Course of the Research:

- I use clients observations based on progress notes I had taken at the time of the sessions.
- I created the questionnaire based on my hypotheses after having read literature; the questions were open questions, I asked students to be short and precise (five sentences). For students, I will send them the final paper before submission to my supervisor, they will be able to make changes or remove they writings.

Progress notes were all reviewed by my practicum supervisor, hypotheses are reviewed by all reviewers and supervisors.

Part Three: Ethical Concerns

1. Informed Consent:
   - For clients, the consents were given during the course of therapy, in the beginning sessions for the adults and the ending sessions for the teenage group. It was clearly stated they were free to accept or refuse. They were told content may be used for educational purposes or other Dramatherapy presentations. They were given the opportunity to ask any question about the use of the material.
   - For classmates, I send them a consent form through mail during the course of thesis writing.

2. Deception:
   Please describe the nature of any deception and provide a rationale regarding why it must be used to address the research question – i.e., is it absolutely necessary for the design? Deception may include the following: deliberate presentation of false information; suppression of material information; selection of information designed to mislead; and selective disclosure.

   To classmates, I only gave my thesis title and they also had heard me talk about my topic, but I didn't give them my theoretical paper before they answered the questionnaire so as to keep the answers as unbiased as possible.

3. Freedom to Discontinue:

   I told clients they could change their mind about their consents whenever they wanted. Classmates will be able to read the thesis before submission and make changes or remove from the information concerning their questionnaires' answers.

4. Assessment of Risks to Subjects' Physical Wellbeing, Psychological Welfare, and/or Reputation:

The research includes no action made during the therapy (for clients) or during the Psychodrama class (for classmates) for the purpose of the paper. The only research method is observation and note taking. The therapy sessions weren't organized with the intent to include the observations in the paper but the observations and notes that were judged to be relevant were included in the theoretical frame post hoc. Participants that were chosen are all recognized as been able to make informed decision by the onsite supervisors or responsible persons (educators and psychologist of the placement). The participant that is still minor of age will have his consent signed by a representative person.

5. Protecting and/or Addressing Participant "At Risk" Situations:

Participants' observations are specified to be so and every hypothesis is mentioned as such so that hypotheses are not taken as absolute realities.

No one else than the participants included in the paper will be notified the information are being used. The only exceptions be the practicum places' supervisors and other responsible person necessarily related to the process. The names and any other cue will be disguised to preserve participant's confidentiality.

I will remain available to answer any question concerning the paper that participants may have. They were being told they can do so.

6. Post-Research Explanation and/or Debriefing:

I have sent classmates my paper so that they could be well informed about how would their answers be included in the theoretical frame. They can ask me anything about my writing. Practicum participants will be informed the observations were used and be told were they can read the paper.

7. Confidentiality of Results:

All names of all participants are changed. For clients, the place where the practicum took place is not mentioned.

8. Data Handling:

Consent forms from clients are kept in folders in my possession. Classmates' answers to the questionnaire are kept into my private computer in word format. They have been sent to supervisors and advisors with the changed names.

9. Other Comments:

Former clients may be interested in reading the thesis and the theoretical parts concerning their experiences. I shall help them to understand the content of the thesis (clients are French). Classmates may want to make changes in the theoretical part elaborated based on their questionnaires, I shall allow them to remove information concerning them.

Signature of Principal Investigator: 

Date: 21/06/06

APPENDIX: SAMPLE CONSENT FORM TO PARTICIPATE IN RESEARCH

I. Consent form sent by email to classmates

Consent form

I, …….. give my consent to Kathleen Olivier to use my answers to the following questions for the purpose of her Dramatherapy research paper.

1.Was there any strong moment you remember?
2.Describe if anything helped you BE in the situation
3.Could you describe how the emotion evolved during this Psychodrama experience?
4.Did you observe any change relating to the situation and what change after the Psychodrama
5. Why do you think the specific situation played in Psychodrama emerged?

I am informed that extracts from my quotes will be used to support theoretical hypotheses on the following paper topic:

Usefulness of embodiment in psychotherapy: Dramatherapy applies neuroscience's knowledge about somatic memories

I have been given the opportunity to read the research paper before it was printed.

Signature

II. Consent form given to Dramatherapy practicum clients

Sample Consent Form #2

Authorization for photography, video recordings, audio recordings and the us case material related to the arts therapies.

Authorisation pour photographie, cinématographie, enregistrements sonores et l'utilisat matérial clinique au sujet d'arts-thérapies.

I, the undersigned _____

Je, soussigné(e) _____

Authorize _____

Autorise _____

to take any:

à prendre/utilser:

	YES OUI	*NO* NO
*photographs/*photographies	_____	____
*video recordings/*cinématographie	_____	____
*audio recordings/*enregistrements sonores	_____	____
*case material/*matérial clinique	_____	____

that therapists deem appropriate, and to utilise and publish them for educational pu provided that reasonable precautions be taken to conserve confidentiality.

que les thérapeutes jugeront opportun et à utiliser et publier pour des fins éducatives, à la co que des précautions raisonnables soient prises pour que soit conservée la confidentialité.

However, I make the following restriction(s):

J'émets cependant les restrictions suivantes:

_____

_____

_____

_____

Signature of Participant/Signature du (de la) participant(e)

_____

Signature of Guarantor/Signature du garant

_____

Witness to Signature/Témoin à signature