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Theory of drives and emotions – from Sigmund Freud to Jaak Panksepp

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Summary

The article discusses the development of psychoanalytic theory in the direction of broadening the reflection on their own based on data derived from empirical studies other than clinical case study. Particularly noteworthy is the convergence that followed between neuroscience and psychoanalysis and the rise of the so-called neuropsychoanalysis. Consequently, this led to eject empirical hypotheses and begin research on defense mechanisms, self, memory, dreams, empathy, dynamic unconscious and emotional-motivational processes (theory of drives). Currently neuropsychoanalysis constituted itself as a discipline contained in itself three separate areas: the psychodynamic neuroscience, clinical neuropsychoanalysis and theory building. The article introduces the theory of Jaak Panksepp emotional systems as an example of an integrated neurobiology of affect, behavioral biology, evolutionary psychology and psychoanalysis. The theory of emotional systems includes the description of the SEEKING system representing basic motivational system of the organism. A part from a new perspective on the theory of drives described by Sigmund Freud, it offers the possibility to take into account the emotional and motivational systems within the understanding of mental disorders such as depression, addiction and psychosis, which is the core of psychoanalytic thinking.

Key words: emotions, Neuroscience, psychoanalysis

Neuroscience and Psychoanalysis

The development of new technologies as primarily neuroimaging led to a significant progress in neuroscience, which since the late 20th century has been exploring new areas of research, previously unavailable. One of such areas are the concepts of mind and therapy which had been developed by psychoanalysis. Indeed, the Nobel Prize-winning neurobiologist Eric Kandel [1, 2] wrote in his works, now regarded as canonical, that psychoanalysis brings the most coherent and satisfactory view of mind. He proposed that neurobiology, cognitive psychology and psychoanalysis should combine their efforts to develop a common concept of the functioning of the human brain

and psyche. In his opinion, such a model would be most useful for the understanding of the conditions of health and development, as well as the incidence and therapy of mental disorders. Kandel pointed out that this model would neither threaten the independence of each discipline nor limit the freedom of development and research.

Simultaneously, a group of researchers and psychoanalysts: Glen Gabbard, Peter Fonagy and John Gunderson [3, 4], stressed that in the age of evidence-based medicine (EBM) it became necessary to empirically verify the effectiveness of psychodynamic therapies, to use external evaluation other than the clinical situation of psychoanalysis, to perform research related to the modern methodology of biological and social sciences, to strengthen evidence-based psychoanalysis, and finally to include the basic methodology of research into psychoanalytic training programs [5]. The last 15 years have produced a significant change in the position of psychodynamic therapy (here the term "psychodynamic" is used interchangeably with the term "psychoanalytic") [6] regarding its relation with empirical sciences. The effectiveness and efficiency of this method of treatment is supported by numerous randomized controlled trials (RCT) [7, 8]. Shedler's review of the meta-analyses of the efficacy of psychodynamic therapy [9] demonstrated that its effect size is similar to that produced by other forms of therapy (CBT, pharmacotherapy of depression) and increases in the cases of long-term psychodynamic therapy.

Data from the neuroimaging studies of the effects of psychodynamic therapy also support the efficacy of this method and its modulatory effect on a number of regions of the central nervous system [10]. In his review of the literature on this topic, Abbas et al. [10] identified 11 research including 2 randomized controlled trials, 5 controlled trials and 4 case series including 210 people (116 people with mental disorders and 94 healthy people in control groups). A common finding was normalization of synaptic and metabolic activity in the limbic system, the midbrain and the prefrontal cortex, following the improvement of mental state. In the face of the growing literature bolstering the value of this kind of psychotherapy, it seems more justified to ask "what and for whom?" than "whether or not?". Roth and Fonagy [11] are trying to answer the question in successive reviews of the research on the effectiveness of psychotherapy.

Regardless of the research into the efficacy of psychodynamic therapy, the last 15 years saw an intensive development of the dialogue between neurobiologists and psychoanalysts. This dialogue was largely about describing the functioning of mind, reflecting upon hypotheses and ideas derived from psychoanalysis, and the emerging research issues. A number of researchers pointed to the process of convergence between psychoanalysis and neuroscience, specifically the neuroscience of cognitive processes [12]. It has been observed that psychoanalytic concepts accurately describe some of the phenomena discovered in cognitive and experimental psychology, such as the unconscious memory of experienced events (UMEE) [12], the issue of relational trauma [13], or unconscious aspects of social cognition [14].

The greatest breakthrough in the relations between neuroscience and psychoanalysis was the emergence of affective neuroscience [15, 16]. The neuroscience of affect underlines the role of emotion in the studies on motivation, behavior, attention,

social cognition, and memory. It focuses on studying the structures of the limbic system and other regions of the brain participating in the regulation and processing of emotions, such as prefrontal cortex, orbitofrontal cortex, insular cortex, basal ganglia, and cerebellum [16]. Allan Schore [17, 18] noticed that just as the behavioral paradigm was the leading paradigm of psychiatry in the 1960s and 1970s, and so was the behavioral-cognitive one in the 1980s, currently we are witnessing a turn towards the study of emotions and psychobiological states, related to the more archaic brain systems responsible for non-linguistic social signals. Such authors as Schore [18] or Panksepp [19] stress that emotions serve adaptive and communicative functions, and that a significant part of them accounts for the unconscious non-verbal affective communication. The latter aspect was broadly discussed in the subject literature, the examples of which include studies on the evaluation of facial expressions with microanalysis [20], on the mother–infant interaction [21], or on the vocalization in so-called musical communicativeness [22].

The analysis of recent literature shows a dramatic increase in the number of interdisciplinary studies referring to the biological basis of emotions and social cognition [17]. Some authors also notice that the new discoveries in science brought about the need to add affective psychodynamic models to the premises of cognitive-behavioral therapy [16, 17] and to open the psychodynamic therapy up to the findings of cognitive therapy, illustrated by the mentalization theory of Peter Fonagy [23]. In this context, neuropsychoanalysis founded and developed by Mark Solms [24] became an important forum of dialogue between neurobiologists, psychoanalysts and cognitive psychologists [25], and some universities introduced psychodynamic neuroscience as an independent degree course.

So far, as described by Georg Northoff et al. [26] in his seminal work on neuroimaging in psychodynamic psychotherapy, the dialogue between psychoanalysis and neuroscience gave grounds for empirical hypotheses and research into defense mechanisms, self, memory, dreams, and empathy. One could also add to this list the studies on unconscious processes (dynamic unconsciousness) and emotional-motivational processes. Neuropsychoanalysis itself begins to take shape as a separate science, though related to other disciplines. Zellner and Olds [27] distinguished its three main strands: psychodynamic neuroscience, studying the biological mechanisms of intrapsychical and intersubjective processes; clinical neuropsychoanalysis, based on working with neurological patients using psychodynamic knowledge; and c) theory building, that is the quest for neuropsychoanalytic models of the functioning of the mind.

Drives as emotional-motivational processes

Since its development until today, psychoanalysis has been underpinned by the concept of unconscious psychic processes, in which an important role is played by emotions and drives, including their conflict with internalized norms and rules of a given culture and the attempt to overcome this conflict by reaching a compromise with the reality, which is the task of the conscious "self" [28]. In other words, the main research area in this model, known as drive model, are the emotional-motivational processes

and the regulatory capacity of an individual, which are closely linked with the development and the individual's personal life history. Emotional-motivational processes (drives) are very deeply ingrained in the psycho-biological structure of an individual, and are evolutionarily common to humans and animals. During the development of psychoanalysis, the drive model was supplemented with the relational model [29], which underlines the significance of relations between persons in the regulation and processing of emotions, their conscious control, empathy, insight, and reflectiveness. This models underlines the theory of attachment, relational and intersubjective psychoanalysis. The every-day practice of a psychodynamic therapist usually alternates between the former model of therapy and the latter [30].

Both models have been discussed in the neuroscience literature, especially theory of attachment, deeply embedded in empirical research [31]. The research into the theory of drives needs standardized nomenclature and the content of terms defined in a way which would allow for a reliable verification of previously formulated hypotheses. Most authors today concur with the basic premise that the notions of "drive" and "desire", found in Freud's works, may correspond with the notion of an emotional-motivational system which, on the one hand, would define a system of behaviors related to the experiencing of basic emotions, and on the other would have its neuronal representation at the level of the central nervous system [32]. There are many models of emotional-motivational processes in neuroscience [32–35] and only some of them refer to psychoanalytic thinking. Most of them, however, cannot be discussed within the scope of this paper. The concept which has gained universal recognition is Jaak Panksepp's theory of emotional systems [36], which represents the synthesis of neuroscience and psychoanalytic thinking.

Emotions and drives from the evolutionary perspective

Panksepp's [19, 36] theory is based on the evolutionary understanding of the BrainMind, in which emotional systems play an important role. According to him, the basic emotional system allows the dynamic organizational forms of the brain be quickly excited and coordinated when challenged by the external and internal environment. In this approach, emotions are of adaptive and inborn nature, and the neuronal circuits associated with them evolved to provide individuals with a high efficiency of survival and passing their genes down to their offspring. According to Panksepp, animals also experience intense subjective emotional states, although their cognitive elaboration is likely to vary significantly from species to species.

The drive and emotion activity of the brain is underpinned, in Panksepp's opinion, by primary emotional processes, which are instinctive and constitute a form of evolutionary "memory". Mammals need this memory to survive in the environment. Primary processes are associated with subcortical centers located in the lower parts of the brain, mainly in its medial part [19, 33, 36]. **Primary emotional processes** include: sensory affects (emotions triggered by sensory stimuli – the feeling of pleasure or disgust), homoeostatic affects (resulting from interoceptive stimulation – hunger, thirst, etc.) and emotional affects (emotions and motivations experienced when acting,

so-called Emotions-in-Action). Situated on a higher level of psychic life, according to Panksepp, there are secondary processes, which modify the primary ones. **Secondary processes** are mostly memory and learning. Their centers are located more cranially an laterally. Panksepp locates them in and between such structures as amygdala, nucleus accumbens and basal ganglia. It is behaviorism, the neuroscience studying behavior, learning and conditioning, that deals with this level of emotions. **Tertiary processes** include cognitive functions, thoughts and planning as well as reflection, regulation of emotions, and "free will", called Intention-in-Action by Panksepp and mentalization by Fonagy [23]. These processes are associated with centers located mainly in the prefrontal cortex. The primary processes, to which Panksepp refers as anoetic, are the emotion-and-drive, unconditioned foundation of life. The secondary (noetic) processes are based on knowledge (learning, conditioning, habituation, sensitization), and the tertiary (autonoetic) processes on self-knowledge (reflection).

In Panksepp's model an important role is played by the relations between individual processes, which are not isolated functions but rather levels of processing within the same psychic process, in which the original and unconscious enthusiasm of a drive takes on a more reflexive and voluntary character. What is more, the tertiary processes enable the integration of cognitive and affective elements, only then making the latter recognizable to reflection and insight. In his hierarchical model of mind, Panksepp employs the notions of nesting and circularity to describe the interactions of the above bottom-up and top-down processes.

Main types of primary emotional processes

On the basis of many years of research into the neuronal mechanisms of emotions, Jaak Panksepp described seven primary emotional systems corresponding to seven neuronal systems in the brain [19, 36, 37]. The emotional systems are located in the subcortical regions. They were identified on the basis of electrical or chemical stimulation of selected regions of animal brains and observation of the induced instinctive behavior. The stimulation of different subcortical regions caused different behaviors, vocalizations and emotions, whose patterns were very similar between various species of mammals, and which could be called impulsive or emotional. The methodology used by Panksepp was based on comparative studies of: 1) the brain; 2) behaviors (their instinctive and emotional patterns); and 3) the human and animal mind. This way, Panksepp described the seven main emotional systems in mammals, which he called SEEKING, RAGE, FEAR, LUST, CARE, PANIC/GRIEF, and PLAY. Each of the systems has a different location and can, under certain conditions, become the dominant principle of the mind.

The SEEKING emotional system is, according to Panksepp, the main and oldest motivational system. It generates drive impulses for exploring the world, becoming involved, interested in the reality. Its activation results in intense processes of learning, producing adaptive behaviors (basal ganglia) and knowledge (neocortex). The neuronal SEEKING system includes a reward center related to enthusiasm and euphoria of involvement but not hedonistic satisfaction.

The RAGE system activates when the SEEKING system is blocked. It manifests itself as aggression, anger and rage. The areas of the brain excited in RAGE include, among others, amygdala, stria terminalis, central hypothalamus, and peri-aqueductal gray matter. This system is also connected to the cerebral and insular cortices.

The FEAR system helps reduce pain and decreases the risk of the destruction of the organism. Its activation leads to fleeing or entering the so-called frozen state.

The LUST system activates emotions and behaviors associated with sexual desire, it is "programmed" during fetal life, and becomes fully manifest during the intense hormonal transformations of puberty.

The CARE system is responsible for maternal behaviors and feelings.

The PANIC/GRIEF system provides the basis of attachment and is activated in the cases of separation. It plays a crucial role in early childhood development and is linked with the activation of opioid, oxytocin and prolactin systems in the brain.

Finally, the PLAY system, or physical social engagement system, plays a significant role in social adaptation. Play, as research on both animals and humans shows, shapes social patterns which have not been represented in the brain before. PLAY reduces negative affects (like anger), strengthens pro-social attitudes, affects the neuroplasticity of the brain, and modifies the functions of other emotional systems.

Detailed descriptions of each of the systems listed above, their constituents, neuronal and behavioral representation, and projections to other areas of the brains can be found in numerous books and papers by Panksepp [19, 36], who has mostly focused on the SEEKING system so far. His theses have inspired many clinical and psychotherapeutic studies.

Clinical and psychotherapeutic aspects of Jaak Panksepp's theory

According to Panksepp and neuropsychoanalysts, the concept of emotional states may be a solid basis for psychiatry and psychotherapy. Emotional systems, including their dysfunctions and different variants of excitations, could be seen as a kind of endophenotypes of mental disorders. On this basis, Panksepp stresses the role of hyperactive SEEKING in psychoses and its deficit in depression and addictions. According to the neuropsychoanalytic model of the depression [37], this disorder may result from the excessive activation of the PANIC/GRIEF system (loss of the object of attachment), which would lead to decreased dopamine levels in the SEEKING system, and the main motivational system in the brain being blocked due to the increased levels of dynorphins and stimulation of kappa opioid receptors. This mechanism would, on the one hand, produce obsessive behaviors in order to stimulate the SEEKING reward center, which would result in dependence on substances or behavioral addictions. On the other hand, this state could become fixed into a chronic anhedonia and depression. It is stressed in the neuropsychoanalytic concept that the dependence present in attachment is based on similar neuronal mechanisms as addiction to substances, and that the latter may result from a loss, its associated dysphoria, negative affect, and seeking the stimulation of the reward system.

This short description does not obviously exhaust the rich material contained in Panksepp's works or those inspired by his theory. His ideas have been employed to bet-

ter understand such disorders as autism, ADHD, PTSD, as well as borderline personality disorders [19]. The above model seems to integrate seamlessly the knowledge from sources as disparate as neurobiology, behavioral psychology, cognitive psychology, psychoanalysis, evolutionary psychology, and attachment theory. It seems to provide inspiration for both clinicians and researchers. What is worth special attention in Polish psychiatric literature are the never fully explored works of Jan Mazurkiewicz [38, 39], whose theses regarding psychic evolution and dissolution, and the role of the drive and emotional dynamics in the movement of psychological activities to the front, seem highly topical and would merit a separate review of their own.

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