

Neurobiological Perspectives on Body Psychotherapy

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Christian Gottwald is particularly qualified to delineate a shared neuropsychological/body-psychotherapeutic perspective, given his extraordinarily broad and multifaceted training and wide range of clinical experience. As neurologist, psychiatrist, medical psychotherapist, former scientific assistant and later director of the outpatient psychotherapy clinic at the University of Mainz, he is very familiar with the medical model. At the same time he went through a number of psychotherapy trainings, aside from his work as psychoanalyst and teaching analyst, including Organismic Psychotherapy (Malcolm Brown), Pessio-Boyden System Psychomotor, and Hakomi Experiential Psychology. Additionally, he was trained in Gestalt therapy and has participated in other trainings in the tradition of humanistic psychology. Aside from his work in private practice in Munich since 1980, he works as lecturer, trainer, and supervisor.

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Introduction

Neurobiology is devoted to the investigation of the brain and nervous system. Particularly over the last ten years, new research technologies have generated an ever-expanding number of research findings. As a field of knowledge, neurobiology is still very young and in the process of formulation. From the perspective of neurobiological research, reality currently looks as if one were looking at a world through a series of small holes. Depending on the hole that one looks through, different aspects present themselves. Many different facets of findings that, at times, seem to contradict one another emerge from different levels of research (for example: molecular, cellular, structural, and anatomical levels). Some neurobiologists such as Joachim Bauer, Gerald Hüther, Josef LeDoux and Gerhard Roth, actively support Body Psychotherapy in retaining an overview in this vast research area: from the psychotherapeutical point of view, preliminary conclusions have also been drawn by Beutel (2003, 2008), Cozolino (2003), Grawe (2004) Levin (2003) and Solms (2002).

This brief description of some aspects of the research findings from the field of neurobiology that are relevant, and perhaps stimulating, to Body Psychotherapists is given from the perspective of a neurologist, psychiatrist, and psycho-dynamically-

oriented Body Psychotherapist. Beginning with Wilhelm Reich, Body Psychotherapy has a very long tradition and a broad empirical basis. ~~The author has been able to accompany and observe many long-term developments in his 35 years of professional practice. He has received feedback a thousand fold from experiences that were created together with patients. The awareness-centered, Body Psychotherapeutic method so developed allowed for the integration of various Body Psychotherapeutic and body therapeutic methods.~~

A consistent picture is also built up from neurobiological research, which has a greater value for practical work. An expanded understanding of numerous psychosomatic and psychic phenomena is now possible. Research findings now confirm much of the empirical work, and show how effective psychotherapy actually changes the brain. These results imply that new impulses lead to changed priority assessments and altered points of emphasis. From this perspective, some speculations, hypothesis and perspectives for Body Psychotherapy can be developed. Whilst somewhat premature and not yet scientifically validated, such speculations and hypotheses can actually have a heuristic value, but conclusive results and established theses for both psychotherapy and Body Psychotherapy have not yet been properly established and any firm conclusions are therefore premature.

Endorsement of Psychotherapy

Some of the central postulations and original theories of Sigmund Freud, and along with them those of psychodynamically-oriented Body Psychotherapy, are now supported by neurobiological research findings; in particular, the premise of the predominance of the unconscious and the origin of neurosis in early childhood (Roth, 2001, p. 454).

Limitations of Talk and Cognition

That there are limitations of cognition and talk (in regards to their efficacy in psychotherapy) is also becoming increasingly clear (see, Damasio, 2001; Spitzer, 2001; Roth, 2001; LeDoux 2003). Gazzaniga (2001) also did some trials with patients that had had the connection between their right and left brain-hemispheres severed and was able to show that, when they were to give verbal explanations for right-hemispherically generated behaviors, their conscious, speech-generating left-hemispheres made up fictitious accounts. Interestingly, there are no direct pathways between the speech-areas and the motor- and sensory-areas of the cortex. Gerhard Roth states:

“Speech (...) serves (...) to legitimize our predominantly unconsciously regulated behaviors for ourselves and for others. (...) Verbal communication only then effects a change in our partners, when they are already in a state of

consonance with us, be it due to internal processes of making meaning or through non-verbal communication.” (Roth, 2001, p. 452).

People aren't guided by their egos, nor informed by their verbalizations, but operate mainly through the unconscious, via affects and emotions from deeper-seated brain structures, in particular from those of the brainstem and limbic system. These are (basically) devoid of language. The fundamental significance of the deep body in the field of affects and emotions is finally becoming recognized in more detail (Niedenthal 2005; Damasio, 1999, 2001).

Human experience is always a combination of the whole unity of the sensory-motor-affective systems. Body Psychotherapy offers a therapeutic setting that goes beyond the normal conscious and verbal conceptualizations to help integrate information from all of the person's sense organs, their affects, their motor behavior, as well as information from their subconscious and unconscious (“implicit memory”). Therefore, Body Psychotherapy, in particular, can consider itself as relevant to, and possibly validated, by these neurobiological findings, even if neurobiology has not yet addressed Body Psychotherapy specifically. Conversely, within the scope of an embodied relationship, this allows a conscious shaping of the therapeutic situation with inclusion of all sensual organs, the affects and the motoric system.

Ego and Self

The Ego and the Self don't occupy specific locations in the brain. In the neurobiological sense, the Self can be conceived of as an organizing principle. Damasio (2001) describes the Self as a recurrently reconstructed biological status that enriches experience with a sense of subjectivity. Many modules within the network that structures the brain contribute to the generation of such self-experiences. As for the Ego, the prefrontal cortex is a central region contributing to the generation of ego-states. It plays a central role, alongside the anterior cingulate cortex for the working memory, especially in the processes of awareness and in the self-regulation of affective states, which are mainly generated in the limbic system (LeDoux, 2003). Rüegg (2001, p. 83) cites numerous studies that demonstrate the importance of the influence that the Ego can have in the appraisal of situations, for example in determining the stress-response of the human organism.

People can significantly influence how they assess and evaluate situations. Accordingly, adequate self-regulation and self-awareness are considered important goals

of therapy. One way in which Body Psychotherapy pursues these goals is to support the client's bodily self-confidence; for example, through (Lowen's Bioenergetic) 'grounding' techniques, or through generative foundational practices similar to those in martial arts, where participants learn to be present in their center, in the lower abdomen (called the 'Hara' or 'Dan T'ien' in Eastern disciplines) or in the contact of their feet with the floor, i.e. to be there 'internally present' (Gottwald, 2008).

Body-Mind-Spirit Unity

The view that both humanistic psychotherapy, and most Body Psychotherapists, have long held, that body, mind, and spirit are a unity, is increasingly becoming substantiated by neurobiological findings. The traditional (Descartian) body-mind split is now no longer tenable from the perspective of the natural sciences. Not only the neo-cortex, but, in particular, some of the inner circuits among the brainstem, midbrain, basal nuclei, thalamus, and the limbic system (probably with contributions from nerve cells in the intestine, the so-called 'gut-brain'), and also with neurotransmitter substances that are found, not only in the brain, but throughout the body and in the blood, together determine the consciousness that is generated in the associative areas of the neo-cortex, along with behavior, perception, emotions, cognition, and experience. The previous separation between organically-based and mentally-conditioned suffering essentially no longer exists and cannot be substantiated.

The Experience of the World as a Constructed Reality

Every individual regularly reconstructs their experience of the world on the basis of a great number of signals (electrical and chemical: possibly in connection with quantum physical phenomena). The outer realities, and the person's inner reality, are two totally different systems, with significant differences in essence and quality. The physical and chemical properties of the outer reality, and the processes of the brain utilizing both the inner and outer experiences, are fundamentally different, in both the physical and chemical sense, like the external physical and concrete reality, when captured by a camera, is translated into digital 'pixels' that can then 'processed' and even 'altered'.

Chemical and physical signals that are already transformed by the sense organs are 'constructed' by the brain into a subjective reality, which many people naively believe to be 'real'. However, that phenomenological reality doesn't exist outside in the environment, but instead is generated in a multi-level process of transformation and

interpretation *within* the organism. Even perceptions – just as memories – are in no way equal to an objective reality: perception can't happen without the body and brain and further necessitates interaction of these with the exterior and interior environment. Perceptual schemas are acquired and built-up in the early-learning environment. At the same time, a unity of perception and action has now been demonstrated to operate on a neural level (Roth, 2001). The importance of the fact that experienced reality and perception are continuously and unconsciously constructed can hardly be overstated. The range of possibilities that Body Psychotherapy can draw upon in attending to different states can enable clients to gain a more direct experience of their unconscious processes of reality construction. As clients notice these phenomena, they can take a more active and conscious part in this process and their mood and self-image changes.

Brain Development and Neuroplasticity

As a living system, the brain needs to, and has the ability to, continuously adapt to its environment. The social environment especially plays a very significant role in structuring the brain. While the essential network of brain cells is originally determined by genetics, its further developmental progresses develop in a highly individualized fashion that is almost totally dependent on growing experiences. Genetic factors have their biggest influence, perhaps only in the very earliest stages of brain development. As we grow up, the experiences that are encountered in respective environments play the most important role. The infant's brain is still developing and growing, and our early (and then also later) experiences definitely 'shape' the brain. Whilst the adult brain is less plastic, early experiences – and structures – that are well 'laid down' or 'built into' our brains, can also be changed or reversed later in life, as there is an ongoing development of organic linkages in the brain, and even the creation of new neurons out of neuronal stem cells remains a possibility throughout life (Gage, 2000). With advanced age, the so-called 'neuroplasticity' then decreases, but still exists to a degree.

The experiences of the infant and toddler are stored in different centers of the associative neo-cortex and limbic system in what Damasio calls "*dispositional representations*" (Damasio & Kober, 1999, p. 151ff). Naturally, these dispositional representations also need to be understood as dynamic and environmentally co-determined patterns. In this regard, psychoanalysis speaks of self- and object-representations. Daniel Stern (1998) refers to the same idea when he speaks of "*implicit relational knowledge*". This knowledge contains the early impressions that the child has

of him/herself and his/her early caretakers (objects), along with associated affective tones and perceptions that result in the variety of world-views that can emerge from the whole of a particular experience. Future research will need to clarify how these affective tones are also associated with, and stored by, the distribution of neurotransmitters and hormones in the blood, and tension-states in the muscles and tissues of the body and the intestine. Candace Pert (1979) for example, has shown how receptors for neuro-peptides can be found, not just in the brain, but also throughout the whole body.

It is clear that the brain develops in an inter-subjective field. From this field, dynamic *internal models of realities* emerge that are closely linked with respective bodily conditions. The biographical sediments, with their organic residue, can be thought of as a form of ‘software’, carrying the possibility of being reprogrammed. This potential of the organic structure of the brain for change is called “*neuroplasticity*”, which forms one of the most essential concepts of neurobiology. Whilst in the past, it was assumed that the potential of the neurons and brain metabolism to adapt and change was unlikely, there are now numerous and definite indications to the contrary (Damasio, 1997). It could therefore be said that the brain is like a life-long construction site. Throughout the course of our life, neurons form new linkages on the basis of respective experiences with the environment and how they are used: this is a process of ‘reinforcement’. The neurobiologist, Joachim Bauer (2002) describes how both positive and negative experiences can lead even to the so-called ‘expression’ or ‘suppression’ of genetic potentials. During our lifetime, it is believed that we draw on only 20% of our genetic potential. It is conceivable that, with greater consciousness, we could come to express more of this potential in the future.

The prefrontal lobe (PFC) is usually viewed as the seat of consciousness and ego-functions. It lies beside the anterior cingulate cortex (ACC), also the center regulating processes of attention, working memory and self-regulation. The hippocampus in the temporal lobe organizes the storage and retrieval of memories. Since the fastest changes in the neural network occur in these areas, quick changes (that are effected through psychotherapy) are likely to be correlated with changes in these areas. The role and the importance of the prefrontal cortex (PFC) and of the anterior cingulate cortex (ACC) have been repeatedly confirmed (LeDoux, 2003; Roth, 2009). Similar neuro-plastic potentials also appear to exist in the hippocampus.

In the neuro-plastic process, the strength of the neural connections (synapses) changes with usage. Whereas the synchronicity of excitation of neurons and their

connections strengthens the corresponding neural cell assemblies, along with their connections, the neural connections that are not used tend to lose synapses and may ultimately disassemble altogether in a process called “pruning”. The survival of neurons, and the quality of their synaptic connections, is dependent on regular excitation (‘Neurons that fire together, wire together’) (Siegel, 2000; LeDoux, 2003).

Recurring stimulation and the synchronicity of experiences leads to a strengthened connection among cell assemblies, which corresponds with the basic tenets of learning. Recurrent stimulations from experience lead to increasingly focused and differentiated responses (Spitzer, 2000). In the end, we can think of the brain and its neural connections, using the motto of Hebb’s Axiom: “Use it or lose it!”

The significance of this discovery cannot be underestimated. Hüther (2003) discusses how we can limit our potentials, if we use our brains one-sidedly. This causes increasingly inflexible routines and automatisms. In particular, our body image, our self-image, and our sense of Self are in need of continuous validation through our senses, and through an uninterrupted stream of up-to-date sensory information (Ramachandran, 2001). Experiments with sensory deprivation prove this point. Using simple experiments, Ramachandran was able to show how the body image can change within minutes, in response to deceptively altered touch (Ramachandran, 2001). The body image is continuously being recreated. Psychic structure is much more dynamic and dependent on bodily states and interactions, than previously suggested by the comparably static psychoanalytic term of “structure”.

There is a life-long process, by which we can learn and modify the structure of our brain (see: Damasio, 2001; Hüther, 2001; LeDoux, 1996, 2001; Merzenich et al., 1990; Roth, 1997, 1999, 2001; Spitzer, 2000, 2001, 2002). It seems probable that, with many patterns of experience and skill, it will be similar to the acquisition of language: learning one’s native language during childhood is relatively effortless. But later, even into old age, we still retain the ability to learn new languages, including phonemes, but it takes more effort. Roth (2001) summarizes: *‘that early childhood influences and experiences are of particular importance in shaping our character and building a frame through which we process later experiences. The later the influence, the stronger it needs to be in order to produce sustainable effects.’*

Memory and Recollection

Memory and respectively-learned patterns fundamentally organize our experience and behavior from moment-to-moment as well as throughout our life. Psychotherapy always touches upon these associated memory patterns, be it consciously or unconsciously. In Daniel Schacter's (1997, 2001) books, the German title fittingly reads, "Wir sind Erinnerung [We Are Memory]". Every significant experience that the infant and toddler makes is stored somehow in its neural networks, specifically, in a variety of sensory maps, that serve for multiple and parallel storage. Given certain experiences at a later age, earlier memories are often recalled and simultaneously reinforced and/or changed at the same time (Nader, 2000; Loftus, 2001). Every current experience therefore is, albeit unconsciously, highly conditioned by memories.

Today's predominant view of the brain is still heavily influenced by Aristotle's metaphor for memory. Aristotle had compared the process of memory storage with writing on an originally blank tablet of wax. Today, we know that external (including not consciously accessible, so-called subliminal) stimuli evoke the brain to search its established neural networks for similar memories, or biographic-contextual patterns (structural analogies). Current experience and behavior is determined by these spontaneously recalled patterns. Memory is always a creative and dynamic reconstructive and inter-subjective process.

Drawing upon the research of Daniel Schacter's, we can differentiate two fundamentally different forms of memory. Memory, as it is commonly thought of, is the equivalent of the so-called "explicit", "declarative", or "conceptual" memory. This form of memory includes words, as well as images. Explicit memories are easily recalled. For activation of such a memory, only one aspect of the respective memory content is needed. This form of memory is often used in the "normal" psychotherapeutic process: by associations, by free association, by prompting and interpretations, and by guesswork (often based on experience). So-called autobiographical memory works similarly. Its content can be verbally communicated. Explicit memories are predominantly stored in the cortex.

Then there is the "implicit", "procedural", or "perceptual" memory (also see, Kandel, 1995, p. 672). Although implicit memory is much more extensive than explicit memory, and it has a much stronger impact on our current experience and behavior, it is not directly consciously accessible. Implicit memory can be thought of as the 'substratum of the unconscious'. As such, it contains contents that are crucial to the psychotherapeutic process. This memory system is not as easily accessible through

conscious, attentional processes. It does not contain linguistic or image contents, but instead is structured by sensory and motor memories (Schacter, 2001, p. 92). Instead, it can be thought of as an affective-sensory-motor unit that is inseparably connected with the body. Implicit memories are predominantly stored in the limbic system, rather than the cortex, and (as such) are 'subconscious'. Traumatic memories, in particular, are stored in these forms of implicit memory. Such memories – and the attendant fear and anger – are associated with patterns of excitation in a particularly important part of the limbic system, namely, the amygdala. The amygdala plays a central role in the emotional appraisal of events. Additionally, the amygdala plays an important role in learning processes that link reward and punishment with respective events.

Sigmund Freud, in his letters to Wilhelm Fließ, described that memories can be changed. Just as any experience is shaped by memory, any experience can also lead to the retrieval of memories. Psychotherapy, but also any other significant encounter, can change such memories. In any form of psychotherapy that aims for personality change, the conscious involvement of memories is therefore almost inevitable. Psychotherapy can effect a progressively focused reorganization and expansion of memory, conditioned by more recent (psychotherapeutic) experiences.

Body Psychotherapy is very conducive to gaining access to implicit memories, and therefore to the subconscious, and even sometimes to the unconscious. Particularly implicit, bodily-oriented or limbic-system based traumatic memories can be more easily actualized, brought into consciousness, and then linked with different words and associations, understood in their historical context, and then extended with new salutary re-embodied experiences, using such an approach. Novel experiences that are holistic and include bodily experience can thus potentially clear traumatic memories, re-writing the traumatic 'program' (van der Kolk, 2000; Ogden, 2006). In any case, they can offer a positive exploration and differential expansion of the traumatic memory patterns and the underlying neural networks. The 'demasking' (an expression of Bach-y-Rita) of older neuronal networks, and the recourse to potentials, which had either been established prior to traumatizing, or to new potentials, also plays a very important role here (Hüther, personal communication).

State-Dependent Memory and Learning

Bower (1981) noted that, when a significant mood was evoked in test subjects, this led to the expansion of their explicit memory of emotional events. For example, there seems to

be a unanimous agreement that, in a happy mood, it is easier to recall events that were previously experienced in this mood, whereas, in a depressed mood, it is easier to recall different instances in which one felt depressed. Memory contents are linked with the sensory impressions from the respective sense organs that originally contributed to the basic experience. Memory recall then, is facilitated through renewed stimulation of such sensory impressions. The neurobiologist, LeDoux, now proposes that the probability of memory recall increases as the number of cues that are present during the memory recall nears that of the original learning event (2001, p. 228).

Accordingly, Body Psychotherapeutic techniques offer a progressively focused recall of memories, through conscious interactive stimulation of respective sense impressions or movements. On the basis of his extensive literature review of the neurobiological research findings, the psychotherapy researcher and cognitive-behavioral therapist, Klaus Grawe (2000), supports the notion that emotionally significant memories are most directly and effectively recalled when sensory and motor aspects are drawn upon and when earlier contexts are represented. He finds that memory recall is far less effective through words and concepts, and that the change process only happens with what can be holistically recalled, and with what can be linked with other resources and memories. Existing cell assemblies thereby might be integrated into more complex and higher order schemas. The mere recall of old memory patterns, on the other hand, would merely strengthen these patterns, which could even lead towards re-traumatization. The discrepancy between the former, problematic contents of the implicit memory system and a corrective emotional experience could then be viewed as meaningful learning. In either case, such a process goes hand in hand with organic changes in the brain, which include genetic expression.

Learning and the Expansion of Memory

Psychotherapy can therefore be viewed as an expansion or modification of existing, neurally-anchored patterns. It can further be said that corrective emotional experiences (in the sense of Alexander & French, 1946, 1980) promote learning, which expands memory and therefore experience and behavior. In this context, here is a brief list of some of the central, neuro-scientific findings on learning. Learning is facilitated under the following conditions:

- The right blend of familiarity and novelty: the absence of which inhibits learning
- Presentation of an issue that invites the use of many different sense modalities
- Simultaneous support through positive emotions and rewards

- Stronger emotions and sensory intensity that lead to stronger memory storage
- An adequate level of challenge and simultaneous avoidance of sensory over-stimulation
- A sufficient level of repetition is necessary.

Body Psychotherapy can easily take these conditions into consideration. Old, well-worn patterns are examined and then expanded upon with novel experiences, which can be enriched by drawing upon all the present-day senses and their qualities, affects and movement. The subsequent anchorage of new experiences is equivalent to the level of storage of the expanded memory in multiple sensory and motor maps (a little like the re-drawing or updating of the maps of a country with new developments, motorways, expansion of cities, airports, etc.)

Here and Now

Neurobiologists emphasize the significance of the ‘present moment’ as the only window of opportunity in which to effect real change (for example, see Pöppel, 2000; Henningsen, 2000). As Body Psychotherapy facilitates the realization of memories in the present, it can be thought of as supporting the re-presentation, and re-minding, of the past. Memories are significantly affected by the context in which they are recalled. Every recalled memory is re-stored in a more or less changed fashion (Nader, 2000; Loftus, 2001). In the present, we constantly construct a subjective reality. With the help of suitable forms of attention, we can gain awareness of this process and then learn to become increasingly conscious and effective in co-creating this reality by new, embodied experiences.

Therefore, and possibly beginning with Fritz Perls (1973), awareness of present-time experience and its structure (rather than recollection of the past) stands at the center of the modern Body Psychotherapeutic endeavor. Contemporary Body Psychotherapy supports the intentional expansion of awareness, both of the ‘now’ and of the ‘old story’, as it is embedded in the present-time experience of the Self and the environment. Over time, this leads to an increasing differentiation of present circumstances from the background of past, and from the subjectively experienced reality of the present. Awakening from the ‘trance’ of memory thus leads to conscious dis-identification from early neurotic patterns.

Perception, Consciousness, and Attention

Consciousness also arises when the brain is confronted with cognitive or motor tasks for which it has not yet established appropriate neural networks. Furthermore, consciousness arises when what is happening within the body or the environment is sufficiently interesting: the brain needs alertness, consciousness, and attention, particularly for problem solving and new learning. Alertness increases as the reticular formation in the brainstem is stimulated (LeDoux, 2003): all new sensory impressions and movements can offer such stimulation. This is an important mechanism that can be utilized in the context of Body Psychotherapy.

Without this sort of attention, our functioning lacks flexibility. We become entrapped by learned automatic and rigid patterns that are represented in the brain, as mentioned above, as having become habitual and unconscious. Attention leads to an excitation of neural cell assemblies in the respective parts of the brain that are associated with focusing attention, to a synchronicity of brainwaves in these regions of the brain, and to an interconnected neuronal network of excitation (Spitzer, 2001, p. 156; Singer, 2004). Attention is linked significantly with increased activity in the orbito-frontal cortex and the anterior cingulate cortex, areas that support the functions of the ego and working memory. Excitation of these areas is a fundamental precondition for influencing the process of change and for learning new patterns, as Ahissar et al. (1992) have been able to show in impressive experiments with monkeys (see also LeDoux, 2003). Without attention to the stimuli of learning, no change in cortical representation occurred (see also, Spitzer 2001, p. 159; Jenkins & Merzenich, 1990).

The activation of cell assemblies associated with a specific learning task then is a precondition for change. Attention also serves to decrease the activity of inhibitory neurons, which thus leads to an increase in activation. The bodily-oriented mental state of “mindfulness” in psychotherapy therefore supports such activation and provides a condition conducive to change. It strengthens the working memory and the influence of the prefrontal lobe and ACC on deeper parts of the brain and opens the door to ‘implicit memories’ that can help to re-structure our personality.

In relation to external stimuli, the brain utilizes two sets of criteria to determine if attention and consciousness will be activated: Is the event known or unknown, important or unimportant? Is it interesting or uninteresting? These criteria also are important in maintaining a stable and meaningful perception. At the same time, a level of familiarity is important as well. A certain challenge and optimal stress-level are seen as conducive to

learning. Sufficient motivation and stimulation are helpful (for example, see Roth, 1997, p. 180 ff.).

On the basis of neurobiological findings, attention, by which we mean the attentive experiencing of the present, must be seen as a very central element of change. Just learning to be 'mindful' by itself strengthens the reflective ego-functions. Various approaches of Body Psychotherapy take these attentional processes into account in different ways. Many Body Psychotherapy approaches have been influenced by the theories and methods of humanistic psychology and Gestalt therapy in particular. "Awareness" as emphasized by Gestalt therapy, but also particularly the state of "mindfulness", as developed by Ron Kurtz, but also the "pilot function" as described by Al Pessio, are all examples of working with attentional processes.

In 1985, Jon Kabat-Zinn (1985) working from a Cognitive Behavioral perspective was able to show that eight weeks of mindfulness training in itself could lead to significant improvements in all sorts of psychosomatic illnesses. It feels important to stress here that this state of increased attention or mindfulness is a 'whole body' state, not just a 'mental' state. It seems very possible that other Body Psychotherapy techniques might only gain their full effectiveness when used with degrees of mindfulness.

In a mindful state, new experiences lead to a transformation of experience and behavior. As an aside, regressive processes remain containable through the use of mindfulness helping clients to feel safe within themselves. Strengthening the connection between the 'felt' experience and the 'speaking about' experience facilitates a distance from the regressive experience that is neither too immersed, nor dissociative. Speaking about the inner experience, whilst in a state of mindfulness, is an opportunity that is particularly cultivated in the Hakomi method, and allows the therapists to share in the inner processes of their clients. In this way, affects and emotions arising from the limbic system can be identified and linked with the speech areas and the brainstem. Psychodynamically, this increases the probability that previously implicit or procedural memories can be consciously experienced then to be stored as explicit memories.

An important additional point: A confrontation with too many simultaneous stimuli, or stimuli occurring at rapid succession, in the same area of the brain, potentially has a negative effect. It can create the chaotic input quoted by Spitzer 2000, p. 219). That's why it is advisable not only to support the increased awareness of psychotherapeutic processes but also to slow them down, in order to reduce the level of arousal and allow for their proper integration into a 'mindful' presence (Ogden et al.,

2006). This allows a clearer perception of effective factors and facilitates a more efficient integration of the experience.

Michael Posner also describes different neurobiological modules of *attentional networks* (1996). For example, the superior colliculus in the midbrain seems to make it easier to shift focus from one thing to the next. It is likely that, in EMDR (Eye Movement Desensitization and Reprocessing), the ongoing alternation between directions of view seems to activate the superior colliculus and helping the person to shift attention and thus loosen established traumatic patterns.

Alternatively, it seems that the pulvinar in the midbrain is more associated with the ability to sustain attention. Crick (1994) emphasizes the role of the nucleus reticularis thalami in directing attention, rather like a spotlight working in conjunction with the cortex. The prefrontal cortex, for example, in conjunction with the anterior cingulate cortex, generates controlled and focused attention. The anterior aspect of the cingulate additionally makes important contributions in the emotional appraisal of the contents of attention (see Roth, 2001; Etkin, 2005).

Neurobiology thereby gives indications for an increasingly differentiated manner of guiding attention and consciousness processes. Currently, this effort is reflected in Body Psychotherapy practice, particularly in the Hakomi method.

It is likely that the work with attentional processes will become increasingly refined in the future. The different possibilities of influencing attention that are provided by the different modules of attentional networks in the brain (for example the ability to focus the attentional 'spotlight') appear to be accessible to conscious guidance and available for training. Neurobiological research will most likely shed increasing light on these clinical possibilities. Similar and respective processes of both increased awareness (consciousness) and attention are also described by the psychoanalyst and neurobiologist, Beutel (2008), when he emphasizes that psychotherapeutic processes should be conducted with mutual 'insightfulness'.

Emotion, Affect, and Feeling: Foundations

Emotions and feelings are particularly easy to access in Body Psychotherapy. For this reason, the following points are of special interest in this context: amongst others, Izard (1991, 1992), Damasio (2001), and LeDoux (1996, 2001, 2002) have all done important research on emotions and feelings: recent studies also include Niedenthal (2005).

The qualities of our experience, our perceptions, our behavior, and in particular our thinking, our memories, our volition and the choices we make are critically informed by our emotions. As mentioned previously, people seem to be changed less just through cognitional changes, talking, or even insights, but more so through different emotional experiences. Additionally, the emotional condition is significantly correlated with general health and the condition of the immune system. Damasio views this as the unconscious and primary foundations of experience. Nonetheless, emotional signs can be externally perceived by others (“e-motion”), and in the focused perceptual training of Body Psychotherapists, this skill can be practiced in highly differentiated ways (for example, in Al Pesso’s “mini tracking” (Pesso, 2008). In contrast to emotions, Damasio defines feelings as those emotions that are experienced within, and that we become conscious of.

This differentiation also seems quite useful from a Body Psychotherapeutic perspective. Accordingly, what others call “affects” are closest to Damasio’s understanding of emotions. They provide an orientation in the highly complex interrelations between the world and subjective reality. The emotional content of information is an essential determinant in decision-making processes. Emotions further serve to differentiate between relevant and irrelevant stimuli.

Affects, emotions, and feelings in turn are indivisibly integrated with the body, in particular with mimic and posture (again see Niedenthal, 2005). Carrol Izard’s 1991 description captures the essence of the reciprocal feedback between these different systems. Damasio terms the affective reactions of the body that are triggered by internal or external stimulation as “somatic markers” (Damasio & Kober, 1999, p. 168 ff). They are the end products of signals from various receptors in the organs or joints and of complex control circuits. Hormones from the reward- and stress-systems, the sexual system (testosterone and estrogen), the thyroid, and numerous neuro-peptides (also see Pert, 1997) make further contributions to the shaping of experience and their processing in the frontal cortex and ACC.

Neurobiology confirms that any sort of psychotherapeutic work that does not take people’s ‘somatic markers’ and emotions into account is rather questionable. As Body Psychotherapists, we can draw on a long history of clinical experience about how to recall and utilize this kind of experience and emotions in a focused fashion, and how the general emotional mood can be influenced in a variety of ways.

Seeing the body, the affects, and the emotions as all intimately interrelated and as playing such a central role in conditioning our experience, gives us the obvious

possibility to contact all the person's affective, sensory, and motor channels for the expansion of their emotional experience in a number of increasingly differentiated ways.

Affects, for example, are always embodied. They are comprised of physiological aspects, but also of emotions and impulses. Such impulses can come into consciousness more easily when they are brought into awareness in an embodied therapeutic relationship and then possible actions can be implemented through a state of mindfulness. Generally, it can be said that abiding mindfully with sensations and affects leads to contact with the emotions and opens up their context in the present. This leads to the rise of feelings, and, as these feelings come into consciousness, they quite naturally lead to underlying associated memories and childhood emotional states, which then can be worked with in a psychotherapeutic or healing fashion.

Conscious Formation of Emotions: Correlations with the Body

Initially, vague affects and emotions, as well as unclear fragments of memory, can be intensified, not only by means of mindfulness, but also through interventions that are energizing: for example, through the utilization of breath and voice interventions. The focused observation and articulation of breathing and voice, as well as the modulation of the tonus in the voluntary and involuntary muscles, which is a common practice in all schools of Body Psychotherapy that go back to Wilhelm Reich.

Neurobiology is now doing research on a wide range of reciprocal relationships between bodily states, affects, feelings, and ideas. Antonio Damasio (1999, p. 204) referred to the well-known studies by Ekman & Friesen (1974). They had instructed normal test subjects to move their facial muscles in a particular way. The subjects didn't know that, in doing so, the researchers "constructed" an emotional expression. Despite being crude and incomplete, a happy facial expression, for example, led subjects to feel happy: an angry expression led to an experience of anger. Izard also noted these correlations (Izard, 1990 & 1991). Damasio goes on to illustrate that our ideas also can generate particular experiences that are otherwise created by a real bodily states (Damasio, 1999, p. 204ff). He terms this way of generating experiences as off-line and top-down, as opposed to most experiences, which are generated through direct stimulation of the body (on-line and bottom-up). Ramachandran (2001) noted that laughter leads to relaxation, a correlation that recently has come to be utilized in so-called laughter-seminars. Rüegg (2001) noted that a strong voluntary or involuntary contraction of the arm musculature during strong grasps (for example, when activating the brakes of a

bicycle or clenching fists), leads to a marked activation of the sympathetic nervous system and the release of noradrenalin. Rüegg goes on to report that the Danish researchers, Vissing & Hjortso (1996) found that this activation occurs even when strong grasps are merely intended or imagined in thoughts. Recently, it was reconfirmed how even a sustained holding of a pen between one's lips or teeth can influence the emotional state (Glenberg et al., 2005; Niedenthal, 2005).

For a long time, Body Psychotherapists have been utilizing the analogous relationships between bodily reactions on the one hand, and affects, feelings and ideas on the other: helping their clients to change gestures, postures, and tension patterns of voluntary and involuntary muscles, or the state of tissues and joints, breath, and vocal expression when one wishes intentionally to modulate the emotional state. To bare one's teeth and push the lower jaw forward (a Bioenergetic exercise), for example, can facilitate contact with one's unexpressed anger and rage. ‘

Centering’, ‘grounding’, vertical alignment, and breathing techniques from martial arts, using the breath-energy “Chi” or “Ki”, can also work as well to change the basic mood, overcome fear, gain a sense of strength and peace, and increase one's sense of safety in the world. Body-oriented psychotherapy techniques with individuals include ways such as these to deepen the felt sense and good feelings about oneself; different kinds of body contact; certain touch techniques that trigger an increased release of oxytocin; the careful handling of emotional states; the re-structuring of bodily gestures; the differentiated use of voice; conscious modification of muscle tone; the informed handling of ideas; and the conscious modification of spatial experience – all of which cannot be illustrated in detail within the scope of this article. This also applies to the anchoring of new experiences and behavioral possibilities, via the use of different sense modalities.

Considering the potency of strong emotions to effect neuro-plastic changes in the brain, Body Psychotherapists should ask themselves a critical question: this is whether a too frequent or undifferentiated provocation of aggressive or painful feelings, as well as unreflective regressive bodywork, does not lead to a phenomenon known as “kindling”, which is an inappropriate facilitation of such predominantly reactive feelings. Kindling is generated by intensive, recurrent stimulations, similar to those stimulants that help to cause epileptic seizures (Dennison & Teskey, 1995). For this reason, any therapy, but especially body-oriented therapies, should make every effort to avoid unnecessary repetitions of extreme emotional states like chronic failures, despair, or past traumas. The

intentional recall of traumatic material is only useful when a new healing experience can be offered in its place, as otherwise this can lead to a consolidation of established patterns of trauma and distress and no new expansion of their affected neural pathways (van der Kolk, 2000; Ogden, 2006). More about this is written about in Chapter 60: “Risks in Body Psychotherapy”; and about working with people in trauma in Chapter 79: “Sensorimotor Processing for Trauma Recovery”.

The Gut-Brain

The role of the so-called “gut-brain” receives some more explicit attention in its relationship to our fundamental sense of aliveness, affects, and emotions. The ‘gut-brain’ is an aspect of the parasympathetic nervous system and is connected to the (main) brain, via the vagus nerve. It is also sometimes referred to as the “enteric nervous system”. According to Shore (1994), William James, Wegner and Gasanov all emphasized the role of sensations from the intestines as significant in the creation of emotions, as early as 1922.

The enteric nervous system comprises more than 100 million neurons, which makes it more extensive than the spinal cord, but only one tenth the size of the main brain, all embedded in the lining of the gastrointestinal system. Ninety percent of its neural connection with the brain is comprised by afferent fibers (leading to the brain), and only 10 percent by efferent fibers (leading from the brain to the intestines), but it also has numerous sets of inter-neurons, all of which makes it capable to carry reflexes and act as an integrating center in the absence of any input from the central nervous system (CNS).

It basically regulates gastrointestinal motility and digestion, and is also assumed to provide essential messages for the immune system. It synthesizes 90 percent of the neurotransmitter serotonin and utilizes more than thirty neurotransmitters, most of which are identical to those found in the CNS. Via the vagus nerve, the brain is updated not only on the situation within the intestines, but also the state of other organs and the immune system.

Rüegg (2001) refers to this system as our “sixth sense”, colloquially know as ‘gut feelings’. It is assumed that information from the enteric nervous system, in the form of somatic markers, plays a constitutive role in the formation of our moods. Following this rationale, stimulation of the vagus nerve, as a treatment intervention for patients with particular kinds of depression, has recently found acceptance within the standard medical practice community. Before this, forms of touch linked to the abdominal organs have

been used as a treatment approach in the context of Body Psychotherapy and Gerda Boyesen's "Biodynamic Psychotherapy" approach is particularly focused on working with the enteric nervous system; on forms of massage that help affect the enteric nervous system; and also on the concept of the "digestion of emotions" as a day-to-day emotional regulator (Boyesen & Boyesen, 1980).

Rating systems: reward and stress system

The emotional system and the relating rating systems are of great importance for our existence in this world. The brain needs to decide, from moment to moment, which tasks are to be addressed at any particular moment in time. This is determined by memory, as well as by the emotional appraisal of the situation in the limbic system. Joachim Bauer systems (2006b) speaks of motivation. The emotional rating also determines what is saved in the memory. Roth states: "In the end the rating systems are dependent upon the action in the sensoric and motoric centres, and *in toto* from the complete history of the brain, in which these cyclic connections between perception, rating, memorization, attention, realization and behavior happened numerous times" (Roth, 1997, p. 241). Successful psychotherapy should be able to influence these rating systems and thereby the person's motivation.

Reward System

Sufficient motivation is fundamental to facilitate any new experience or behavior. It results from positive experiences, which cause a stimulation of the so-called 'reward' system. This is located in the mid-brain. Essential parts are the ventral tegmental area (VTA), the ventral striatum, and the nucleus accumbens. Central messenger substances of this system are dopamine, endogenous opiates (such as enkephalins and endorphins), as well as oxytocin, vasopressin, and (in the male) adiuretin. It is connected with many other brain regions, especially with the emotional centers and the prefrontal cortex. It decides whether the environment presents 'targets', for which it is rewarding to mobilize. In principle, the activation of the reward system causes well-being and a readiness to concentrate and to act.

There is a pronounced effect on the activation of certain genes and on pain sensitivity, and the reward system also strengthens the immune system: "*Motivation systems turn off if there is no chance of social benefit and they turn on in the contrary case, i.e. if there is appreciation and love.*" (Bauer, 2006b, p. 35).

The transmitting agent oxytocin is of special importance, as it has a cause and effect of binding powerful relationship experiences. Most forms of friendly interaction cause its release, especially caresses or tender massages, stimulation of the erogenous zones and during orgasm; but also even when persons are encountered from whom the respective tenderness might be expected or wished for (Bauer, 2006b, p. 49). Oxytocin, and the endogenous opiates, reduce stress and fear by calming the stress and fear center of the amygdala and of the upper emotional center of the anterior cingulate cortex (ACC) (Bauer, 2006b). The reward system was discovered almost by accident by the Canadian scientist, James Olds, in the year 1954.

In experiments with rats, he had stimulated a part of the hypothalamus with an electrode: this obviously caused pleasure in the rats. In another experiment, the rats could give themselves an electric impulse of the electrode located in their hypothalamus with a lever. The rats were obviously so fascinated by the effect of this stimulation that they used the lever more and more often stimulating themselves. Finally, they even forgot to eat and drink. This process can be looked upon as equivalent of a dependence or addiction. John Reynolds showed, in 2001, that, some minutes after use of the lever, the synaptic strength between neurons in the midbrain had become altered. From these experiments we can recognize how effective stimulation of the reward system seems to be.

In this context, studies in monkeys are also of interest, in which higher ranking monkeys showed a higher dopamine level and were also less at risk to become cocaine dependent. Joachim Bauer emphasizes that the base of all motivation is to find and to give inter-human acknowledgement, appraisal, attention or affection. From the neurobiological point of view, we are creatures in search of social resonance and cooperation (Bauer, 2006b).

Thomas Insel therefore created the term ‘social brain’ in 2004. Hence, we should go for the inclusion of the reward system in therapy at any moment and ask ourselves: ‘How can we support our patients in well-being and acting more efficiently and how can we create the respective experiences together?’ ‘What strengthens their immune system and helps them to get healthy again?’ ‘At the same time the question is important: What concerns the patient emotionally?’ ‘What impulses are necessary to motivate and prepare them for a change?’

Holistic, embodied and positive new experiences within therapy seem to contribute directly to the individual’s wellbeing and motivation. Such experiences lead

some patients, perhaps for the first time, to the awareness of how a particular behavior or a contact can make reward a possibility. Contact itself is motivating for most people; physical contact probably much more so.

The Stress or Fear System

The stress or fear system works to a certain degree contrarily to the reward system. This large cybernetic system comprises the amygdala, the hypothalamus and aspects of the brainstem, as well as the pituitary and the supra-renal or adrenal glands. Stress leads to an activation of the noradrenergic and dopaminergic systems, through the release of noradrenalin, dopamine, corticotrophin-releasing factor (CRF), and cortisol.

This release in the sympathetic branch of the autonomous nervous system results in several distinct cardiovascular, gastrointestinal, renal and endocrinal changes as the whole body adapts, almost instantaneously, to being able to implement the “fight or flight” behaviors. This has been mentioned in other parts of this chapter, and in other chapters. What I would like to focus on here are the more positive aspects of stress.

Hüther (1997, 2001, 2003) noted that, initially, some level of stress is both necessary and sufficient to effect an optimal level of activation of the brain. A meaningful level of healthy stress, or “eu-stress”, is dependent on the respective individual’s appraisal of a situation, seeing the situation, not as distressful, but more as a potential for success, fulfillment, exploration or development. This kind of eu-stress, with its respective hormonal side effects, can be generated in psychotherapy through techniques such as helping the client change by a “skillful frustration” (as it is commonly known in Gestalt therapy) of the person’s games, familiar distress patterns, or their ‘aliveness-avoiding’ techniques. This helps the person to find benefits within a so-called stressful situation.

When a stimulus causing stress cannot be met with a new coping strategy, anger, helplessness, fear, or sadness can ensue. Overwhelming stress of this sort leads to a massive release of cortisol. Perception is narrowed, and the possibility of any creative openness disappears. However, this can be ameliorated as Hüther (2003) noted an experiment in which a monkey, isolated in a cage, was confronted with a dog. Its cortisol level instantaneously increased massively, but when the monkey was in the cage with a friendly monkey, its cortisol level only rose very little.

In contrast to such animal experiments, it has been shown that a breast feeding, intimate contact and even joint orgasm raises the level of oxytocin, which in turn

strengthens the bonding experience and behavior of partners (Uvnäs-Moberg, 1997). Besides that, oxytocin appears to be the foundation of monogamous and parental care behaviors. It generally increases a sense of well-being. Furthermore, this substance also seems to lead to the noteworthy reciprocal care behaviors in groups of chimpanzees that can be observed after volatile arguments. Afterwards, they embrace one another, shake hands, and pet and kiss each other, even on their lips.

Harry Harlow's famous experiments with rhesus monkeys had previously illustrated the significance of touch (Harlow & Harlow, 1962). For therapy, and particularly Body Psychotherapy, this means that adequate and, as far as possible, embodied positive bonding experiences, often using touch, can prevent an unnecessary increase in cortisol levels and the senseless repetitions of stress. Corrective healing experiences that have come to be internalized over the course of therapy should have a similar effect, in particular, if they are repeatedly embodied, as well as being remembered. Such reinforcement would correspond with Damasio's (1966) notion of "top-down" activation of experiences.

Raleigh et al. (1991) reported on experiments with monkeys that showed that dominant and submissive behaviors in male animals are determined by experiences of victory and defeat. Amongst other effects, these experiences determined the concentration of the neuro-modulator, serotonin, in their brains. A higher serotonin level leads to more effective dominance behaviors. A conscious regulation of stress levels in the therapeutic situation can therefore be possible through modulating confrontation with friendly care, or even touch. This was initially the essence of the German term "Behandlung" (applying a hand) "treatments". In Body Psychotherapy, so-called 'grounding', 'facing' (instead of confrontation), and even basic practices from the martial arts, can provide a better foundation for more sensible dominance behavior, and help produce a respectively higher level of serotonin, while touch and massage in the context of Body Psychotherapy can most probably influence the oxytocin metabolism, and thereby the client's sense of well-being. In these ways, neurobiology can give us a better understanding of the mechanisms of the body in therapy.

Post-Traumatic Stress Disorders

Active control of the stress system is of particular importance in the context of post-traumatic stress disorders. Secondary changes in the control loops between the amygdala, hypothalamus, pituitary gland, and adrenal cortex (HPA-axis) play a central role in these

disorders that some people experience because of trauma. Traumatized people can have great difficulties verbalizing their traumatic affects. Imaging methods can show that, during activation of implicit traumatic memories, the speech center (Broca's area) is not co-activated through trauma-associated stimuli (van der Kolk, 2000). From the side of the frontal lobe, it can be seen that initially it is hardly possible at all to influence the activation of the traumatic emotions mediated by the amygdala. Respective trauma-associated stimuli essentially correlate with fragments of implicit memory. In particular, the fear and anger components of such experiences seem to be mediated by the amygdala. Imaging methods can show, for example, that visual stimuli that are associated with trauma can activate the amygdala, without activating the cognitive structures of the associative cortex (LeDoux, 1996). Body Psychotherapy seems to be in a particularly suitable position to help to transform implicit and traumatic memories into explicit memories that can then be verbalized and a degree of conscious control can then be exercised.

However, as mentioned, those Body Psychotherapeutic methods that are essentially non-verbal interventions can also be very emotionally evocative. Particularly, in regard of post-traumatic stress disorders, they must be used with great care to prevent any 'flooding' of traumatic memories and 'kindling' or re-traumatizing levels of stress activation of the amygdala. Influenced by the insights of research into neurobiology today, we – as Body Psychotherapists – try firstly to help patients with their post-traumatic stress disorder symptoms in order to help to stabilize them in their life, and to train their mindful awareness. Our orientation is towards enabling patients to preserve the connection to the present and to stay in contact, to slow down their traumatic processes and only then, in connection with all embodied possibilities, intentionally to remember memories with traumatic content, and then to reorganize these to overcome their handicap (van der Kolk, 2000; Ogden, 2006).

Mirror Neurons

In another neurobiological discovery, in 1996, Rizzolatti and colleagues found neurons in the pre-motor cortex of monkeys, which they came to refer to as "mirror neurons" (Gallese, 1996; Rizzolatti, 2002). These neurons were activated when other monkeys were observed executing certain movement patterns. The authors proposed that these neurons constitute the neural foundation of learning through imitation, but also affect resonance behaviors and empathy. They view this facility as an "inner repetition" of the

behaviors of others. We recognize other individuals and their emotional state by generating somato-sensory representations. We simulate, in our brain, how the other individual might feel in similar states (summary in Bauer, 2006; Gallese, 2003; Adolphs, 2003). This means inevitably that our brain is activated in those parts that are being activated in the person observed. In the meanwhile, there are numerous other studies that show that mirror neurons not only exist in the pre-motor cortex, but that the sensory and affective maps of the brain seem to contain mirror neurons as well. They get activated when sensory or affective experiences, such as disgust, are observed in the environment. Joachim Bauer (2002) has offered a good summary of these studies. Although it could be premature to evaluate the significance within psychotherapy and Body Psychotherapy of mirror neurons at this time, they might constitute the neural foundation of general curative factors that become active in every psychotherapeutic encounter with a significantly experienced other.

Summary of Clinical Implications for Body Psychotherapy

Psychotherapeutical research demonstrates that only up to 15% of the results of the overall outcome of psychotherapy depend on the method of treatment. About 30% depend on the quality of the therapeutic relationship, 15% are effects of stimulated hope ('placebo effect') and 40% result from individual and specific factors in the life of patients (Asey & Lambert, 2001). We can pick up important hints from neurobiology as to how and why we should focus our complete attention more and more on this 85% of effective factors. Therefore, some of the central aspects regarding how neurobiological research findings could find reflection in the practice of psychotherapy and Body Psychotherapy is summarized below.

Neurobiology shows us how our current experience is unconsciously and continuously recreated by correlating new stimulations with past experiences. Body Psychotherapy can inspire patients (or clients) to develop the awareness of their perception and experience in this creative, and initially unconscious, act, so that they become increasingly able to attend to and consciously co-create this process.

However, we can now be certain that body, soul and spirit are always a psychosocial-biological unity, interwoven inseparably with the environment. Humans are a self-organizing, living, so-called 'distributive' system with many parallel ways of signals and distinctive levels and these are always in flux. Affects, emotions and feelings are an essential element and an expression of this unity. This basis of processes of change has

still a long road to go before arriving in the general consciousness. But we are also interested in the consequences for practical psychotherapeutic work?

Spitzer, a psychiatrist and neurobiologist from Ulm in Germany, emphasizes the relevance of play for learning and growth (Spitzer, 2000b). A therapeutic “*playing field*”, devoid of threatening consequences, could offer a space to learn and practice any desired new behaviors. In the practice of Body Psychotherapy, such a playing field should be arranged to have the quality of openness towards creative development in many different forms. To give one example, Al Pesso has always viewed the therapeutic situation as a “*possibility sphere*” (Turnbull & Collins, 2008; Pesso & Perquin, 2008). Obviously, the possibilities within such a playing field are much more open and plentiful than in the orthodox ‘talking’ cure. The patient can naturally assimilate a scenery of possibilities into the frame of his current world-view, structure, range of experience, behavior and history. He projects himself, and his world-view, into the scene and then acts accordingly: able to experience something of the changes. Aside from individual Body Psychotherapy, Body Psychotherapeutic group therapy presents a particularly rich playing field with many additional figures that can serve to carry a person’s projections. Of course, it is possible for the therapist to influence and mold this scenery, as well.

In all of this work, it is considered essential that patients participate in the unfolding events with a mental state of self-awareness or *mindfulness*. Whilst they may follow their impulses and act upon them, they are also invited to observe themselves and all their reactions mindfully all the time. All sensory channels can be drawn upon to allow for a fresh perception of the current environment. Particularly with adults, mindful action (*acting in*) is often necessary for this kind of perception to gain enough weight to lead to the recognition of hitherto established, experiences, especially those imprinted in social contexts according to a dysfunctional model of the world and self.

Understanding the background gives better access to the Self, part of the implicit relationship knowledge, thus allowing new healing experiences for their expansion and development. A differentiation of the model of the expanded, or new, reality from the past experiences that shaped the older model can, in a first step, lead to a *disidentification* from the neurotic experience or the now dysfunctional or inappropriate survival technique. At this point, the patient often gets in touch with his original childhood feelings and related experiences of deprivation and traumatization. Novel experiences can then link themselves meaningfully with the older experiences of deprivation and trauma and the previously rigid patterning can then start to change.

In therapy, if patients learn to utilize this state of awareness, they also will have this ability increasingly available and will be able to participate in life in a more and more aware or ‘present’ manner. They will also be able to distinguish more clearly the neuronally-wired implicit knowledge of relationships and the shadows of their past. Thus they can learn to realize the present better, and recognize the signals of the sensual impressions and their somatic markers, becoming aware of their present-day options and discerning between these two levels. Basically, they learn qualities of consciousness by which they can gradually influence – and increase – the percentage of what is happening in their normal life.

The quality of a positive relationship with a significant ‘other’ constitutes a large degree towards the success of any psychotherapy, so this is therefore the fulcrum point of any form of Body Psychotherapy. As mentioned above, the range of someone’s possibilities with regards to experience is initially determined by the wiring of their brain. This wiring is determined by a combination of genetic factors, social contexts, past events and the person’s resulting habits that have been practiced up to the present moment. The neurobiological findings about the inevitability of the established neural wiring makes certain demands on the therapist to approach the client’s experience with an attitude of respectful acceptance. Any ideas about how the client ‘should’ become different (in personality, behavior, etc.), particularly in the beginning phases of therapy, are completely out of place and, most often, stem from a lack of understanding from the therapist.

Methods of how to work with the transference and counter-transference in differentiated ways, how to discern self- and object-representations, i.e. the patient’s models of reality, and how to work with their core beliefs have been addressed in other chapters in this book. Nonetheless, something needs to be emphasized here in this context: many patients have so few sufficiently positive object-representations that their inner experience is like a desert that doesn’t allow for sufficient positive experiences in the present. Just as the child’s brain is originally shaped through its experiences in early childhood with its mother, neurobiological healing must take place in the inter-subjective field between the patient and therapist. Fundamental experiences that are missing can then be re-created in concrete and embodied ways. Holistic experiences, that may include bodily encounters with the therapist or – in group settings – with other group members, thicken the so-called “corrective experiences” as described by Alexander & French (1946, 1980). Just as the radiant gaze of the mother, as well as her touch and

vocalizations, hold a great significance for the infant, the visual, auditory and other sensory sense channels continue to have a much stronger effect on the client's experience than mere words. From this perspective, even an empathic "hmm" contains much more nuanced and multi-dimensional information on how the therapist relates to a client's expression, than any long verbal explanation. Appropriate embodied contact and novel healing experiences support the expansion and internalization of more adequate "dispositional representations" of new and helpful object-experiences, as Damasio says. Established, repetitively-used, one-sided, often dysfunctional, coping strategies contain the danger of becoming fixed, in a neurological sense, due to the strengthening of neural connections through repetition.

If encounters with the therapist, or other group members, are offered in such a way that all sense channels, movement and touch are used simultaneously, so as to make a new experience sufficiently impressive, organic changes in the brain, in the form of neuro-plastic processes, can be facilitated; these advance psychological growth in later stages of life, making expansion upon previously stored memories eminently possible for people in therapy. It is therefore our contention that Body Psychotherapy experiences are more likely to assist the patient to develop new neurological pathways, as these are experienced within more sensory and supportive channels than just the verbal and cognitive.

One characteristic of health is the ability to respond flexibly and to regenerate oneself: this is the concept of 'resilience' (Antonovski, 1987). By offering a range of new experiences from within a supportive environment, Body Psychotherapy can assist the building of resilience. New models, patterns, and possibilities of how to interact with the environment in less dysfunctional ways can be offered, tried out, experienced and then a new pattern is laid down.

The recovery of otherwise initially inaccessible 'resources' and 'novel holistic' experiences that can potentially be recalled, obviously comes to the center of the healing process once and again, and not only when working with trauma. Additionally, resources, and a wide range of coping strategies that the patients are unfamiliar with, can be offered to them over the course of therapy. Resuscitating existing neuronal patterns of experiencing and behavior (resources) and connecting them to other patterns is easier than generating totally new experiences and with these new patterns and their neuronal connections. Therefore it makes sense, to call upon existing resources as frequently as possible, especially those existing prior to traumatization or states of deficiency in the

patients. Paul Bach-Y-Rita (1990) described this process as ‘de-masking of fundamental older neuronal stimulation patterns’.

This can happen, for example, in mindful bodywork done in a warm-water (35°C) shallow pool, in which patients in the group can feel. According to Gerald Hüther (personal communication, 2008) existing positive experiences from earliest childhood (or even from intrauterine experiences in the amniotic fluid) can be called up from the deeper (more unconscious) areas of the brain and thus become accessible and worked with.

So-called ‘re-constructive bodywork’ (like this kind of work in the water) or grounding, balance, expansion of breath and voice (as in Yoga), or elements from martial arts work, can be very useful, but can’t be further expanded upon much in this chapter. However, the psychoanalyst and neurobiologist, Manfred Beutel (2008), believes that changes of implicit procedures are possible by non-verbal communication below the threshold of conscious perception.

When such regenerative additional possibilities are just practiced, but can’t seem to be properly experienced, or learned by the patients, one is often faced with the ramifications and implications of an old, probably complex, story. This then indicates that it is necessary both to attend to the present structure of experience ‘mindfully’, and also to explore important old associated feelings and the historical background so as to enrich them within a deeper emotional framework, which can then be worked with to create new healing experiences. This approach could be referred to as ‘revealing bodywork’.

In the unfolding of these old feelings, therapists should probably begin to give more consideration to a particular set of neuro-biologically substantiated facts: every emotionally impact-full experience conditions the brain. Any re-experiencing of old suffering or deprivation – without a concomitant restorative or healing experience – can destabilize the patient’s present equilibrium and potentially re-traumatizes them. The neural connections correlating with these negative experiences are then strengthened further: this is not therapeutic. To recall old pain, and experiences of deprivation and/or trauma is therefore only useful when therapy can offer the experience of a better ‘ending’ to these old painful stories.

An actualization of the person’s problems, in a mental state of awareness or mindfulness, displays the contemporary structure of the experience and then leads it back into the past experience. This proceeding then allows for a differentiation from the old story, from the new possibilities that available in the present. In this therapeutic process, the patients should be made to feel as safe as possible. This condition makes it easier for

them to relax, which makes access to their emotions and feelings easier, creates a more positive and supportive environment, and – on occasion – even leads to a spontaneous recollection of the original conditions of deficit.

There is also a psycho-biological presumption (or impulse coming from the patient) of ‘wanting’ to heal. There are many different reasons why patients need novel and clearly embodied present-time experiences in which they find that sufficient support is available, and missing experiences are provided in the here-and-now. Pessó (2008) refers to this type of intervention as the “antidote”. It seems reasonable to strive towards improvement of the patient’s situation from the very beginning of therapy through offers of such positive experiences. At the same time, this might represent an activation of their reward system and an improvement of the state of their immune system (Bauer, 2006).

Embodied experiences, in a good therapeutic relationship, in connection with all the senses, especially touch and movement, are direct and intensive. The qualities of these new experiences (and their respective neurobiological connections regarding the possible neuroplastic changes) demonstrate, in a very impressive manner, that they can have a justified hope for an improvement in their situation. This results in a direct influence on the effects of the therapeutic process (i.e. on the 15% placebo effect). This in turn improves the working relationship, even when uncomfortable experiences cannot be avoided.

A sufficient degree of emotional involvement and activation, or challenge and temporary destabilization of the patient, might be considered necessary to allow for new learning to occur (Hüther, 2003). But as patients usually experience a significant level of psychological strain as it is, they commonly do not need an additional challenge from the therapist. Additionally, the actualization of the old story also generates a lot of stress and dis-stress. In individual cases, the therapist must consider the right mixture of safety and relaxation, as opposed to challenge, on an on-going basis, as his part of the co-creation of the therapeutic process.

Proper therapy results in increased ego-strength. Subsequently, ‘internalization’ allows for improved self-regulation and self-awareness. This leads to a stronger inclusion of and co-regulation from the frontal lobe and ACC, and this is likely to form a stronger connection with the amygdala, the center that regulates traumatic memory.

Old memories can be re-experienced and be changed and expanded with novel and healing elements: the person’s memory thus become re-categorized. As the reconstruction of the brain needs time and repetition, in Hakomi, we repeatedly invite our

patients to remember positive new experiences, in between sessions, as vividly as they can, using gestures and concrete substitute symbols that the patients choose. Clinically, we have the strong impression that the repeated recollection of new experiences strengthens their internalization. This also implies a transformation and novel synaptic connection of control loops in the brain, for example in the sensory and motor maps of the parietal and frontal cortex.

Given that a stable therapeutic alliance has been properly established, and these safeguards are considered, some of the findings of neurobiology can offer very helpful information about the re-framing of experiences for patients. Occasional relapses into older ways of behavior and experience, particularly under stress, are a natural part of the psychotherapeutic process, considering the extent of much more deeply engrained and habitual neural connections. It is good and relieving for both therapists and clients to know that. Here, the image of a deeply worn rut in an age-old paved road, or an old gramophone record that had been scratched, can be helpful. It takes practice, repetition, and time to make – and reinforce – new pathways outside of the old rut.

Future Prospects

To date, Body Psychotherapeutic methods have not been evaluated neuro-biologically. A huge amount of research is evidently called for to examine and clarify some of the Body Psychotherapeutic possibilities, questions, and speculations, as presented above. In the future, the short- and long-term effects of touch, movement, and gesture, as well as the inclusion of the senses in Body Psychotherapy are likely to be shown and substantiated in detail through techniques like functional Magnetic Resonance Imaging (fMRI) and other methods. There are very strong indications suggesting that integrative, multi-modal treatment models that include psychotherapy, as well as psycho-pharmacological treatment, amongst other things used when or as necessary, offer the best approach for most chronic disorders. In dealing with such, an integrative understanding of psychotherapy, and Body Psychotherapy, can offer essential and effective help. The value of Body Psychotherapy – and other body therapeutic methods such as Feldenkreis, Rolfing, etc. – in multi-modal and integrative treatment models, is likely to become increasingly evident. The dialog between different schools of psychotherapy and Body Psychotherapy can also be enriched by neuro-biological understandings. The various different models of healing could (and should) be discussed, and researched, under consideration of neurobiological findings. Modern psychotherapy and Body

Psychotherapy could (and should) become grounded, not only in depth psychology, but also in neurobiology. Similarly, these disciplines could benefit from adopting something more of a Body Psychotherapy perspective.

References

- Adolphs, R., Tranel, D., Damasio, H. & Damasio, A.R. (1995). Fear and the human amygdala. *Journal of Neuroscience* 15, pp. 5879-5891.
- Adolphs, R., Damasio, H., Tranel, D. & Damasio, A.R. (1996). Cortical Systems for the Recognition of Emotion in Facial Expressions. *Journal of Neuroscience* 16, pp. 7678-7687.
- Adolphs, R. (2003). Cognitive Neuroscience of Human Behaviour. *Nature Reviews Neuroscience* 4, pp. 165-177.
- Ahissar, E., Vaadia, E., Ahissar, M., Bergman, H., Arieli, A. & Abeles, M. (1992). Dependence of cortical plasticity on correlated activity of single neurons and on behavioral context. *Science*, 257, Issue 5075, pp. 1412–1415.
- Alexander, F. & Morton French T. (1946). *Psychoanalytic Therapy: Principles and Application*. New York: Ronald Press.
- Alexander, F. & Morton French, T. (1980). *Psychoanalytic Therapy: Principles and Application*. Lincoln, NE: University of Nebraska Press.
- Antonovski, A. (1987). *Unraveling the mystery of health: how people manage stress and stay well*. San Francisco: Jossey-Bass.
- Asey, T. P. & Lambert, M. J. (2001). Empirische Ergebnisse für die allen Therapien gemeinsamen Faktoren: Quantitative Ergebnisse [Empirical results for all common factors in therapies: Quantitative results]. In: M.A. Hubble, B.L. Duncan & S.D. Miller. (Eds.) *So wirkt Psychotherapie. Empirische Ergebnisse und praktische Folgerungen [How psychotherapy Works: Empirical results and practical implications]*, (pp. 41-81). Dortmund: Modernes Leben.
- Bach-y-Rita, P (1990). Brain plasticity as a basis for recovery of function in humans. *Neuropsychologia*, 28, pp. 547-554.
- Barbas, H. & Pandya, D.N. (1989). Architecture and intrinsic connection of the prefrontal cortex in the rhesus monkey. *Journal of Comparative Neurology*, 286, pp. 353-375.
- Bauer, J. (2002). *Das Gedächtnis des Körpers: Wie Beziehungen und Lebensstile unsere Gene steuern [The memory of the body: Those relationships and lifestyle controlled by our genes]*. Frankfurt: Eichborn.
- Bauer, J. (2006). *Warum ich fühle was du fühlst? Intuitive Kommunikation und das Geheimnis der Spiegelneurone [Why do I feel what you feel? Intuitive communication and the mystery of mirror neurons]*. Hamburg: Hoffmann & Campe.
- Bauer, J. (2006b). *Prinzip Menschlichkeit - warum wir von Natur aus kooperieren [Principles of Humanity - why we cooperate naturally]*. Hamburg: Hoffmann & Campe.
- Baxter, L.R., Schwartz, J.M., Bergman, K.S., et al. (1992). Caudate glucose metabolic rate changes with both drug and behavior therapy for obsessive-compulsive disorder. *Arch Gen Psychiatry*, 49 (9) pp. 681–689.

- Beutel, M.E., Stern, E., & Silberzweig, D.A. (2003). The emerging dialogue between psychoanalysis and neuroscience: *Neuroimaging Perspectives: Journal of the American Psychoanalytic Association*, 51, pp. 773-801.
- Beutel, M.E. (2008). Vom Nutzen der bisherigen neurobiologischen Forschung für die Praxis der Psychotherapie [The benefits of recent neurobiological research to the practice of psychotherapy]. *Psychotherapeuten Journal*, 8, pp. 384-392.
- Bower, G.H. (1981). Mood and Memory. *American Psychologist* 36: pp. 129-148.
- Boyesen, G. & Boyesen, M-L. (1980). The Collected Papers of Biodynamic Psychology, Vols. 1 & 2. London: Biodynamic Psychology Publications.
- Brody, A.L., Saxena, S., Schwartz J.M. et al. (1998). FDG-PET predictors of response to behavioral therapy and pharmacotherapy in obsessive-compulsive disorder. *Psychiatry Res.*, 84 (1), pp. 1-6.
- Brody, A.L., Saxena S., Stoessel P., et al. (2001). Regional brain metabolic changes in patients with major depression treated with either paroxetine or interpersonal therapy: preliminary findings. *Arch Gen Psychiatry*, 58 (7), pp. 631-640.
- Cozolino, L. (2003). *The neuroscience of psychotherapy: Building and rebuilding the human brain*. New York & London: Norton.
- Crick, E. (1994). *Wie die Seele wirklich ist [As the soul is real]*. München: Artemis & Winkler.
- Damasio, A.R. (1996). The somatic marker hypothesis and the possible functions of the prefrontal cortex. *Philosophical Transactions of the Royal Society, B: Biological Sciences*, 351, pp. 1413-1420.
- Damasio, A. & Kober, H. (1999). *Ich fühle, also bin ich: Die Entschlüsselung des Bewusstseins [I feel, therefore I am: The decoding of consciousness]*. München: List Verlag.
- Damasio, A. (2001). *Descartes Irrtum [Descartes Error]*. Stuttgart: Schattauer.
- Dennison, Z. & Teskey, G.C. (1995). Persistence of kindling: Effect of partial kindling, retention interval, kindling site, and stimulation parameters. *Epilepsy Res*, 1995, 21, 3, pp. 171-182.
- Edelman, G. (1993). *Unser Gehirn - ein dynamisches System [Our brain - a dynamic system]*. München: Piper Verlag.
- Edelman, G. (1995). *Göttliche Luft, vernichtendes Feuer [Divine air, destructive fire]*. München: Piper Verlag.
- Ekman, P. & Friesen W.V. (1974). Detecting deception from the body and face. *Journal of Personality and Social Psychology*, 29, pp. 288-298.
- Emrich, H. & Gehde, E. (1998). Kontext und Bedeutung: Psychobiologie der Subjektivität im Hinblick auf psychoanalytische Theoriebildungen. [Context and Meaning: Psychobiology of subjectivity with respect to psychoanalytical theory building]. *Psyche* 9, p. 10.
- Etkin, A., Phil, M., Pittenger, C. Polan, H.P. & Kandel, E.R. (2005). Toward a Neurobiology of Psychotherapy: Basic Science and Clinical Applications. *J. Neuropsychiatry & Clinical Neuroscience*, 17, pp. 145-158.
- Furmark, T., Tillfors, M., Marteinsdottir, I., et al. (2002). Common changes in cerebral blood flow in patients with social phobia treated with citalopram or cognitive-behavioral therapy. *Arch Gen Psychiatry*, 59 (5) pp. 425-433.
- Gage, F. (2000). Mammalian neural stem-cells. *Science*, 287, pp. 1433-1448.
- Gallese, V., Fadiga, L., Fogassi, L. & Rizzolatti, G. (1996). Action recognition in the premotor cortex. *Brain*, 119, pp. 593-609.
- Gallese, V. (2003). The roots of empathy: The shared manifold hypothesis and the neural basis of intersubjectivity. *Psychopathology*, 36, pp. 171-180.

- Gazzaniga, M.S. (ed.) (2000). *The New Cognitive Neurosciences*. Cambridge, MA: MIT Press.
- Glenberg, A.M. (1997). What memory is for Behavioral and Brain. *Sciences*, 20, pp. 1-55.
- Glenberg, A.M., Havas, D., Becker, R. & Rinck, M. (2005). Grounding Language in Bodily States. In: R. Zwaan & D. Pecher, *The Grounding of Cognition: The Role of Perception and Action in Memory, Language and Thinking*. Cambridge: University Press
- Glenberg, A.M. & Robertson, D.A. (2000). Symbol grounding and meaning: A comparison of high-dimensional and embodied theories of meaning. *J. of Memory and Language*, 43, pp. 379-401.
- Goldapple, K., Segal, Z., Garson, C., et al. (2004). Modulation of cortical-limbic pathways in major depression: treatment-specific effects of cognitive behavior therapy. *Arch Gen Psychiatry*, 61 (1), pp. 34-41.
- Görnitz, T. (2002). *Der kreative Kosmos [The Creative Cosmos]*. Heidelberg: Spektrum Akademischer Verlag.
- Gottwald, C. (2004). Bewusstseinszentrierte Körperpsychotherapie [Conscious-centered Body Psychotherapy]. In: S. Sulz, L. Schrenker & C. Schricker (Eds.) *Die Psychotherapie entdeckt den Körper [Psychotherapy Discovers the Body]*. München: CIP-Medien.
- Gottwald, C. (2004). Bewusstseinszentrierte Körperpsychotherapie – Angewandte Neurobiologie? (Conscious-centered Body Psychotherapy – Applied Neurobiology?) *Psychotherapie*, Vol. 9, No. 2, pp. 185-218.
- Gottwald, C. (2007a). Von Neurobiologie inspirierte Erweiterung der psychodynamischen Praxeologie durch bewusstseinszentrierte Körperpsychotherapie [From biologically inspired extension of the psychodynamic praxeology by his conscious body-centered psychotherapy]. *Psychotherapie Forum*, 15, pp. 73-77.
- Gottwald, C. (2007b). Eine körperpsychotherapeutische Sicht auf die Neurobiologie A Body Psychotherapeutic view of neurobiology]. *Psychologische Medizin*, 4, pp. 4-20.
- Gottwald, C. (2008). Körpertherapie auf dem Boden von potenzialentfaltender Gestalttherapie [Body therapy on the ground of potentially unfolding Gestalt therapy]. In: L. Hartmann-Kottek & U. Strümpfel (Eds) *Gestalttherapie [Gestalt Therapy]*: Berlin, Heidelberg: Springer.
- Grawe, K. (2000). *Psychologische Therapie [Psychological Therapy]*. Göttingen: Hogrefe.
- Grawe K. (2004). *Neuropsychotherapie [Neuropsychotherapy]*. Göttingen: Hogrefe.
- Grotstein, J.S. & Schore, A.N. (1994). *Affect Regulation and the Origin of the Self*. Hillsdale, N.J.: Lawrence Erlbaum Associates.
- Harlow, H.F. & Harlow, M.K. (1962). The effect of rearing conditions on behavior. *Bulletin of the Menninger Clinic*, 26, pp. 213-224.
- Henningsen, P. (2000). Vom Gehirn lernen? Zur Neurobiologie von psychischer Struktur und innerer Repräsentanz [Learning from the brain? On the neurobiology of psychological structure and internal representation]. *Forum Psychoanalysis*, 16, pp. 99-115.
- Hüther, G. (1997). *Biologie der Angst [Biology of Fear]*. Göttingen: Vandenhoeck & Ruprecht.
- Hüther, G. (2001). *Bedienungsanleitung für ein menschliches Gehirn [Operating Instructions for a Human Brain]*. Göttingen: Vandenhoeck & Ruprecht.

- Hüther, G. (2003). Die nutzungsabhängige Reorganisation neuronaler Verschaltungsmuster [The use-dependent reorganisation of neuronal wiring patterns]. In: G. Schiepek (Ed.) *Neurobiologie der Psychotherapie [Neurobiology of Psychotherapy]*. Stuttgart: Schattauer
- Izard, C. (1977). *Human Emotions*. New York: Plenum Press.
- Izard, C. (1991). *The Psychology of Emotions*. New York: Plenum Press.
- Izard, C. (1992). Four systems for emotion activation. *Psychological Review* 99, pp. 561–565.
- Jenkins, W.M., Merzenich, M.M. & Recanzone, G. (1990). Neocortical representational dynamics in adult primates. *Neuropsychologia*, 28, pp. 573–584.
- Kabat-Zinn, J., Lipworth, L. & Burney, R. (1985). The Clinical Use of Mindfulness Meditation for the Self-Regulation of Chronic Pain. *Journal of Behavioral Medicine*, 8 (2), pp. 163-190.
- Kandel, E. (1991). *Principles of Neural Science*. New York: Elsevier.
- Kandel, E. (1995). *Neurowissenschaften [Neuroscience]*. Heidelberg: Spektrum Akademischer Verlag.
- Kaplan-Solms, K. & Solms, M. (2001). *Clinical Studies in Neuro-psychoanalysis: Introduction to a Depth Neuropsychology*. London: Karnac Books.
- Kurtz, R. (2002). *Hakomi, eine körperorientierte Psychotherapie [Hakomi: a body-oriented psychotherapy]*. München: Kösel.
- Lambert, M.J. (1992). Psychotherapy outcome research: Implications for integrative and eclectic psychotherapists. In: J.C. Norcross & M.R. Goldfried (Eds.). *Handbook of Psychotherapy Integration*. New York: Basic Books.
- LeDoux, J. (1996). *The Emotional Brain: The mysterious underpinnings of emotional life*. New York: Simon & Schuster.
- LeDoux, J. (2001). *Das Gehirn und seine Wirklichkeit [The brain and its reality]*. München: dtv.
- LeDoux, J. (2003). *Das Netz der Persönlichkeit - wie unser Selbst entsteht [The power of personality: How our Self is created]*. Düsseldorf und Zürich: Walter Verlag. (Orig.) *The Synaptic Self: How Our Brains Become Who We Are*. New York & London: Penguin.
- Leutzinger-Boleber, M. & Pfeifer, R. (1998). Erinnern in der Übertragung – Vergangenheit in der Gegenwart [Transferred memories: The past in the present]. *Psyche*, 9, 10, pp. 884-918.
- Leutzinger-Bohleber, M., Mertens, W. & Koukkou, M. (1998). *Erinnerung von Wirklichkeiten, Psychoanalyse und Neurowissenschaft im Dialog [The memory of realness: Psychoanalysis and neuroscience in dialog]*. Stuttgart: Verlag Internationale Psychoanalyse.
- Levin, F. (2003). *Psyche and Brain. The biology of talking cures*. Madison: International Universities Press.
- Loftus, E.F. (2001). Falsche Erinnerungen [False memories]. In: Rätsel Gehirn [Puzzle Brain]. *Digest 2: Spektrum der Wissenschaft*, pp. 62-67.
- Matthis, I., Kihlbom, M., Prawitz, D.M. & Bryngelson, L. (2004). The Body-Mind Study Groups of the Swedish Psychoanalytic Society. *Neuropsychanalysis*, 6, pp. 228-230.
- Matthis, I., Kihlbom, M., Bjerström, V., Lagerlöf, U. & Klawitter, L.H. (2008). The Body-Mind Study Groups of the Swedish Psychoanalytic Society. *Neuropsychanalysis*, 10, pp. 220-221.
- Merzenich, M.M., et al. (1990). How the brain functionally rewires itself. In: M. Arbib (Ed.) *Natural and artificial parallel computation*. Cambridge, MA: MIT Press.

- Nader, K., Schafe, G.E. & LeDoux, J.E. (2000). Fear memories require protein synthesis in the amygdale for reconciliation after retrieval. *Nature*, 406, pp. 722-726.
- Niedenthal, P.M., Barsalou, L.W.. et al. (2005). Embodiment in Attitudes, Social Perception and Emotion. *Personality and Social Psychology Review*, 9, 3 pp. 184-211.
- Ogden, P., Minton, K. & Pain, C. (2006). *Trauma and the body: A sensorimotor approach to psychotherapy*. New York & London: W.W. Norton & Co.
- Olds, J. (1995). Self-stimulation of the brain. *Science*, 127, pp. 315-324.
- Perls, F.S. (1973 / 1976). *Gestalttherapie in Aktion [Gestalt Therapy in Action]*. Stuttgart: Klett-Cotta
- Pert, C. (1997). *The Molecules of Emotion: Why you feel the way you feel*. New York: Schribner.
- Pert, C. (1999). *Moleküle der Gefühle [Molecules of Emotion]*. Reinbek: Rowohlt
- Pesso, A. & Perquin, L. (2008). *Die Bühnen des Bewusstseins oder: werden wer wir wirklich sind [The stages of consciousness or: be who we really are]*. München, CIP-Medien.
- Pöppel, E. (2000). *Grenzen des Bewusstseins [Boundaries of consciousness]*. Frankfurt: Inselverlag.
- Porges, S. (2007). The polyvagal perspective. *Biological Psychology*, 74, pp. 116-143.
- Posner, M. & Raichle, M.E. (1996). *Bilder des Geistes [Pictures of the Spirit]*. Heidelberg: Spektrum Akademischer Verlag.
- Raleigh, M.J. (1984). Social and environmental influences on blood. *Cerebral Cortex* 4, pp. 8-26.
- Ramachandran, V. (2001). *Die blinde Frau, die sehen kann: Rätselhafte Phänomene unseres Bewußtseins [The blind woman, who can see: Puzzling phenomena of our consciousness]*. Hamburg: Rowohlt.
- Rizzolatti, G. & Arbib, M.A. (1998). Language within our grasp. *Trends in Neuroscience*, 21, pp. 188-194.
- Rizzolatti, G., Fadiga, L., Fogassi, L. & Gallese, V. (2002). From mirror neurons to imitation: Facts and speculations. In: A.N. Meltzoff & W. Prinz (Eds.) *The imitative mind: Development, evolution, and brain bases*, (pp- 247-266). Cambridge: Cambridge University Press.
- Roth, G. (1997). *Das Gehirn und seine Wirklichkeit [The brain and its reality]*. Frankfurt: Suhrkamp Taschenbuchverlag.
- Roth, G. (1999). Entstehen und Funktionen von Bewusstsein [The origin and function of consciousness]. *Deutsches Ärzteblatt*, 96, 30, A-1957 / B-1686 / C-1567.
- Roth, G. (2001). *Fühlen, Denken, Handeln [Feeling, Thinking, Touching]*. Frankfurt: Suhrkamp-Verlag.
- Roth, G. (2009). *Aus der Sicht des Gehirns [From the view of the brain]*. Frankfurt: Suhrkamp-Verlag.
- Rüegg, J.C. (2001). *Psychosomatik, Psychotherapie und Gehirn [Psychosomatics, Psychotherapy & the Brain]*. Stuttgart: Schattauer.
- Schacter, D. (1997). *Searching for memory: The brain, the mind and the past*. New York: Basic Books.
- Schacter, D. (2001). *Wir sind Erinnerung [We are memory]*. Reinbek: Rowohlt Taschenbuchverlag.
- Schore, A.N. (2003). *Affect Regulation and the Repair of the Self*. New York: W.W. Norton & Co.
- Siegel, D.L. (1995). Memory, trauma and psychotherapy. *J. of Psychotherapy, Practice and Research*, 4, pp. 93-122.

- Siegel, D.L. (2000). *The Developing Mind: Towards a neurobiology of interpersonal experience*. London: Guildford Press.
- Singer, W. (2004). Ein Spiel von Spiegeln [A game of mirrors]. *Spektrum der Wissenschaft (Spezial) 1*, pp. 20 -25.
- Singer, W., Engel, A.K. & Fries, P. (2001). Synchrony, oscillations, and relational codes. *Nature Reviews Neuroscience*, 2, p. 704
- Solms, M. & Turnbull, O. (2002). *The Brain and the Inner World: An introduction to the neuroscience of subjective experience*. London: Karnac Books.
- Spitzer, M. (2000). *Geist im Netz [Ghost in the network]*. Heidelberg: Spektrum Akademischer Verlag.
- Spitzer, M. (2001). Ketchup und das kollektive Unbewusste [Ketchup and the collective unconscious]. Heidelberg: Spektrum Akademischer Verlag.
- Spitzer, M. (2002). *Lernen [Learning]*. Heidelberg: Spektrum Akademischer Verlag.
- Stern, D.N. (1998). Die Lebenserfahrung des Säuglings [The lived experience of the infant]. Stuttgart: Klett-Cotta,
- Turnbull, J.K. & Collins, J. (Eds) (2008). *Leadership Learning*. Basingstoke: Palgrave Macmillan.
- Uvnäs-Moberg, K. (1997). Physiological endocrine effects of social contact. *Academic Science*, 807, pp. 146-163
- Uvnäs-Moberg, K. (2003). *The Oxytocin Factor: Tapping the hormone of calm, love and healing*. Cambridge, MA: De Capo Press, Perseus Books.
- van der Kolk, BA., McFarlane, A.C. & Weisaeth, L. (2000). *Traumatic Stress: the effects of overwhelming experience on mind, body & society*. New York: Guilford.
- Vissing, S.F., Hjortso, E.M. (1996). Central motor command activates sympathetic outflow to the cutaneous circulation in humans. *J. Physiology*, 492, pp. 931-939.