

Three Body Psychotherapy Cases that will be Explained by the Sympathetic – Parasympathetic Model

Case Presentations by Pat Ogden and Peter Levine

By Jerome Liss, M.D.

j.liss@fastwebnet.it

Part I. The Scientific Orientation p. 1

Part II: The Sympathetic – Parasympathetic Model p. 3

Part III. The Case Studies p. 6

Part IV. The Theory p. 16

Part V. Two General Notions of Emotional Disturbance and Psychotherapy p. 19

Part I. The Scientific Orientation

The Body Psychotherapy movement has been searching to establish the scientific basis of its special orientation.. One important direction has been the support for research projects that study patient change based on questionnaires filled out before and after psychotherapeutic intervention. This type of study requires a quantitatively significant number of cases. Also only the results results are looked at, not the therapeutic process itself.

Therefore, a second direction for scientific investigation, which has not yet been developed, involves **the study of the psychotherapeutic process**. This requires a detailed analysis of the therapeutic process, with step-wise interventions, based on **specific case examples**. This article will try to initiate this new type of scientific inquiry.

A Theory that Explains a Sequence of Therapeutic Interventions

Why has the study of concrete processes during psychotherapy been neglected, not only in Body Psychotherapy, but in all forms of psychotherapy? One reason has involved a misunderstanding of science. Those who believe that scientific investigation must involve the study of a large number of cases in order to give statistical data regarding the regularity of particular observations – as if only the quantitative results can support a hypothesis – have a limited notion of how science can work.

Carl Hempel's philosophy of science (Hempel,1952,1965) offers a general notion of science that will serve as our guideline, namely, that "science is the back-and-forth movement between theory and observations." This guideline permits us to construct a different type of scientific paradigm, the "psychotherapy process paradigm." By "process" I mean the observation and registration of concrete events that take place during a psychotherapeutic session. And how can the concrete observations support or disconfirm a scientific hypothesis or theoretical model? **Not** by a quantitative accumulation of a repeated type of observation, since this is not possible by studying "single and unique cases." Rather, by the **correspondence of a sequence of processes to a theoretical framework**. Hempel offers us a useful term for the connection between an observation and its theoretical explanation, namely, "rules of correspondence." Therefore, the scientific challenge is to "explain" an observed sequence of process-events during a psychotherapeutic session by showing that these are "covered" by our theoretical umbrella. (For a more extensive presentation of how "single and unique" case studies can serve as the basis for scientific investigation, the reader is

referred to the article, "The Philosophy of Science and the Clinical Researcher: A Proposal for a New Scientific Psychology," Liss,1986.) The upshot is that **we can use our single case studies to understand more deeply the therapeutic process on a scientific basis.**

A Barrier Against Clinical Science; The Sparsity of Clinical Studies that Give Sequential Reproduction of the Therapeutic Session

Not only does people's lack of awareness of the "clinical process scientific paradigm" create an obstacle for clinical research, but there is also another significant barrier that we must face : **the lack of case reports that present a sequence of concrete processes during the therapeutic session.** In other words, most articles regarding psychotherapy merely present general concepts while, at the most, barely hint at the specific events that might be observed during a specific session. Thus, a reader of an article often says, "The article was very general while I wanted to understand what really happens, but there were no concrete case examples." We can briefly speculate about the factors that create this important barrier, a barrier that limits scientific evaluation and progress, but that also limits the teaching of psychotherapy and the evolution of psychotherapeutic effectiveness. Three obstacles: 1. the lack of habit and technical difficulty of registering sessions (diminished now with the availability of video and audio registration), 2. the fear of being criticised by colleagues who think, "That's not a correct intervention," when the therapeutic process is presented in an article, 3. The fear of transgressing the rule of confidentiality. These obstacles can be overcome. (The previously cited article, "A Proposal for a New Scientific Psychology," offers suggestions for doing so.)

The Source of the Material

Fortunately, not all psychotherapists have been impeded by these barriers. I have chosen two articles that are presented on the European Association Body Psychotherapy website that present **process sequences during the psychotherapeutic session.** My first comment is to give a warm appreciation to these body psychotherapists who found the means to register and transmit essential sequences of a concrete therapeutic session. And we can give I begin, therefore, with an appreciation of the three authors – Pat Ogden and Peter Levine – and hope that this article will encourage the reader to return to their original case presentations. (Ogden,2000; Levine,www.traumatology healing.com)

A Scientific Challenge

Science is a challenge, very close to a game. Here is the game I wish to play: "Can the "theoretical umbrella" that I present "cover" (in the Hempelian sense) the observations that are recorded? The reader is asked to play this game with me. Of course, I will play it from my side, but the reader can evaluate for himself whether the "correspondences" between observation and theory are justified, and whether the theory is sufficient to cover all the events presented in each article.

The first essential question is, "**What theoretical umbrella** can explain the great complexity and variety of moments in a therapeutic sequence?"

Part II: The Sympathetic – Parasympathetic Model

The Hypothesis

I propose that the concept of **sympathetic vs. parasympathetic-dominated processes** can account for the majority of observations in body psychotherapy. Sympathetic and parasympathetic processes are regulated by the limbic system of the brain. While there are

different views, historically, regarding the question, "What constitutes the limbic system?," I will now present a provisional map of the limbic system based on recent neurophysiological research. Next to each level of the system, I will indicate one or several of the authors – and of course there are others – who have investigated each particular level.

An Enlarged View of The Limbic System	
from the highest (cortical) to the lowest (sub-cortical) brain levels	
Region	Major Researcher
Orbito-frontal lobe	Rolls, Damasio, Shore
Cingulate gyrus	Ochsner, Bush
Hippocampus	Edelman, Kandel, Laborit
Insula	Rolls, Rizzolatti
Amygdala	LeDoux, Laborit
Hypothalamus	Gellhorn, Rossi
Periacqueductal Area (or Central Gray Matter)	McNaughton
Neuromodulator Production Centers	Edelman
a. Tegmentum	Shore
b. Locus Coeruleus	Berridge
c. Raphe Nuclei	to be researched
d. Pendulopontine Nucleus	to be researched
Visceral Nuclei	Porges

What the Sympathetic and Parasympathetic Impulses Actually Do

Let us imagine two intertwining chains that go from top to bottom (or, equally, from bottom to top): One is the **sympathetic** chain, the other the **parasympathetic** chain. Historically, it was known that the **sympathetic** chain regulates **energy-spending processes** that prepare the body for action and that guide body processes in the midst of action: increased heart rate, faster breathing, higher blood pressure, increased blood distribution to the voluntary "action" muscles, decreased blood distribution to the involuntary muscles of the digestive tract, increased blood pressure, inhibition of peristalsis and of gastric intestinal tract secretions, sweating, etc. The sympathetic reaction also provokes the release of "stress hormones," especially corticosteroids and noradrenalin. And, of great importance, many levels of the sympathetic chain connect to the **basal ganglia** (which is not a part of the limbic system), producing emotional expression and other **automatic actions**.

On the other hand, the **parasympathetic** regulates **energy-conserving and energy-renewing processes**. This means that when we rest, our blood returns from our voluntary muscles to the involuntary muscles within our digestive tract, peristalsis returns, digestive secretions can be stimulated, blood pressure diminishes, heart rate slows, breathing slows down and muscle tone diminishes.

Many of these processes are directly associated with hypothalamus regulation of the Autonomic Nervous System (Gellhorn, 1972). But today's neurophysiological research has widened our horizons. We can now think of the sympathetic and parasympathetic processes "orienting" every functional level of the conscious-unconscious "limbic system." Here is a simplified overview:

The Limbic System	
Cortical Level	Regulation
Orbito-frontal lobe	consciousness of visceral and emotional experiences
Sub-Cortical Level	Regulation
Cingulate gyrus (some researchers regard the Cingulate gyrus as cortical)	Self-Other dynamics
Insula	Body experience, disgust
Hippocampus	Object-in-space perception, explicit memory
Amygdala	Anger, Fight/Flight
Hypothalamus	Autonomic Nervous System (Sympathetic – Parasympathetic regulation of the vasculature), Hormones
Central Gray Matter	Pain (Physical and Emotional)
Neuromodulatory Centers	Total brain activation
Visceral nuclei	Visceral reactions

The multiplicity of brain levels that influence the vertical Sympathetic-Parasympathetic chain gives theoretical weight to our basic proposal: **To interpret emotional suffering and psychotherapeutic change according to sympathetic-dominant vs. parasympathetic-dominant processes** is supported by recent brain research.

Now we will come to the basic challenge of this theory: **Can we "see" Sympathetic-dominant or Parasympathetic-dominant processes in following the sequences of a body-oriented psychotherapeutic session?**

Part III. The Case Studies

Pat Ogden

Pat Ogden (2000) presents the case of Mary, a middle-aged business woman who suffered from being raped repeatedly by her uncle from ages four to ten. Her subsequent symptoms included panic attacks, depression and a sense of "no boundaries." After an altercation with an authority figure, a "re-stimulation" of her trauma, she began to have flashbacks, insomnia, physical symptoms, continuous arousal, uncontrollable shaking, vaginal bleeding and periods of immobility.

Here are some moments of the therapy:

Mary was asked to push her hands against a pillow held by the therapist. Doing this she first experienced nausea and fear. Interpretation: the S. was stimulated by pushing with the hands against the therapist, re-enacting the traumatic situation, but this time with an active defense. The buried P. of naueas and fear emerged. ("**S.**" = "**sympathetic**, "**P.**" = "**parasympathetic.**")

Thus an activation of the S., with the trauma in mind, permitted the long hidden P. reactions. This enhances S./P. interplay, overcoming their long-standing scission. The S. action also helps "contain" the P. and prevents P. flooding, that is, feeling emotionally overwhelmed. The therapist intuits the "just right" dosage and also encourages the patient's self-regulation. The P. is like a river, the S. is like its solid banks. We need the river to flow, but it can also flood over its banks. The therapeutic process is an art of permetting a sufficient P. flow while rebuilding its S. banks of containment.

Sympathetic Containment of the Parasympathetic Flow

The therapist's "contact statements" – "The strength of the contact is increasing," "You seem to be settling down," – creates a conscious (cortical) experience which increases conscious-to-unconscious (cortical-to-subcortical) regulation, thus also helping to contain the P. emotional response without repressing it. The therapist asks, "What's happening in your body as you push? What do you feel in your back and spine?" This empowers the patient to create her own conscious (cortical) processes that contain the P. flood. The patient was asked to describe the purely **physical** sensations of the body rather than the emotional sense, further containing the emotions, but avoiding repression, thereby creating a way to be conscious of the inner world without being submerged by its force.

The patient continued the active defense response of lifting the arms, pushing still further, then using the back, pelvis and legs as part of the protective action. She said, "This feels good!" She became calmer and mindful. Interpretation: Mary had completed a natural rising-and-subsiding of a an aggressive, protective S. impulse. The P. impulse of the fear and sense of being overwhelmed emerged from the deep sub-cortical unconscious, was contained by the S. protective action, and both subsided together. We can call this "completion of the aroused impulses." Since this is a biological-based memory pattern, the disturbing impulses will inevitably return, But the work can be repeated and, in time, one can expect positive change, perhaps leading to resolution. The positive feelings are associated with a renewed production of endomorphins and other neuro-peptides. (See Biondi, 2005)

D.O.Hebb's Dictum: Neurons that fire together, wire together.

When Mary decided to continue facing the traumatic memory, we can see another wave of S. impulses spontaneously arising: jaw tightening, right shoulder and arm constricting, laboured breathing. Interpretation: Her S. system is spontaneously re-activated, as if liberated from repression by the preceding emotional cycle. This serves to liberate the patient from a chronic sense of weakness, depression, vulnerability. If this new memory continues to be spontaneously activated in normal life circumstances, she will feel stronger and more confident. Gymnastics can also activate a dorment S. system, but the traumatic memory is not being activated, so it is not modified, and the P./S. split remains.

An overall interpretation can be applied to many psychotherapeutic sequences: The arousal of the "unhappy" neural circuits becomes associated with the new inputs of the therapeutic session. That means that the very moment the patient is accessing elements of the traumatic memory – **at that very same moment** -- new inputs are being established and connected to the trauma. What are the new inputs? The Self-Other relation between patient and therapist, the heightened expression of verbal description and non-verbal gestures, increased breathing

required by spoken language, etc. These new inputs change the neuronal circuits. The essential point is that the neuronal circuits of the trauma, which repeat themselves and become self-reinforced during the process of obsession – and this happens to the patient when he or she is alone -- now receive new inputs during the therapeutic session that will change their structure for the future. A new psychophysical network is being created, with the overwhelming trauma being connected to new “containing” neuronal patterns. And this is not limited to the cortical-conscious processes, nor to any single level of the sub-cortical unconscious regulation, like the amygdala, but involves **all** sub-cortical levels of the limbic system. The general process can be summed up by D.O. Hebb’s dictum, announced in the 1950’s, and still a guideline for understanding neuronal change: **“Neurons that fire together, wire together.”**

A Very Touching Therapeutic Sequence

Pat Ogden notes that Mary felt more calm after the traumatic feelings were expressed by the active defense and heightened expression. The patient decided to face the traumatic upsurge once again. In fact, another wave was spontaneously returning; this is how memory works. We will describe, once again, the therapeutic sequence. **Especially important is how the “just right” spontaneous defensive actions also permitted another element of the traumatic memory – “deep shaking feelings” – to arise during the intensification phase and naturally subside with completion.** This again demonstrates that S. and P. impulses have a natural arc of getting stronger and then naturally subsiding.

Mary remembers once again the episodes of abuse. (P. predominance) This time the S. active defense impulses begins spontaneously, rather than solicited by the therapist, as in the first cycle. This shows that a memory the S. defense is already returning, after the first cycle of learning, creating banks for the emotional river. How does it happen? The patient’s jaw begins to tighten, her right shoulder and arm begin to constrict, and her breathing becomes laboured. Pat Ogden writes, “These are all possible signs of defensive responses emerging spontaneously.”

We can now describe the therapist’s superb, intuitive intervention: The therapist does not ask for anything more. No requests. No questions. He merely feeds back to the patient what is happening and observable: “Your jaw and arms seem to be tightening and your breathing is changing... Let’s take a few moments to sense what’s happening in your body before we go on with the content.” This shows that a case study of such supreme quality is not just a basis for scientific reflection, as is the goal of this article, but is also an essential tool for teaching therapists. (Does this mean that general articles or vague case studies are less useful than we might have supposed? Perhaps this is the case.)

Mary feels the urge to move her head to the left, and remembers turning her head to look at the wall on the left during the repeated episodes of sexual abuse. Therefore, another element of the memory is spontaneously arising. Let us remember, we are not talking of cortical-conscious memories, but of **memories imprinted in all levels of the sub-cortical brain.** (Squire,1992) Also, the therapist’s description of what is observable, when looking at the patient, probably gave the “just right” contact – neither too active nor too distant – that allowed the spontaneous emergence of this new element of the traumatic memory. Pat Ogden was trained by Ron Kurtz and the Hakomi Therapy School. A key phrase of Ron Kurtz, when accompanying a patient during deep sobbing emotions, was, “Stay with it...” Pat Ogden’s words were accomplishing the same effect.

The next part shows how Body-Oriented Psychotherapy can create very special experiences, opening the doors of the emotional unconscious in a way that perhaps no other therapeutic approach can imitate.

“As Mary was mindful of her head a neck turning to the left, she was also aware of physical impulses that seemed involuntary, as if they were happening ‘by themselves.’ Her body

seemed to take on a life of its own as she encouraged to be mindful of her sensations and movements. Mary reported that 'my hand wants to become a fist' and the therapist encouraged her to 'feel the impulse and allow that to happen' without doing it voluntarily. While the previous pushing motion against the pillow was entirely voluntary, Mary's hand now slowly began to curl into a fist spontaneously. Mary reported that she wanted to 'hit out.'" (p.12)

A Subtle Intervention

The next moment in the therapeutic sequence shows that the therapist took a slight risk, according to our analysis of P. flooding emotions and S. containment. The therapist might have said, "Let the impulse happen in a spontaneous way." That would have increased the S. containment by means of an expressive action. But the therapist took another track. Therapist: "Feel that impulse to hit out and just notice what happens next in your body." Pat Ogden offers a cognitive justification for this notion of "feeling without acting." "Sensorimotor processing was occurring spontaneously through mindful attention to body sensation and impulses, and by harnessing cognitive direction to support the body's processing." (p.12) In terms of our brain map, to avoid the actual performance of the S. defense, "to hit out," increased conscious perception of the inner psychophysical experience. While traumatic flooding is a bottom-top brain experience, from sub-cortical impulse generators to conscious awareness, one aspect of resolution is to increase top-down cortical-to-subcortical containment regulation.

Pandora's Box

But the emotion did not become more contained! A new element of the trauma surged up, in fact, a very deep element, namely, "panic!" And the therapeutic adventure, surprisingly, takes off once again. **Mary reports that she is beginning to feel "panic!"** What is "panic"? It is the P. rebound after mobilization of the S. active defense. It is a return to the trauma, with the **withholding** of the S. defense, that is, to **not** "hit out," permitting the sub-cortical volcano to spew out more lava from its P. boiling storehouse.

The therapist did not expect this. Did he make a mistake? If we become conscious of S. and P, impulses as "quantities" and "dosage," there is no mistake. It was just a risk. The risk occurred the moment she suggested, "Feel it but don't express it," lowering the S. banks of protection. And the blow-by-blow description presented by Pat Ogden permits us to observe and understand the therapeutic drama.

The patient began to shake. She was experiencing shaking and shudders, which are among the deepest components of the panic reaction. Physical components of the active defense reaction also spontaneously emerged, but in a subdued way, such as the right arm rising slowly in the "hitting out" protective reaction. (The subdued but nevertheless "containing" S. defense allowed the P. shaking panic to go on, without suppression, but in a tolerable dose.) And at the end, the shaking subsided and the patient felt relief.

But not only relief. The patient also felt "tingling throughout her body." She also reported feeling her "muscles softer," her "heart rate slower," and "a good feeling of heaviness throughout her body." And she said, "I feel peaceful for the first time in weeks." I say that the therapist struck gold! The intuition of encouraging the patient to feel the active hitting out defense, but not to execute it, was a "just right" intervention that permitted the volcanic depths of the P.-dominant trauma to burst through – the "shaking and shudders" – and then find resolution. (More details of the positive therapeutic outcome, as well as of other interpretive explanations, can be found in Pat Ogden's article, which is well worth the reading.)

In summary, this exceptional case study shows how the art of dosing S. and P. elements of a trauma and the active defense mobilized by the trauma can serve the goal of healing. The

traumatic experience had gone through a full cycle, from parasympathetic flooding, to sympathetic containment, to renewed parasympathetic flooding, to diminished sympathetic containment, to a final state of parasympathetic completion and peace. All accompanied by the renewed Self-Other dynamic (the therapist's presence), the tracking of the experience with cortical consciousness, and the "just right" expressive action in words and gestures to guide sympathetic-parasympathetic oscillations.

Peter Levine

In his article, "Panic, Biology and Reason: Giving the Body its Due," Peter Levine offers two case studies that are sufficiently detailed to permit our Sympathetic-Parasympathetic analysis.

Nancy had been suffering from anxiety attacks. It began two years earlier during the Graduate Record Exam. The exam is required for entering graduate school. The traumatic event itself suggests another sub-cortical process, the impact of **sub-cortical neuromodulators that create sympathetic arousal**.

Nancy arrived early for the exam and went to the student cafe "to have a coffee and smoke a cigarette." (These coffee is a strong sympathetic arouser. The cigarette has mixed sympathetic-parasympathetic effects.) Therefore, already aroused chemically, she was sitting close to a group of students talking about how difficult the exam would be. "Overhearing this, Nancy became agitated, lit another cigarette and gulped down a second coffee." So we have an increase of a chemically induced sympathetic arousal. "She remembered feeling **jittery** upon entering the room. (S. arousal symptom.) She **recalled** that the exams and marking pencils were passed out. (Sympathetic arousal increases the secretion of acetylcholine from the pendulopontine nucleus in the pons, waking up the whole brain and increasing memory.(Kandel, 2006) Traumatic memory often contains this component.) She wrote **vigorously**. (The heightened sympathetic charge activates the basal ganglia action output.)

Merely recounting this part of the memory makes Nancy "breathless and agitated," both symptoms of the S. Thus the S. over-arousal is being partly re-lived during the recounting of the traumatic episode during the therapeutic session.

And the therapeutic adventure begins! Peter Levine asks the patient "to lie down and relax." Surprise! "Relaxation was not the answer!"

"As I naively, and with the best of intentions, attempted to help her relax, she went into a full-blown anxiety attack. Her heartbeat accelerated further to about 150 beats per second." Fortunately, the attack did not last. The patient's pulse and breathing slowed down. The therapist felt relieved. But the therapeutic adventure did not stop here.

"Her pulse dropped precipitously to around 50 beats per minute. She became still. Her face paled and her hands began to tremble: 'I'm real scared...stiff all over...I'm dying...I can't move...I don't want to die...help me...don't let me die.' She continued to stiffen, her throat becoming so tight that she could barely speak. Nancy forced the words, '...I feel I'm going to be killed... There's nothing....it's just blank...'

What happened? In the position of relaxation, which means that there is less thalamic input (for a more complete explanation, see the later section, "The Enlarged Sub-Cortical Brain Map,"), the S. - P. sequences connected to the sub-cortical traumatic circuits go out of control. First comes the S. over-charge, with heart-beat and breath accelerating. Then comes the intense P. **rebound**, with the pulse plummeting to 50 beats per minute, the face becoming pale, the hands trembling, the panic rising and the sensation becomes one of dying. This is hitting bottom! Steven Porges (1996,2003)describes the visceral (bottom of the brain) regulation of this death-like experience. But let us remember, once again, that **all** levels of the sub-cortical limbic system are involved in **all** phases of S.-P. oscillation.

What happened in this therapeutic drama? The therapist saves the day! First, he suggests that she feel the pencil. (This gives the cortex a specific sensory input that comes from the traumatic memory, but the conscious-cortical perception also increases cortical "containment.") Mary then says, "I remember now. I remember what I thought. My life depends on this exam!" Her P. death experience is now spontaneously diminishing, there is a rebound return of the S. with her heart rate returning to normal, and she is now accessing cortically-based memories -- overcoming the cortical black-out of "it's just blank" -- with the cognitive conclusion, "My life depends on this exam." This shows that Nancy is still within the traumatic memory, but less overwhelmed.

Hearing the words, "My life depends on this," Peter Levine accesses his own image of the attacking tiger. He cries out, "You are being attacked by a large tiger. See the tiger as it comes at you. Run toward those rocks, climb them, and escape!" Hearing this, "Nancy lets out a blood-curdling yell. She began to tremble, shake, and sob in waves of full body convulsions." Once again, the therapist has hit gold! Immersed in the traumatic memory, the patient's blood-curdling cry unleashes her S. impulse, and then there is a spontaneous rebound to the P. with trembling, shaking and sobbing. This is deep healing of the traumatic experience.

Are we right to claim, "Only Body Psychotherapy can give such deeply organic results?" Until we read blow-by-blow case studies based upon other therapeutic approaches -- case studies that show the intense Sympathetic defense followed by the equally intense Parasympathetic rebound -- we can say this claim is not falsified.

And here is the happy ending. "I stay with Nancy for almost an hour while she continued to shake. She recalled terrifying images and feelings from age four. She had been held down by doctors and nurses and struggled in vain during a tonsillectomy with ether anesthesia. She left the session feeling 'like she had herself again.'" After several more sessions, "Nancy was taken off medication, entered graduate school, and completed her doctorate in physiology without relapse."

I would be happy that a non Body Therapist would say, "I don't believe this!" Because Body-Oriented Psychotherapy, when done correctly, gives results that are unbelievable.

"Just Right" Activation and Attention Toward The Trauma

We can note that the P. rebound of crying and sobbing also led to other memories of trauma. Being held down and struggling in vain against the nurses and doctors during the tonsillectomy involves the same neural circuits as the later trauma. (Is there always an earlier trauma when dealing with adult trauma?) What is certain is that the arousal in the present moment of the traumatic circuits, at the "just right" dosage, as well as the trusting Self-Other relationship with the therapist, permits the patient to access associated memories involving the same sub-cortical circuits. This is predicted by Ernst Rossi (1987) when he speaks of physical-based memory: The reactivation of the physical memory can open the doors for the return of the repressed, that is, the return to consciousness of the traumatic experience. This applies to both physical somatic (outside of the brain) memory and the inner subcortical unconscious brain memory. Going back to the therapy with Nancy: If the sub-cortical circuits of the trauma **had not been sufficiently re-activated**, the earlier memory would probably not have come to mind and, even if they had been consciously recalled, the "split" between cortical consciousness and the unaroused sub-cortical circuits would have very likely result in a limited therapeutic benefit. To put it simply, the "correct dosage arousal of trauma," by means of Body-Oriented Psychotherapy, represents an essential step for deep healing.

Marius and the Wild Dogs

Another case study within the same article supports further our thesis: An analysis of sympathetic-parasympathetic forces can help explain anxiety and its healing.

In a workshop, Marius, in his twenties, worked on his feelings of anxiety and panic. Anxiety symptoms often represent a combination, or mixture, of sympathetic-dominant and parasympathetic-dominant forces. Marius spoke of weakening in the legs (loss of S. muscular tone), nausea (P. digestive dysregulation), flushing with head and face warm (P. increase of arterial blood) and sweating (S. sudation). Other frequent symptoms of anxiety include heart beating and short of breath (S.), dizziness (P.), dry mouth (S.), tremors (P.), and a knot in the stomach (a knotting up of S.-P. regulation). (See Liss, Jerome, "Recent Research in the Neurophysiology of Emotions: From Gellhorn to Edelman," for a more thorough analysis of S. vs. P,-dominant symptoms.)

The traumatic memory: Marius, eight years old, walking home alone from the mountains, was attacked by three wild dogs and bitten on the leg. And there was a correspondence with present reality. Not only did he have frequent anxiety symptoms, but he also suffered from frequent pain in the leg, pains located in the very place in which he had been bitten by the dogs. This is another example of a sub-cortical memory, one that probably involves the Central Gray Matter, a deep sub-cortical nucleus regulating pain, and underlying the hypothalamus.

The following therapeutic approach is a basic method of Body-Oriented Psychotherapy. The P.-dominant symptoms of fear and panic are activated through recall. **At the very same moment the therapist encourages a S.-dominant reaction of active defense.** In this example, the therapist, Peter Levine, activates several components of the S. defense. Marius, of Eskimo origin, is encouraged to feel "strong," remembering the strength of men hunting (a part of his culture), feeling the strength of his legs within a new pair of pants that had been given to him by his mother (the pants created by his mother also having symbolic meaning within his culture), imagining throwing a spear at a polar bear, and other activating sollicitations to balance the P.-based fear with S.-based neural processes.

But the therapeutic process is an adventure for both patient and therapist. While accessing the traumatic memory, Marius returns to P. weakness, fear and motor inhibition. Then he accesses the S. active defense. Then he spontaneously returns to the P. fear and weakness. This oscillation happens several times. (Such P.-S. "oscillations," we hypothesize, are therapeutically more effective than a simple solution of the S. overcoming the P. This "step-by-step" way creates better integration of the Sympathetic-Parasympathetic interactions.)

Here is the therapeutic sequence: Marius accesses the trauma, he sees the dogs and gets panicked. (P.) He begins to run away. (S. through imagination) He then rebounds into the P.: "Agh...my leg, it burns like fire...I can't move...I can't move! My leg is numb. I can't feel it."

Peter Levine notes, "This is the critical point." Marius is reaching the rock bottom of his P. fear. Levine hands Marius a roll of paper towels, thinking (correctly, I believe), "If Marius freezes now he will be re-traumatized." Marius grasps the roll and "strangles it." No more elaboration in the imagination. The depth reached in the P. trauma requires mobilizing **a total S. protective response.** Here is how Levine describes the intensity of the physical act:

"The group, myself included, looks on with utter amazement at Marius' strength as he twists the roll of paper and tears it in two. (Levine adds, I have asked weightlifting friends to replicate this and only a few have been able to do so.) And Marius lets out screams of rage and triumph." This means that we have unknown forces lurking within our S. protection system, and reacting to trauma which, when isolated, can act as a disabling memory, will also, in therapeutic circumstances, call forth the reserves of our muscular strength and our Self strength.

After the triumph, Levine asks, "What do you see?," referring to the dogs. "They are all bloody and dead." This is not an image that comes from **horizontal** cognitive-to-cognitive,

cortical-to-cortical, causality. It is not, "One thought leads to another thought." It is an example of **down-to-up** vertical brain causality. The transformed sub-cortical impulse system shoots **up** to the cortex to change the conscious memory system. Thus, the sub-cortical dysregulation has been resolved, for the moment. New messages are being sent up to the image-forming cortex. The vicious attacking dogs are now imagined dead.

A therapeutic sequence might very well finish this way. The S.-based triumph over the P. fear. But when the therapeutic sequence goes yet one step further, into the P.-rebound, something deeper begins to happen. In my experience, this only happens occasionally.

A Spontaneous "Emotional Reparative Experience" (Alexander, 1950)

Marius at first continues to express his S. impulse, no longer as fighting aggression, but as joyous running. He reports his inner image: "I am running...I can feel my legs, they are strong like springs." Levine observes rhythmic extensor-flexor undulations of the legs (S. action), a visible manifestation of Jacobsen's 1938 observation, namely, that when we are in deep imagery, we will have barely visible motor impulses that correspond to our images of action.

Levine also notices that at the very same moment the patient's entire body is trembling and vibrating. (simultaneous P. impulse) Note:

Note: The "symptoms" and "manifestations" of the S. and P. impulses, as presented in this article, are derived mainly from the work of Ernst Gellhorn (1972). The specific correlations offered here can be questioned and opposed. Necessarily, they will be modified and refined over time.

Adventure: What will happen to this "S.-P. mixed impulse state?" Marius continues to report his inner images: "I am climbing...climbing...I see them below...they're dead and I'm safe." He has found his safe refuge. And at that point the patient begins to sob softly. Therefore, we have a spontaneous rebound into the P. state. After several minutes of silence – meaning that the therapist and group have become receptive, accessing their own parasympathetic state of resonance -- the therapist asks, "What do you experience now?"

Marius' images show his rebound into a positive parasympathetic state. "It feels like I'm being carried by big arms. He's carrying me in his arms. I feel safe. Other images of the familiar surroundings then enter his consciousness. At the end, he returns to his family's house, his father opens the door, and the previously negative attitude of the father is transformed into love and receptivity. Marius: "I'm crying because he's not angry at me. I can see he was upset and scared." Traumatic memory images are being resolved; previously in overcoming the wild dogs, now in overcoming the Self-Other alienation with the father.

Once again, we see that deep resolution in the parasympathetic state, is followed by a sense of total psychophysical peace. "I feel very peaceful now; I feel vibration and tingling all over. It is even and warm." (P. state) "My father loves me." (Self-Other resolution)

Summing It Up

In summary, we have evidence of a therapeutic sequence that follows the Sympathetic-Parasympathetic model. The P. trauma is faced within a tolerable dosage. The S. defense is called forth, connects to the P. experience, and this leads to partial resolution. The P.-S. sequence may be repeated, almost like repeating waves emerging from deeper waters. Finally, the patient experiences deep P. sobbing. This results in a more complete sense of resolution, with a feeling of peace and a sensation of tingling throughout the whole body, as well as the feeling of Self-Other reconciliation with the father.

Part IV. The Theory

Orientation

The first purpose of this article is to show that the sympathetic-parasympathetic brain model, which represents a synthesis based on recent neurophysiological research, can be useful for the clinician and researcher. The goal is to demonstrate that sequential events, during a therapy session, can be explained by application of the Sympathetic-Parasympathetic Model. The challenge: Does the theoretical model "cover" the evidence of the therapeutic sequences? (Evidence and theory are presented together in order to demonstrate this "covering."). Are there a sufficient number of correlations? I propose that the reader has sufficient material in order to judge whether this first hypothesis is supported.

To be niggly about the matter, we can count **the number of specific observations** that have been explained by our S./P. analysis: 18 in the first case, 31 in the second case, 39 in the third case. (Each case example presented in this article used the majority of specific items presented in the original case study.)

The Model Gets More Specific

A second challenge: Does this study bring forth "regularities" that were not in the original hypothesis? Yes.

1. The traumatic experience, in each case presented, represents a P.-dominated experience. (This corresponds to Steven Porges' Level III of visceral regulation, the DVC (the Dorsal Vagal Complex), that produces the "falling dead," "total collapse," "everything is lost" visceral defense.) (Porges, 1996,2003)

2. Mobilizing the S. active defense system compensates for the P. runaway of panic, making the emotion more tolerable and helping resolution. This was seen in each of the three cases.

3. During the therapeutic process, we might see oscillations between the S. and P. experiences. The art of psychotherapy is to ride with the waves, allowing their natural rise and fall. This also supports the notion that **there is a natural curve, with parasympathetic-fear and sympathetic-anger impulses intensifying, then diminishing and, finally, coming to completion.** A corollary: one reason for the return of traumatic experiences is that the impulses lack completion.

A valid objection to this point: The cases studies in this article involve patients with clear-cut evidence of trauma. But it is not certain that other types of emotional disturbance would show the same rising-subsiding of the emotional impulses. In other words, perhaps the original traumatic experiences were easily accessed because the subcortical impulses were crying out for attention, expression, discharge and resolution. In contrast, it is possible that many patients with character disorders, chronic depression, adaptive problems, confusion regarding decisions, etc., will not show such volcanic impulses that flood experience.

Response: This objection is important. The case studies involved dramatic situations of trauma. In each case the traumatic memory easily rose to consciousness along with the primal impulses of fear and rage. In contrast, more subtle and chronic problems might not show such clear-cut evidence that the underlying impulses can rise and subside. This invites the research clinician to write up and **study therapeutic sequences** involving other types of emotional difficulty. (.Note)

Note: It is not easy to find case studies in which therapeutic progress is slow and undramatic. Why are such case studies not available? I propose that it is easier to record the

several dramatic moments that emerge when working with trauma, as in these case studies, than note down, with patience and persistence, the more subtle vacillations that characterize other types of therapeutic encounter. So this scientific challenge is open to body-oriented psychotherapists ready to write down their audio- or video-recorded sessions.

Completing Our Model

The Sympathetic-Parasympathetic Model leaves out an important dimension: the impact of consciousness. While the S./P. impulses developed in multiple levels of the subcortex are constantly influencing the conscious-cortical processes -- a bottom-to-top circuit vividly revealed in Marius' change of imagery regarding the mad dogs -- the conscious cerebral cortex also exerts top-to-bottom influences. One example is when Pat Ogden's therapist offered the patient "mindful descriptions" of her state, which supported the cortical containment of out-of-control sub-cortical impulses. In fact, a great deal of ordinary psychotherapy is based on top-to-bottom containment, re-evaluation and re-orientation.

Thus the model must be expanded. The Sympathetic-Parasympathetic Model, which emphasizes regulation among sub-cortical levels, must be enlarged. This modification can be called the Cortical - Subcortical Interactive Model. But there is a significant clinical implication in our emphasizing the S./P. Model over the Cortical - Subcortical Interactive Model. **The subcortical impulses must be activated in order to be modified.** Top-to-down conscious thought, perceptions, reappraisals, etc., cannot effectively modify sleeping neurons. That is why verbal therapies can sometimes fail to create a therapeutic impact. The patient, after months of cognitive work, can conclude, "Yes, I fully understand my problem, but nothing has changed." (See "Psychoanalysis and Neurophysiology," 2006, for a more thorough analysis of this obstacle.)

David Boadella: The Endoderm-Mesoderm-Ectoderm Model

The Sympathetic-Parasympathetic-Cortical Model has already been presented in a most elegant manner by David Boadella. Boadella starts from the three tissue layers of the embryo and develops the "Endoderm-Mesoderm-Ectoderm Model." (Read **Lifestreams**, 1979, and articles in **Energy and Character** to understand his important work.) In brief, the endoderm produces the visceral organs. This is the anatomy. Its physiology is parasympathetic. The mesoderm produces the muscles. The physiology of the voluntary muscles is sympathetic. The ectoderm produces neural tissue. Thus consciousness, a result of the ectoderm, interacts with S.-P. impulses, receiving their messages (bottom-to-top), and sending back messages (top-to-bottom). (See, Liss, J., "The Boadella-Liss Model as a Scientific Project: The Observational Basis of Clinical Science," 1997, for a case study applying both models.)

Consequences of a Sub-Cortical Map with Multiple Levels

Researchers will tend to emphasize a particular brain region when explaining the regulation of emotions. Antonio Damasio (2003) the pre-frontal cortex. Kenneth Ochsner (2001) the cingulate gyrus. Joseph LeDoux: (1996) the amygdala. Ernst Gellhorn: (1972) the hypothalamus. Steven Porges: (2003) the visceral nuclei. But most researchers will agree that other levels of the limbic system come into play at the very same time. The map, "The Limbic System," presented at the beginning of this article, is meant to avert the tendency of reducing this complex phenomenon to a single factor.

In fact, this map helps clarify Daniel Stern's lucid comment that we are in "emotional states" only a small part of the time. But we are **always**, as Stern points, in some state of "activation." (2004) Thus, the S./P. chain, running from the bottom of the brain to the top, is always creating some complex form of psycho-physical activation, even through the name of a specific emotion, "fear," "sadness," "anger," "disgust," "enthusiasm," "exhilaration" or

"happiness," is not always appropriate. Perhaps we can call these S.-P organic state "moods." "Activation states," or moods, transform into specific emotions and specific emotions dissolve back into "activation states." These are all manifestations of limbic regulation.

The limbic map shows interactive neuronal circuits, and these are enclosed within the brain. At the same time several limbic processes create outputs that go outside of the brain, directly affecting the somatic body: 1. the hypothalamus regulates arterial vaso-dilatation and vaso-constriction, the production of hormones and regulation of the immunological system, for example, with direct innervation to the thymus. 3. the visceral nuclei (and certain hypothalamic nuclei) influence visceral regulation.

Chemical Activators Awakening the Neurons

Another modification of our limbic system map is required: The limbic system not only involves interacting **neural** circuits. The lower brain regions of the pons and medulla create the neuromodulators: dopamine, serotonin, noradrenalin and acetylcholine. Thus neural processes are accompanied by **chemical** processes. These neuromodulators send up jets of activation to all levels of the brain, subcortical and cortical. (For a more specific analysis of their functions, see Liss,2003) These chemicals have great impact upon the **intensity and duration** of the neural processes. Thus the treatment of emotional dysregulation requires the modification of subcortical **neural** and subcortical **chemical** processes.

Part IV. Two General Notions of Emotional Disturbance and Psychotherapy

Freud Was Right and Wrong

Our neurophysiological map suggests that Freud was both right and wrong. He was right in saying that we are vulnerable to unconscious forces. He was wrong in suggesting that these are forces that were once in conscious and then repressed. The neurophysiological map of the brain suggests that these unconscious forces – the parasympathetic and the sympathetic – are **subcortical, and therefore outside of consciousness; they can never become conscious.**

Why is that? Only the architecture of the cerebral cortex is sufficiently complex to support conscious processes. The Freudian unconscious, meaning memories that are repressed from conscious and then return to consciousness, can only occur in the cortex. Meanwhile the basic impulse systems – S. rage and aggression, P. vulnerability, hurt, sadness and loss – are subcortical, influencing cortical consciousness, but not directly accessed by consciousness.

Freud says that the unconscious must be brought into consciousness. By changing Freud's notion of what is conscious and unconscious, we can say he was right. **The unconscious subcortical impulses must be sufficiently activated, during the therapeutic session, in order that they can be re-connected to new conscious (cortical) and unconscious (subcortical) neuronal patterns. (Hebb's Law)** Cortical-cognitive reflections that become elaborated while the subcortical emotions remain cold will just maintain the scission between the mental and the emotional. And what is a major sign that the subcortical unconscious is being sufficiently awakened? When the subcortical systems discharge upwards and influence the orbito-frontal lobe entry point into consciousness. At that point the Freudian unconscious manifests itself: buried memories emerging into consciousness, increased emotional intensity, symbols, images, new "free associations," irrational ideas, etc. But this Freudian unconscious, which can only be sustained by the cortex, is mainly a reflection of a dynamic system that has its origins elsewhere, namely, within the many levels of the unconscious subcortex.

Supporting Hebb's Law

Behaviourists and learning theorists could claim that "to return to the traumatic event during psychotherapy makes the patient sicker." A basic principle of memory is that repetition of a neuronal circuit will reinforce that circuit. Eric Kandel reiterates, in **In Search of Memory**, (2006) "practice makes perfect." Every time that a memory is recalled or re-enacted, it reinforces that memory pattern. So is it true that we are making our patients sicker?

We have clinical evidence that our work helps patients feel better. The three case studies examined in this article show evidence of significant patient improvements. But how can we defy the basic laws of memory?

The answer is that we are re-connecting these traumatic circuits to non-traumatic circuits. The Hebb Law states that if we are experiencing two neuronal patterns at the very same time, they will connect in the future. The therapeutic setting promotes such re-connections. The patient, while accessing the traumatic memory, is doing something particular, something that he or she does not do when talking with family members or when mulling over the traumatic situation lying alone in bed at night.

The patient recounts the event to the therapist. This means that two new things are happening:

1. **To recount the event out loud and without interruption.** This means that psychotherapy is an event which cannot happen when a person is silently alone nor when a person tries to share his suffering with good-willed family members who inevitably interrupt with good intentions. **Psychotherapy means to create a new psychophysical event that leaves new memory traces.** The traumatic episode connects up to a series of new neuronal events. What does such deep emotional sharing, therefore, do in the brain? Mobilize the cortical areas of verbal neural structures (Broca's and Wernicke's areas), modify visceral regulation such as by increasing the breath flow, increase cortical motor area and subcortical basal ganglia neuronal sequences that shift the brain balance from limbic system emotional dominance to action pattern dominance, increase feedback to the brain from the activated and expressive somatic body, for example, with the thalamus receiving more sensory input, increase neuromodulator secretions, modify corticosteroid-neuradrenalin hormonal regulation with an increase of adrenalin, etc.

The example of Mary, who begins to show spontaneous protective action movements after the very first emotional cycle, shows that such re-connections can begin early in psychotherapy.

2. **To recount the event to the therapist.** Sometimes the most important part of a therapeutic sequence, according to patient reports, is the feeling, "Now another person knows what I've gone through. What a relief!" Neurophysiological research has not yet revealed the subcortical Self-Other map in its entirety, although evidence of the Self-Other relationship has been suggested by diverse studies: perception of the face registered in the amygdala and striatum (entry to the basal ganglia), spacial relationships of Self and Other registered in the hippocampus, Self-Other patterns in the cingulate gyrus, etc. We should not expect to find a single region devoted to Self-Other dynamics. But as developmental research carried on by Edward Tronick (2005), Daniel Stern (1985) and George Downing (1997), among others, gets to be more widely known, we can expect that neuroscientists will verify the subcortical basis of the Self-Other relationship.

The point is that the trusting relationship with the therapist enters the deep subcortical unconscious, creating new connections with the traumatic circuits, and thereby modifying their impact for the future. The concept of "internalization" helps our understanding of the modified Self-Other relationship. The traumatic event creates a deep sense of solitude, one feels in a desert. At the same time the negative attitudes of parents who blocked the sharing of deep distress in other circumstances remains implicitly present, creating an anti-therapeutic "internalization."

All this is overturned when the patient recounts the trauma to the trusted therapist. A new "internalization" is created in the subcortical layers, and afterwards, the event will always be remembered with the positive presence of the receptive therapist.

Enlarging the Sub-Cortical Brain Map

The vertical map of the Limbic System (p.4 for the map itself) helps us understand the complexity and depth of psycho-physical states. This sub-cortical chain, as already said, sends upwards messages to the conscious cortex and receives cortical messages in return. But two other sub-cortical regions are very pertinent for limbic system functioning.

Basal Ganglia

The **basal ganglia**, composed of the striatum, putamen, globus pallidus and substantia nigra, organize our motor actions, whether they are habitual or responding to novelty. The motor areas of the cortex determine the final output for much of our activity, but the basal ganglia creates a blueprint for our strategy. (Edelman, 1989,2004)

And its connection to the limbic system? When we are talking about "arousal" or other psychophysiological states, the limbic system explains the event. But when we talk of **non-verbal expression, emotionally-based gestures, habitual or automatic actions**, we mean that the limbic system is giving directions to the **basal ganglia**. In fact, most regions of the limbic system have direct connections to the basal ganglia or pass through the Nucleus Accumbens to reach the same destination.(Kelly,2004) Meanwhile the basal ganglia, through direct feedback circuits, send messages that return to the same regions of the limbic system. The basal ganglia also have a strong impact on neuromodulators, increasing dopamine and noradrenalin, which are very strong brain activators. Finally, the **basal ganglia** sends messages to the **thalamus**, that then relays messages up to the **cortex**, and the cortical messages return to the **subcortical limbic regions**. That is why the execution of the action, in both Pat Ogden's and Peter Levine's case studies, can have such total impact upon the limbic system's emotional and psychophysical transformations.

Thalamus

The thalamus too must be connected to our limbic map. LeDoux (1996) has already shown that the thalamus, receiving messages from the world (through the Ascending Reticular System), sends "low road" messages directly to the amygdala, and "high road" messages that go first to the cortex and afterwards descend to the amygdala.

Here are several other ways that the thalamus influences emotional regulation: 1. Messages of patterned motor actions reach the thalamus and then are sent to the motor cortex (influencing action) and also to other parts of the cortex (influencing perception and thought processes). Therefore when people are alone, without their action program organizing cortical attention, their consciousness becomes vulnerable to traumatic memories.

The thalamus, receiving messages from the limbic system, begins to send up more "emotional" messages, while the lack of a basal ganglia "action" structure has eliminated the thalamic "action-organizing" messages. This helps explain why traumatic experiences, deprived of an active defense to "contain" them, can "flood" the cortex with out-of-control emotions.

But the brain usually has a multiplicity of mechanisms to account for any global experience. For example, the limbic system output reaches cortical-consciousness in other ways as well. Examples: from the amygdala to parietal and temporal lobe regions, from the cingulate gyrus

and orbital frontal lobes to the prefrontal cortex, from specific neuromodulator activators, such as noradrenalin, to the cortex, with the neuromodulator enhancing cortical "focusing."

In fact, being alone and unoccupied, can produce effects like the loss of an important love figure, causing **a drop of input to the thalamus**. The thalamus, which prefers "optimal input," is hungry for the missing sensation. The person may "act out," as one way for receiving compensatory thalamic input. But if the person is just home lying in bed, the hungry thalamus may receive compensatory inputs from an inner source, the limbic system. **And if the limbic system is "charged up" by unresolved traumas, then the pathological result can be an obsession with the traumatic episode**, the repetition of the obsessive thought causing an auto-reinforcement of the traumatic memory, and the person gets worse over time.

Summary and Conclusion

Three cases of Body Oriented Psychotherapy are presented. (Pat Ogden and Peter Levine) The goal is to use unique and unrepeated case examples as the basis for "scientific inquiry" according to the notion of science as the "back and forth movement between facts and theory."

These cases are selected because of their blow-by-blow therapeutic sequences. Such concrete description permits a detailed analysis of therapeutic moments and the correlation of these moments with the theoretical model, the Sympathetic-Parasympathetic Model. This model integrates different levels of the brain's subcortex, based on the research of Gellhorn, Rolls, LeDoux, Edelman, Porges and others. It is found that the Sympathetic and Parasympathetic Systems are expressed by "active" vs. "receptive" impulses, and these correlate to symptoms of aggression and rage (sympathetic), on the one hand, or sobbing and fear (parasympathetic), on the other hand, or else situations of "mixed impulses" as seen in worry and anxiety.. During the therapeutic sequences we can see abrupt changes of emotion and behavior – from attacking rage, for example, to convulsive sobbing – and these changes can be understood as a "rebound" from the Sympathetic to the Parasympathetic systems.

As a conclusion, just as an enlarging continent of knowledge also creates a larger frontier with the unknown surrounding waters, this presentation can stimulate many more new questions than it can actually answer.

Bibliography

Berridge, Craig and Waterhouse, Barry, "The Locus Coeruleus-Noradrenergic System: Modulation of Behavior State and State-Dependent Cognitive Processes," **Brain Research Reviews**, 2003, 42, 33-84.

Biondi, Massimo e Picard, Ann, "Increased Maintenance of Obsessive-Compulsive Disorder Remission after Integrated Serotonergic Treatment and Cognitive Psychotherapy Compared with Medication Alone", **Psychotherapy and Psychosomatics**, 2005, 74, pp. 123-128.

Boadella, David (ed.), **Energy and Character: The Journal of Bienergetic Research** (Dorset, England: Abbotsbury Publications).

Boadella, David, "The Change of Consciousness: Energy, Chemistry and Dynamics of the Brain". Abbotsbury, England, Abbotsbury Pubs., 1979.

Bush, George e al, "Cognitive and Emotional Influence in Anterior Cingulate Cortex", **Elsevier Science Ltd**, 2000, pp. 215-217.

Damasio, Antonio and Anderson, Steven, Cap. 15, The Frontal Lobes, pp 404-46 in Heilman, Kenneth, & Valenstein, Edward, **Clinical Neuropsychology**, Oxford, Oxford University Press, 2003.

Downing, George, **Il Corpo e la Parola**, Roma, Ed. Astrolabio; 1997.

Edelman, Gerard M., **The Remembered Present**, New York, BasicBooks, 1989.

Edelman, Gerard M., **Wider Than The Sky**, New York, Yale University Press, 2004.

Franz , Alexander , **Psychosomatic Medicine**, New York, W. W. Norton Pub., 1950.

Gellhorn, Ernst, **Principles of Autonomic-Somatic Integration: Physiological Basis and Psychological and Clinical Implication**, Minneapolis, University of Minnesota Free Press, 1967.

Hempel, Carl G., **Aspects of Scientific Explanation**, New York, Free Press, 1965.

Hempel, Carl, (1952) **Fundamentals of Concept Formations in Empirical Science**, International Encyclopedia of Unified Science, Vol II, No. 7, Chicago, University Press.

Jacobsen, Edmund, **Biology of Emotions**, Springfield, Ill., Charles C. Thomas Pub., 1967.

Kandel, Eric R., **In Search of Memory, The Emergence of a New Science of Mind**, New York, W.W. Norton & Company, Inc., 2006.

Kelley, Ann E., "Ventral striatal control of appetitive motivation: role in ingestive behavior and reward-related learning", **Neuroscience and Biobehavioral Reviews** **27**, Elsevier 2004, pp. 765-76.

Laborit, Henri, **Inhibition of Action**, Paris, Masson Pub., 1969.

LeDoux, Joseph, **The Emotional Brain**, New York, Phoenix, 1996.

Levine Peter A., Ph. D., "Panic, Biology, and Reason: Giving the Body Its Due". www.traumahealing.com.

Liss, Jerome, "*The Philosophy of Science and the Clinical Researcher: A Proposal for a New Scientific Psychology*," published in Italian: "Filosofia della Scienza e la Ricerca Clinica: Una Proposta Per una Psicologia Scientifica Nuova," in **Psicologia Clinica** (ed. Prof. Mario Bertini, Università di Roma "La Sapienza"), Vol. 2, No. 2, May-August, 1983, pp. 143-163, and in **La Psicoterapia del Corpo**, (by Liss, Jerome and Boadella, David), Rome, Ed. Astrolabio, 1986, Chapter XIV.

Liss, Jerome, "**The Boadella-Liss Model as a Scientific Project: The Observational Basis of Clinical Science**," Energy and Character, Vol. 28, No. 1, May, 1997, pp. 21-29.

Liss, Jerome, "*Recent Research in the Neurophysiology of the Emotions, from Gellhorn To Edelman*", 2003, www.biosistemica.org

Liss, Jerome, "*Vertical Brain Mechanisms for Understanding Conscious, Unconscious and Non-Conscious Knowledge, How Neurophysiological Maps Justify the Different Schools of Psychotherapy*", 2005, www.biosistemica.org

Liss, Jerome, "*Psychoanalysis and Neurophysiology*," **Ricerca Psicanalitica**, XVII,3., 2006, pp.295-314. Available in English: www.biosistemica.org

Mac Lean, Paul, **Triune Concept of the Brain and Behavior**, Toronto, Toronto University Press, 1973.

Ochsner, Kevin and Barrett, Lisa, "A Multiprocess Perspective on the Neuroscience of Emotion", (Ch.2) in Mayne, Tracy J. & Bonanno, George A., **Emotions. Current Issues and Future Directions**, New York, The Guilford Press, 2001.

Ogden, Past & Minton, Kekuni, "One Method for Processing Traumatic memory", **Traumatology**, Volume VI, Issue 3, Oct. 2000.

Porges, Stephen W., "Emotion: An Evolutionary By-Product of the Neural Regulation of the Autonomic Nervous System", **NYAS Neurobiology of Affiliation**, 10/08/1996.

Porges, Stephen W., "The Polyvagal Theory: phylogenetic contributions to social behavior", **Physiology & Behavior** **79** (2003), pp. 503– 513.

Porges, Stephen W., "The Polyvagal Theory: Phylogenetic Substrates of a Social Nervous System", **International Journal of Psychophysiology**, 42 (2001), pp. 123-146.

Rizzolatti, Giacomo e Sinigaglia Corrado, **So Quel Che Fai, Il cervello che agisce e i neuroni specchio**. Milano, Raffaello Cortina Editore, 2006.

Rolls, Edmund T., **Emotion Explained**, Oxford, Oxford University Press, 2005.

Rolls, Edmund T., **The Brain and The Emotion**, Oxford University Press, 1999.

Rossi, Ernest, **La Psicobiologia della Guarigione Psicofisica**, Rome, Ed. Astrolabio, 1987.

Schore, Allan N., **Affect Regulation and the Origin of the Self** (The Neurobiology of Emotional Development), Lawrence Erlbaum Associates, Publishers, 1994.

Schore, Allan N., **Affect Regulation and the Origin of the Self** (The Neurobiology of Emotional Development), Lawrence Erlbaum Associates, Publishers, 1994.

Squire, Larry R., "Memory and the Hippocampus: A Synthesis From Findings With Rats, Monkeys, and Humans", **Psychological Review**, 99, 2, 1992, 195-231.

Stern, Daniel N. M.D., **The Present Moment in Psychotherapy and Everyday Life**, W.W. Norton & Company, 2004.

Stern, Daniel, **The Interpersonal World of the Child**, New York, basic Books, 1985, Especially Chapters 6 and 7.

Tronick, Edward, "Why is connection with others so critical? The formation of dyadic states of consciousness", from Nadel , J. & Muir, D., (eds) , **Emotional Development**, Oxford Univerty Press, 2005.