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Summary: The author presents the results of neuroscience and neuropsychoanalysis that support empirically many conceptualizations made by psychoanalysis of clinical phenomena related to human functioning, and the therapeutic relationship. The purpose of the text is not a reduction one field of knowledge to another, but an emphasis the importance of cooperation in the fields of research on the functioning of the human mind and brain. In this sense, the author refers to the main principles of the new field of knowledge, which is neuropsychoanalysis. The text attempts to look at the phenomenon of psychopathology and psychotherapy through the prism of the latest neuroscience research. In particular, the paper mentions the issue of system of memory and learning, the question of intersubjectivity, and the mirror neuron system, as well as a description of the neuro-behavioral PLAY system. The text discusses the concepts and ideas of various neuroscientists, as well as theoreticians and practitioners of psychoanalysis: J. Panksepp, V. Ramachandran, D. Stern, D. Winnicott, W. Bion, T. Ogden. In the last part, the article presents the TFP treatment developed by Otto Kernberg and his team, as a method that specifically implements the conclusions of neuroscience.

Introduction

The purpose of this paper is to present the meaning of certain neuroscience research findings for the practice of psychotherapy. Psychotherapy, psychopathology, and the science of the brain together form a vast field of knowledge and research, so it is impossible to cover everything within those disciplines here. Therefore, in this text, I will try to show how some data from neurobiological research support the findings of psychotherapy and, above all, psychodynamic psychotherapy and psychoanalytically-oriented therapy. The main methodological principle that guides such considerations is the principle of cooperation. That is, the relationship between neuroscience and psychoanalysis, or more broadly — psychotherapy, should be co-operation rather than incorporation [1]. This is also consistent with the claim made by two of the most prominent theorists whose activities combine research on the brain with a clinical perspective, Jaak Panksepp and Mark Solms [2, 3]. They claim that the relationship between neuroscience and psychoanalysis is not about who is right, but to complete Freud's work that he began over a century ago, among others, in his work

Entwurf einer Psychologie. In this text, I will use a few terms interchangeably — neuroscience, brain research or neurobiology — to denote different areas of research and practice concerning the functioning of the human central nervous system. On the other side of the equation, I mainly refer to the theory and practice of psychoanalysis and psychodynamic therapy, as these are fields of knowledge which are vitally interested in the findings of neuroscience. An expression of this interest is the journal *Neuro-psychoanalysis*, founded in 1999, which publishes works of some of the most eminent researchers of the brain such as Jaak Panksepp and Joseph LeDoux, and the *International Neuro-Psychoanalysis Society,* founded in 2000. Furthermore, what is extremely important, the findings of neuroscience give significant support and confirm the clinical intuitions of psychoanalytic psychotherapy.

In creating his metapsychology, Sigmund Freud eagerly appealed, in keeping with his educational background, to the language of neuroscience and biology. These references should be treated rather as a kind of metaphor or approximation and ultimately as a kind of hypothesis. Freud was aware of the impossibility of translating his psychology directly into neuroscience. Still, he used this language, and sometimes abused it [see 4 p. 26–27]. It should be noted, however, that Freud did not have the opportunity to make better use of scientific data about the brain, because that science was only in its infancy. Nevertheless, Freud expressed the hope that in the future, the language of biology would replace the language of psychology [5]. There are various ways to evaluate Freud's theory, but it is possible to draw biological understanding of his theory. For example Freud's student, Herman Nunberg, insisted that Freud was a monist in matters of relationships of psyche to soma. According to him, Freud treated mental processes as a manifestation of somatic processes [6, p. 87]. On the other hand, Patricia Churchland, dealing with the neurobiological bases of human behavior, writes about the nervous system of mammals (including humans) as follows: "that is why, in the most fundamental sense, care is the basic function of the nervous system. Brains are organized so as to seek the welfare and avoid discomfort. Thus, the system capable of self-maintenance and avoidance of pain is the source of the most fundamental values — values related to survival and well-being" [7, p. 60]. This quote refers to the role of oxytocin and vasopressin in the formation of human attachment and higher emotions associated with care and love. These words are similar to the old Freudian concepts of the mental apparatus and its energy which seeks discharge and which is subordinated to the pleasure principle. Freud's aforementioned hope, however, is still far from realization. The question is whether this is possible and necessary? Neuroscience data are related to psychological phenomena rather as correlations than as genetic connections. It introduces the entire issue of the subjective quality (i.e., qualia, the definition of which, by the way, is very unclear), which is widely discussed in cognitive science [8, p. 117–144]. In spite of the opinion of one of the most eminent representatives of

cognitive science, Daniel Dennett, one can argue, as does the philosopher Thomas Nagel, that the quality of consciousness is irreducible. This irreducibility leaves space for psychology and psychotherapy as independent disciplines dealing with human subjectivity. Therefore, it seems that, despite progress in the field of neuroscience, psychotherapy always retain its autonomy as a discipline dealing with the individual world experience specific to each person. On the other hand, in her book about the development of neuropsychoanalysis, Casey Schwartz [9] notes that the laboratory situations studied by scientists which operationalized different affective phenomena of human life are still very far removed from the subtle phenomena analyzed during a psychoanalytic session. It does not change the fact that the connections between the findings of psychoanalysis and biology are becoming increasingly visible. One of the main areas which they relate to is the area of reflection on the functioning of the unconscious. The second area is the importance of affective and emotional human life, and in particular, unconscious affective reactions. We can say quite definitely that the existence of the unconscious is widely accepted by researchers of the brain and there is no need for additional legitimization of the term [see 10, 11]. One of the main areas of common reflection in biology, brain research and clinical psychology is the importance of early childhood attachment and its deficits. It is worth noting, as does Myron Hofer [12], that it is biology which is approaching those areas and conclusions which have long been the domain of psychoanalysis. From this perspective, sharing mutual interest in those fields of knowledge could be a creative perspective. Jaak Panksepp showed [13] that the lack of interest in the results of neuroscience has led evolutionary psychology to an impasse. They constructed their hypotheses without taking into account the latest neurobiological knowledge. As Andrzej Łukasik has noted [14, p. 24], this state of affairs has changed completely in recent years. It is important not to repeat this mistake in psychotherapy. Unfortunately, there is a lack of reliable publications in Polish which would deal with the subject. In English, quite a lot has been published in that field. In Poland one of the few exceptions is the collection of articles *From Neurobiology to Psychotherapy* [15]. The main Polish theoretician dealing with this subject is Sławomir Murawiec.

Many prominent representatives of brain science appreciate the contribution of psychoanalysis and Freud in the study of human functioning. Joseph LeDoux and Antonio Damasio emphasized that Freud was a pioneer in the study of human emotionality. Strongly associated with the development of neuropsychoanalysis, Jaak Panksepp and Marks Solms on different occasions have pointed out that studying the brain basis of emotional human life initially remained at the margins of the main interest in neuroscience, which was focused primarily on the cognitive and perceptual functioning of human being. Panksepp wrote that they found allies in their study of affective humane life only among psychoanalysts and psychotherapists [16]. Mark Solms [17], the main representative of neuropsychoanalysis, cites the example of Nobel Prize winner and prominent

brain researcher, Eric R. Kandel, who in his paper *Biology and the Future of Psychoanalysis: A New Intellectual Framework for Psychiatry Revisited* from 1999 wrote that the Freudian model of mind remains the most coherent and intellectually satisfying view of the mind. Solms underlines that now in many places around the world, researchers are investigating various aspects of the functioning of the brain, and thus expanding our knowledge of human functioning. Therefore, it would be a significant loss if psychoanalysis and, more broadly — psychotherapy, were not be interested in these results.

In this paper, I would like to present a few of the problems and issues that, from the different perspectives, are examined by neuroscience and psychoanalysis (and psychodynamic therapy). Wider recognition of the interconnectedness of these disciplines will require more extensive work. Here, I would like to focus on the following topics: 1) the problem of unconscious mental life in perspective of the emotional brain and the emotional memory in connection with the subject of unconscious representation of self and object; 2) the role of intersubjectivity and the system of mirror neurons; 3) the importance of neurological PLAY system for human development and human health. At the end, I will try to provide some practical tips which, in my opinion, can be derived from the presented knowledge to the practice of psychotherapy.

Emotional brain — locus of unconscious

Efrat Ginot notes in her book *The Neuropsychology of the Unconscious. Integrating Brain and Mind in Psychotherapy*, that neuropsychological exploration supports the assertion that unconscious processes monitor, control, and guide our behavior, and that they are responsible for the implementation of goals and desires, as well as responsible for automatic responses to changes in the environment [11, p. 55]. One of the main functions of unconscious processes is the affective modulation of cognitive processing. It was an erroneous anthropological vision to view the human being as primarily a knowing being who could be studied by cognitive psychology and cognitive science using the metaphor of a computer to explain the mind. Researchers now acknowledge that their discipline is no longer cognitive neuroscience, but has begun to be affective neuroscience. As Franco De Masi (referring to LeDoux) admits, linking emotional life with the unconscious is the main point of contact between psychoanalysis and neuroscience [18, p. 81–82]. The Italian analyst tries to differentiate the importance of the unconscious categories by separating the traditional dynamic unconscious from the emotional unconscious. He compares the emotional unconscious with the recognition of unconscious mental life described by Wilfred Bion. The relationships between these two types of phenomena of psyche, he describes as follows: “in contrast to the dynamic unconscious, which can be extracted on the surface, the emotional unconscious cannot be

known, but it serves knowing. In this sense the emotional unconscious is a necessary condition for the appearance and operation of the dynamic unconscious, which remains with him in constant relationship." [18, p. 87]. The distinction which De Masi makes, corresponds to the understanding of unconscious mental life proposed by Otto Kernberg [see 19, 20] which distinguishes between the more primitive unconscious, which is not the result of repression (such characteristics can be found in Freud's later writing) and repressed unconscious which is an achievement of Oedipal phase in development with the tripartite structure of the psyche (id-ego-superego). I will try to show that Kernberg's approach is even more compatible with the neurobiology data, and gives more therapeutic possibilities which Kernberg used in his creation of transference focused psychotherapy (TFP).

The search for the neurological correlates of feelings and affective states is definitely now the most important direction of research in neuroscience, admits Joseph LeDoux [21, p. 653]. The most interesting studies connecting the process of cognition with emotion concern the role of the amygdala and the whole limbic system. Joseph LeDoux [22] even created the term "emotional brain" to express the concept of this connection. The main contention of his theory is the division the process of "experience" into two levels of information processing. The first level is a fast, unconscious emotional message associated with the path: thalamus—lateral nucleus of the amygdala (low path). This way, humans immediately react to emotional stimuli (mainly the nature of anxiety). The second level is associated with the "intellectual", cognitive stimulus evaluation. This is a slower way, and its effect is later in assessment the significance of the stimulus. The path runs through the following structure: thalamus—neocortex—the lateral nucleus of the amygdala [22, 14, p. 62]. Further research showed that the amygdala has numerous links with cortical centers responsible for cognitive functions [11]. On the other hand, they showed that it corresponded to emotional memories. Therefore the amygdala is neuronal locus of emotional memory [14, p. 62]. Initially LeDoux investigated its role in the reactions of anxiety. Further studies have shown that this structure is responsible for the general emotional response, regardless of the sign of emotion [see 23, 14]. The results obtained with the "emotional brain" studies show that the human is actually able to receive information unconsciously — without intellectual, conscious assessment, only through emotional assessment. This is extremely important conclusion, among others, for the understanding of the therapeutic process, for understanding phenomena in the transference-countertransference space. This is also the conclusion about basic role of emotional processes in comparison with cognitive and intellectual processes. It shows that the emotional reactions, for example anxiety disorder, is not about cognitive assessment and interpretation, but it is emotional automatism, which is associated with unconscious processes. Because the amygdala is responsible for emotional memory, it is not the problem of simply automatic, adaptive, emotional reaction

(healthy reaction), but reactivity related to the unconscious emotional patterns (reaction possibly pathological). This observation leads to the issue of existence of two neuropsychological systems of memory. There are in fact two types of memory (and learning): declarative and emotional (latent). Declarative memory is associated with the hippocampus, the emotional with the amygdala. Declarative memory is the memory of the whole system of associations with emotions, but in relation to the facts, not feelings. This memory is the memory of events that can be recalled to consciousness. The memory of emotional experience is responsible for recall emotional background, the emotional response and in this sense, is not available for cognitive awareness, although it is a part of affective aware experience. Some differences in the functioning of these two memory systems result from the fact of differences in the development of structures that constitute the brain substrate. Emotional memory functions from the beginning of life, which is associated with early maturation of amygdala. The event memory is associated with the hippocampus. This structure matures only at the age of 2–3 years. Similarly, later developed is dorsal - lateral part of the prefrontal cortex, with which the hippocampus is strongly linked. The cortex is bound with the ability to recall memories stored in the hippocampus [24, p. 39]. That is why events before 3 years of age cannot be recalled. Neuropsychoanalysis interprets the emotional memory system as a reservoir of affective patterns of self-object relationships [2, 11, p. 67]. The existence of these patterns is postulated by Otto Kernberg. He refers, among others, to the concept of Melanie Klein, Ronald Fairbairn, and Edith Jacobson. Dyad patterns of self-object (significant other) form the most primitive substance of mental life, and form the basis for the emergence, postulated by Freud, tripartite structure of the mental apparatus.

Emotional memory, located in the amygdala, would also be associated with potential early traumas that affect strongly on the development of the brain and secretion of cortisol (stress hormone). A particularly powerful stressor seems separation and deprivation of emotional contact with the mother [1, p. 8–11, 24]. This confirms the psychoanalytical belief of the role of early unconscious, emotional factors in the development of various forms of psychopathology. Miron Hofer cites data from developmental psychobiology which indicate the importance of early attachment for mammalian development and deprivation of contact with the mother, her body, smell and care. He admits that these studies confirm and complement the psychoanalytical conclusions about the formation of object relations, the formation of mental images of the world, the effects of early trauma and loss, and the importance of early childhood experiences for the formation of the adult [12, p. 19].

Intersubjectivity, mentalization, theories of mind

The psychoanalyst and researcher into the early mother/child relationship, Daniel Stern, has devoted much attention to the theme of intersubjectivity. His research on infants has shown that from the beginning of life they have a certain automatism in imitation of adult behavior (e.g., infants show the tongue if an adult does the same). As Stern points out, children from the beginning of life are ready to enter into the intersubjective matrix. This matrix is a common experience, reflecting, learning, emotional and behavioral tuning. Stern describes these early mother-child relationships sometimes in terms of music as attunement, sometimes as the performance of a complex, shared choreography. This is about intuitively adjusting to each other and understanding each other without words [see 25]. This is likely linked with Bion's descriptions of maternal reverie [26, p. 67–68, see also 27]. The formation of the presented phenomena in the intersubjective space is possible by neurobiological system of mirror neurons that are activated in response to the behavior of the other person, reflecting the behavior in the form of arousal of cortical activity corresponding to the activity performed by the other person [see 1, Stern, 28, p. 80–81]. Studies on this type of neurons allow a better understanding of the human capacity for empathy, identification, and maybe even more primitive processes like internalization and incorporation. Intersubjectivity by Stern is the ability to share, understand, empathizing, feeling, participation, entry into the world of subjective experience of another human being. It involves the interpretation of behavior, gestures, facial expressions, voice, rhythm of speech, and of course what the other person says [29, p. 64]. It is a crucial competence for psychoanalytic therapy. The main phenomena presented and being developed within the framework of psychoanalysis as transference and countertransference, identification and projective identification, internalization, object relations, empathy, the formation of the superego are associated just with intersubjectivity [28, p. 78]. Intersubjectivity is also connected with phenomenon which Peter Fonagy called the ability of mentalization [23]. Marta Szpak notes that, the concept of mentalization is connected with other theoretical concepts, such as symbolization, reflective functioning, theory of mind, and social cognition [30, p. 11]. In the philosophy of mind, evolutionary biology, and evolutionary psychology researchers use the terms: higher level intentionality, shared intentionality and theory of mind. At its simplest, researchers understand it mostly as those cognitive operations associated with the ability to predict what the other participants in social interaction are thinking [see 31, 32, 33]. The concept of theory of mind is widely used by cognitive and evolutionary developmental psychologists, such as Michael Tomasello, but the phenomenon is also described by investigators of autism. One of the most prominent brain researchers, Vilayanur Ramachandran claims that some of his studies on Autism

Spectrum Disorders resulted in confirmation of the importance of the mirror neuron system for the development of empathy, social skills and the ability to create imaginations of the mind of another man. Ramachandran showed in his research that people with autism, for whom impairment of the intersubjective is typical (in social skills, empathy etc.), do not exhibit normal activity of mirror neurons in response to the observations of the behavior of other people [34, p. 159–162]. This conclusion confirms the link between the phenomenon of intersubjectivity and the neurobiological substrate, which is the mirror neuron system. It should be noted, however, that the phenomenon of autism is not limited to the issue of disability of mirror neuron system and the difficulties in creating a theory of mind. Autism Spectrum Disorders are associated with a much larger, not entirely explicit, set of the neurological changes [see 35, 14].

Ramachandran also linked functioning of mirror neuron system with the phenomenon of speech acquisition [34]. We can say that this is another aspect of intersubjective matrix of child-caretaker relationship. How unusual are the effects of the mirror system activity shows Ramachandran's results from investigating the phenomenon of phantom sensations. He presents, in his book, example of a patient deprived of an arm as a result of injury, who developed the phantom symptom. When researchers presented to him the situation, in which one person is stroking the other hand, he felt on his phantom limb sensation of being stroked. Ramachandran interprets this phenomenon as the effect of mirror neurons. That is why the patient could have experience of observed movements associated with the imagination of feeling of being stroked. In this case, however, it ran out of sensory signals flowing from the real arm, which would deny the fact that the hand is touched by someone. The researchers have repeated this effect on people who have had a limb, but have been put under local anesthesia [34, p. 146]. This example demonstrates the great potential of the human brain when it comes to intersubjectivity phenomena — empathy or identification with the other human[1]. From this perspective, e.g., the mechanism of projective identification, described by psychoanalysis, is no longer something mysterious and mystical.

Presented problem of connections of mirror neuron system with intersubjectivity shows how we can understand the phenomenon, which is for years described and developed theoretically by psychoanalysts. It suggests that psychotherapy cannot be blind to these, sometimes subtle, phenomena of non-verbal and non-cognitive sphere. However, it is impossible to work with this sphere by using cognitive approach to therapy or working only with irrational beliefs.

1 Of course, the mirror neuron system is not the only cerebral substrate of the phenomenon of empathy. Andrzej Łukasik mentions here as well: the orbitofrontal cortex, the ventral medial prefrontal cortex, the inferolateral frontal cortex, supplementary motor area, anterior insula and the amygdala [14, p. 83].

Neural PLAY system

At the beginning of his classic study of play, Johan Huizinga wrote: “Play is older than culture; because although the notion of culture may be not clear, it assumes in any case the existence of some human community, animals did not wait at all for people to teach them how to play. It can even be said that human customs did not add any significant special features to the general concept of play. Animals play just like people. All the basic features of play are already realized in the playful animals.” [36, p. 11]. Next, Huizinga points out that the phenomenon of play goes beyond “physiology”, in that it is not simply for biological survival. Play would make sense to perform a certain function and eventually underlies cultural human activity.

The quotation above indicates two important things: firstly, play is an activity which humans share with other animals; secondly it is also an activity which is not inherently tied to culture, so it is an autonomous phenomenon associated with the nature of the human as a biological being. Similar conclusions were drawn by Jaak Panksepp in his concept of basic neuro-behavioral systems. One of them is the PLAY system [16, 37]. The researcher argues that the PLAY system (like all other systems described by Panksepp) is universal to the world of mammals. Its conclusions are mainly based therefore (in connection with his main methodological assumption) on research of animals’ play. This is undoubtedly a weakness of the concepts. However it is difficult to refuse the basic idea common to Huizinga and Panksepp about sharing human play phenomenon with other mammals.

Panksepp refers to the definition of play given by Gordon Burghardt, who distinguishes five definitional criteria: 1) lack of clear relevance to the process of adaptation when the play appears; 2) it is a spontaneous activity, with the main aim of obtaining pleasure; 3) play is an incomplete and exaggerated version of adult activity; 4) play is composed of many repetitive activities; 5) play is reduced by stress, so the animal must be fed, healthy, and in a comfortable environment to play [37, p. 352]. Huizinga defines play as follows: “play is a voluntary activity within certain fixed limits of time and space with voluntarily accepted, but absolutely applicable rules; it is a goal in itself; it is accompanied by the feeling of tension and joy and the awareness that this is different from >ordinary life<” [36, p. 51–52]. Earlier, the Dutch researcher had discussed a list of characteristics of play which approached the definition formulated by Burghardt. He listed among others: autonomy, autotelism, freedom, a symbolic and non-literal dimension as something distinct from behaviors related to survival or satisfying other biological functions, and repetitiveness [36, p. 20–26]. Although Huizinga probably treated play as something more autonomous in relation to biology than Panksepp does, it seems that the conclusions of the study of Panksepp also justify the definition of humans as homo ludens.

Similarly, as the rest of the seven basic systems distinguished by Panksepp (SEEKING, FEAR, RAGE, LUST, CARE, PANIC/GRIEF) the social PLAY system is associated with subcortical brain activity[2]. It is responsible for many physiological changes and the creation of affective awareness. Panksepp does not specify which limbic brain structures are involved in the system (although he emphasizes the importance of the thalamus). He suggests connection with the dopaminergic system. It seems that he postulates the existence of this system due to the universality of the phenomenon of play in human behavior, and all other mammals. He says that play is essential to the development of social competence (therefore also for the so-called social brain). It involves learning cooperative behavior, aggressive competition, hierarchy, some important specific behaviors, and even competence in the care and motherhood (play is associated with the simulated parenthood). Panksepp also suspects that the deprivation of playing may cause symptoms similar to those found in the syndrome of ADHD [37, p. 353]. The consequence of these observations is the Panksepp's belief that play is a key activity for proper human development, but also for the reduction of psychopathological symptoms (e.g., depression). Consequently, Panksepp sees the importance of the implementation of PLAY system in psychotherapy. These conclusions are in a way not revealing. Play is the key technique in psychotherapy and psychoanalysis of children. Panskepp's conclusions not only confirm the importance given to play in the life of man and culture by Huizinga, but also support the basic idea of the eminent child analyst, Donald W. Winnicott [38, p. 121–122, 39]. He claimed that play is a key activity important for children's development and the health of adults. Winnicott often compared therapeutic work to play. In this sense, analytical work would help the patient to gain the possibility of playing. Winnicott wrote "it appears appropriate to adopt a general principle that psychotherapy is where two areas of playing overlap: the one that belongs to the patient, and the one that belongs to a therapist. If the therapist does not know how to play, he/she is not able to work. If the patient does not know how to play, something needs to be done to tech him/her how to play, only then he/she can begin psychotherapy. Playing is fundamental, because that is when the patient can be creative" [39, p.83].

An interesting theme is that the goal of psychoanalytic work in terms of Wilfred Bion and Thomas Ogden is streamlining the process of dreaming, which is basic activity of the mind [see 26, p. 46–47, 40]. Winnicott said about the need to unblock the possibility of playing. Ogden — using the concept of Bion — talks about unlocking the possibilities of dreaming. Panksepp in his concept of PLAY system compares play to dreaming (REM dream, dreaming). He claims that perhaps the

2 Panksepp deliberately uses capitals in the names of systems distinguished by him. It is because to emphasize the importance of these primitive mechanisms and indicate that it is something new, which no one described previously [37, p. 2]

two processes — one awake, the second during sleep — may have similar functions. Both processes would be responsible for the integration of affective information. It would allow the child or adult to adapt to the physical and social environment [37, p. 378]. One of the arguments supporting this thesis is the secretion of the same neurotransmitters in two mentioned processes — dreaming and playing. Perhaps we can say that Bion's dreaming and Winnicott's playing are similar processes. Bion describing the function of dreaming points out that it allows to transform emotional experience in alpha elements [26, p. 46]. In this sense, the process of dreaming and so-called alpha function protect humans from psychotic conditions, or psychological disintegration. It is worth noting that the function of play at psychotherapy of children is not only to provide the transference material, but also the assimilation of emotional experiences.

Implications for therapy

It is time to answer the question, what practical conclusions can be drawn from the results presented in neuroscience research related to certain concepts of psychoanalysis? Jaak Panksepp is one of those brain researchers who combine their research with interest in their clinical application. One of the conclusions which can be draw from the studies of affective functioning of the human is to highlight the role and importance for the survival of a safe attachment. The psychotherapeutic setting may be new, safe environment for the expression of primary and unconscious affect, and it creates the possibility of therapeutic change [41, p. 13–15]. In his book *The Archaeology of Mind. Neuroevolutionary Origins of Humans Emotions* [37] Jaak Panksepp devotes one of the chapters to psychotherapy and clinical issues in general. However the conclusions that he outlines, are quite disappointing. They are based mainly on the finding quite a few obvious facts for psychotherapy, such as the recognition of the importance of a safe therapeutic relationship, expression of feelings in this relationship, the importance of attachment and trauma in early childhood pathologies and in shaping mental health. On the other hand, Panksepp is quite critical of psychoanalytic metapsychology as too expanded. Mentioning therapies [37, p. 444], which he believes somehow fit into his vision of affective therapy, he lists rather eccentric method of Arthur Janov, EFP therapy developed by Leslie Greenberg [see 42] and short-term psychodynamic approach of Habib Davanloo, or David Malan [see 43]. We can, of course, argue with such conclusions. From one point of view these conclusions are too general; on the other hand, they do not mention very important data of neuroscience which are presented in this paper. In this sense, psychotherapy should take into account not only the affect, emotional experience, attachment processes and affection, but in general the existence of unconscious mental processes, which are primarily affective. Research on intersubjectivity and system of mirror neurons support the importance given

by psychoanalysis to different phenomena occurring in transference-countertransference space, which are responsible for creating therapeutic relationship. The analysis of patterns of these phenomena is a major way to working-through pathology of the patient. Another practical application of the presented results, above all studies related to the role of intersubjectivity and emotional memory, is indicating the importance for the therapy especially severe pathology of non-verbal signals: the expression of the face, body posture, micro-movements, etc. [44, p. 109–111]. This is due to the recognition of the existence of unconscious, structurally unrepressed emotional experiences included in the system of implicit memory of amygdala and in general of the right hemisphere of the brain [see 11]. Probably there are neuropsychological patterns of relationships with objects. The conclusion drawn from the research and theory of Jaak Panksepp on the role of the PLAY system (and dreaming), would be that therapy should take into account such aspects and functions of the unconscious mind, as those postulated by Bion, Ogden and Winnicott. It indicates the role of automatic affective processes, the main task of which would be "digesting" emotional experiences. This conclusion shows that behavioral or cognitive change made through training or reformulation of cognitive schemas, is insufficient. This is because the change in the internal organization of the human mind is possible mainly through affective assimilation of undigested experience. Detailed descriptions of methods of treatment are formulated in writings of these psychoanalysts.

Finally I would like to suggest that perhaps the best therapy, which takes into account the above-presented data and conclusions, is Transference Focused Psychotherapy (TFP) created by Otto Kernberg and his team. It was best described (although it is not limited to this group of pathology) in the context of the treatment of personality disorders, particularly — severe disorders [45, 46]. This therapy assumes that the therapeutic space is a field for the expression of the unconscious self-object (significant other) relations which, alternately activated, form the main structure of the patient's personality, his way of experiencing themselves and others, and thus may form the basis for the development of psychopathology. Therapeutic setting is a framework for the expression of these patterns. Implicit memory (emotional memory), associated with the earliest, preverbal human experience, is probably associated with these patterns. TFP therapy takes into account these patterns. They are reflected in the patient's response to the setting, to therapist, in the manner of behavior, in his/her statements, micro-reactions and micro-movements. They can be seen primarily through the analysis of the dominant affective type of transference of the patient, which indicates the activation of the respective self-object dyads. TFP comes from the merger of object relations theory and ego psychology. It uses the traditional style of interpretation referring to the economic, dynamic and structural aspects of the transference, but in the context of here-and-now. In case of severe personality disorders it uses the concept of projective identification and, described by

Heinrich Racker [47, p. 133–137], concordant and complementary identification in the transference-countertransference space. In this sense, it takes into account both the importance of the dominant affect of the session, as well as unconsciously reactivated pairs of self-object during the session, which are always connected by dominant affect in the transference.

In conclusion, we can say that the paper presents the results of some neuroscience studies in conjunction with the concepts of psychoanalytic and psychodynamic therapy. Although the text does not take into account all available data, just as it does not take into account all possible to formulate consequences, it tries to show the common points for psychotherapy and brain science. In the final part of the text it shows some therapeutic implications of neuroscience study. We also made attempts to present a model of Transference Focused Psychotherapy, because it seems to have the strongest relations with the formulated conclusions.

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