

Interface between psychoanalysis (and other psychotherapies) and brain plasticity: is there a state of the art?

Following up the initiative of the *Revista de Psiquiatria Clínica* to bring up for discussion emerging and challenging topics of wide interest, here we provide opinion from experts debating the letter to the editor by Scorza and Cavalheiro on the potential interface between psychoanalysis and brain plasticity. Being a controversial and timely topic, which underlies different opinion, this initiative points out to an enriched discussion and potential clinical utility of these interconnected concepts.

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Psychoanalysis and its role in brain plasticity: much more than a simple bla, bla, bla

Commentaries on the letter to the editor/ *Rev Psiq Clín.* 2013;40(3):124-6

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In the letter by Scorza and Cavalheiro¹, the authors posit that the use of psychoanalysis for neuropsychiatric syndromes “has a direct positive influence” on neurogenesis. Yet, the authors acknowledge that the putative mechanisms to explain the alleged role of psychoanalysis on neuroplasticity remain “still poorly explored”.

In a letter addressed to Wilhelm Fliess in April 1895, Sigmund Freud manifested his willingness to integrate the canons of brain anatomy and physiology with his ideas on psychopathology in order to propose a theoretical model grounded on neurobiological processes². Months later he sent the draft of his ideas on this topic to Fliess, who retained the manuscript. This piece, later entitled “Project for a Scientific Psychology”, was published posthumously in 1950³. On that account, Freud prophesied the significant progress of neurosciences in the last decades, which promoted a better understanding about the way the brain responds to environmental stimuli, psychosocial factors as well as therapeutic interventions.

The recent debate on the applicability of empirical research as a way to scrutinize the effectiveness of psychoanalytic as a treatment modality has been a contentious one⁴. Although some authors have advocated that the assumptions of psychoanalysis and its proclaimed therapeutic effectiveness should be examined in experimental testing conditions⁵, others understand that the benefits of psychoanalysis are axiomatic and not amenable to enquiry via empirical research methodology⁶. In any case, if psychoanalysis does in fact produce significant neuroplastic changes, as highlighted by Scorza and Cavalheiro¹, this attribute per se is not a tantamount to treatment effectiveness. After all, neurochemical and neuroplastic changes happen in the brain in response to a plethora of stimuli and interventions.

The seminal studies conducted on *Aplysia* sensorimotor synapses revealed that synaptic transmission may induce neuronal structural changes. These neuronal changes are generated via a cascade of neurochemical phenomena, which subsequently activate immediate early genes, increase neural cell adhesion molecules (NCAMS), resulting in neuronal reconfiguration. These neuronal modifications happen as a response to a series of environmental influences, particularly in the context of stressful stimuli⁷. Results from animal studies have revealed distinct mechanisms of neuroplasticity: stress may produce excessive growth in the amygdala, while generating opposite effects in hippocampus⁸.

In fact, there is growing evidence indicating that interventions designed to promote favorable emotional states may achieve its outcomes via neuroplastic changes in the brain⁷. These interventions include cognitive therapy⁹, meditation¹⁰, and physical exercise¹¹. It remains unclear though whether these interventions improve neurological function and behavior or whether they simply mitigate the effects of stress on the brain⁸.

Considering the aspect mentioned above, the purported neuroplastic changes induced by psychoanalysis may not render any uniqueness to this discipline. It may in fact, place psychoanalysis among other interventions – clearly less expensive and more readily accessible – which may also produce behavioral consequences mediated by neuroplastic changes.

As the old bard from Stratford-upon-Avon once wrote, “*All that glitters is not gold*”. This maxim should be always borne in mind when one is offered with fine jewelry for an exorbitant price. After all, apart from the matter of authenticity, one may look also very personable sporting a shiny trinket instead.

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Up to now, the details of the relationship between the brain and mental processes – precisely how the brain gives rise to various mental processes – is understood poorly, and only in outline³. To date, there are no known new approaches to psychotherapy which are derived from neurobiological data. According to Northoff⁴, the linkage between neurobiological and psychological processes gave rise to a new discipline, neuropsychology. Neuropsychology may be considered the continuation of Freud’s 1895 project⁵. Solms argues that neuropsychology provides a conceptual bridge between psychological and neurological science⁵. Neuropsychology focuses predominantly on linking psychodynamic concepts like dreams, the unconscious, ego/self, to specific psychological, e.g., cognitive and affective functions, which in turn may be localized in particular brain regions.

Neuroscience asserts that emotion is processed independently of conscious awareness; not in the dynamic unconscious of Freud but by the rules of neural circuitry and neuropsychology. Neuroscience embraces different cognitive functions like attention and working memory that are taken as initial starting points and then related to supposedly corresponding concepts like memory or dreams within the psychodynamic context.

How this is done? The answer may lie in the plasticity of the brain. The neuroplasticity could reconcile psychoanalysis and neurosciences. The brain is not a rigid organ but a dynamic structure in constant rebuilding. The plasticity involves diversity and singularity contrary to the genetic determinism. Mind, body and brain are manifestations of the same organism. Psychological phenomena emerge from neurobiological processes. Progresses in neurobiology have allowed to establish correlates of psychological functions in terms of genetics and cognitions. The dramatic changes provoked by research of structural and functional plasticity augmented our understanding of what is feasible and what can be achieved by the various forms of psychotherapy including psychoanalysis.

There is even further convergence. Many of the cognitive, affective, and social functions investigated in neuroscience are related to the psychological functions Freud described. For instance, the cognitive function of memory and especially autobiographical memory may be closely related to Freud’s psychological function of repression^{3,6,7}.

There is certainly a similarity in that both psychological structure and neural structure are not real in the physical sense but rather virtual. Psychological functions are assumed to correlate with the mental contents in question; the former is thus a sufficient condition of the latter. This is different in the case of psychological structure and organization. Such structural model implies that we may not be able to find a particular region to be specifically and exclusively associated with the functions of the ego and the ego itself Freud described. Evaluation of psychoanalytic theories based on their biological evidence is critically dependent on speculative interpretation of what the theories predict at neuronal level.

What the future reserves? The RDoC classification of the NIMH aim at developing systems of classification that start from the assumption that psychiatric disorders are brain disorders. The RDoc proposes that the classification should include genetics, molecules, cells, neural circuits, behavior and self reports allowing therefore to understand mental disorders in a more complex way than the dualism neuroscience and psychoanalysis permit.

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Good psychoanalysis should provide an attentive, receptive and non-judgemental setting with high frequency of meetings, constancy and non-impositive attitude. This shall at proper time foster the development between patient and analyst of a unique affective relationship, the transference, after the former having tested enough times the reliability of the analyst’s attitude. These conditions will eventually allow a degree of self-disclosure that very often the patient hadn’t yet achieved even in his/her most secret conversations with him/herself. The nature of the transference shall be brought to the patient’s awareness and consideration as part of a process of mental expansion.

Many influential neuroscientific authors²⁻⁶ agree that one of the main functions of affects is to assign differences of relevance to different clusters of memories/neural networks. Evolution provided that relevance be accompanied by plasticity to foster learning important to survival. So, a psychotherapeutic method that happens within a context of affective intensity shall logically benefit from increased neuroplasticity.

I believe it’s to this reasoning the authors, using different words, want to call attention to. But why to develop a rationale instead of going straight to factual evidence? It’s a cognitive theorist who says: “... unless and until (an issue) can be shown to be theoretically possible – that is, to be neither a logical nor a scientific contradiction – any discussion of the evidence is likely to be compromised by a priori disbelief”⁶.

Psychoanalysis has been accused of being much better at making hypothesis than at verifying them scientifically. In a sense, it’s true, if we take as the sole valid criterion for scientificity evidences provided by controlled trials of falsifiable hypothesis. Nevertheless, some important neuroscientists^{3,7}, alongside with hundreds of thousands of patients around the world, insist to give psychoanalysis an important role in their lives and within the realm of sciences. What could possibly lead so undisputable a scientist as Eric Kandel to write that “it (psychoanalysis) still represents the most coherent and intellectually satisfying view of the mind”⁷?

I dare say it may be the recognition that the human mind is far too complex to be reduced to what so far can be tested in controlled studies. Besides the often quoted saying that “absence of evidence is not evidence of absence”, some scientists may recognize that controlled trials often keep little resemblance with the reality of human experience. To fit a so called golden standard scientific paradigm one must deny the most distinctively subjective human dimensions psychoanalysis accepts but which are still intractable by these methods without atrociously decimating its complexity. Some scientists agree that popperian falsifiability doesn’t always apply, or in some instances must be deferred not to turn science impossible⁸.

The authors emphasize hippocampal neuronal growth potential to highlight neuroplastic possibilities for psychoanalytic action but I would also underline the huge epigenetic variability of memory within the 600 million synapses per cubic millimeter of our human brain⁹.

Psychoanalysis can’t provide golden standard proven laws for the human mind, only a big ‘toolbox’ of insights learned from a century of clinical experience of applying its unique method. To our excuse I would mention Henry Roediger III’s conclusion after reviewing a century of evidence-based research on memory: “... The great truth of the first 120 years of the empirical study of human memory is captured in the phrase ‘it depends’”¹⁰.

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Scorza and Cavalheiro¹ raise an interesting question, namely the question if psychoanalysis has an effect on brain structures in particular on the hippocampal neurogenesis. They and other supporters of a neuro-psychoanalytical approach expect to provide empirical evidence for psychoanalytical theory and practice from studies of the brain. Some researchers hope that such brain research might stimulate revisions of the psychoanalytical theory or practice². Others even wish that neuro-psychoanalytical research could possibly elevate the scientific status of psychoanalysis. But not all share this enthusiasm. Opponents question the relevance of neuro-scientific data for psychoanalytic theory and practice. They criticize that such an integration is unnecessary, misguided or at best premature^{3,4}.

The neuro-psychoanalytic approach suggests that only what is measurable in terms of brain activity is real. But even if we accept that mental activity is always somehow reflected in brain activity, it does not mean that neuroscience would be the best or even the only way to test empirically psychoanalytic theory and practice. It does not even mean that what we cannot illustrate in a brain scan, is “a simple bla, bla, bla”. If we would apply this argument to serious mental illnesses like depression or schizophrenia, we inevitably would have to characterise these illnesses as non-existing, as in the last 30 years no structural or functional markers in brain imaging or other biological markers for these illnesses have been identified.

We have to acknowledge that there are different approaches to science, which do not share the same models how scientific knowledge is obtained. The psychoanalyst David Rapaport published already in 1960 a brilliant and to date unsurpassed seminal analysis of “the structure of psychoanalytic theory”⁵. He stated that psychoanalytical evidence is mostly based on accumulated clinical observations. The collection of these observations does not follow explicated rules – a prerequisite for a scientific theory. These clinical observations also do not allow constructing testable deductions, which on their part would permit to falsify these observations. Theories, which cannot be falsified, can explain everything and predict nothing⁶.

Hence, how would Scorza and Cavalheiro¹ operationalize the criteria to prove the “benefits” of some psychoanalytical schools (not even discussing, which “school” they eventually mean)? How would they break down psychoanalytical theory and practice to testable hypotheses? How would they control for significant factors, which might also impact on the hippocampus? What would they propose how to exclude alternative explanations for observed brain changes? And even Scorza and Cavalheiro¹ think that all these obstacles would be superable, do they think psychoanalysts would still recognise what they consider to be “psychoanalysis”?

These and other questions make it obvious that the reconciliation of psychoanalysis and brain research presumably remains a dream.

We should leave psychoanalysis what it is: a fascinating dialogue of two (or sometimes more) persons to understand (not to explain) the world and themselves. The “truth” knows more than one way.

References

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In this Letter to Editor, Scorza and Cavalheiro¹ challenge our minds banqueting at the same time psychoanalysis and neuroplasticity. Trust me, from these brilliant minds is coming one innovative concept. The field of basic neuroscience has great development in the last 30 years, thus the ancient belief that brain is “static” was replaced by a word that highly represents the enormous adaptive capacity of neural circuits, which is neuroplasticity². Probably, neuroscientists did not yet provide the best definition of neuroplasticity but we can assume that is a functional property of the neuronal cells in feeling and respond to each other and to the environment outside the brain³. This takes into consideration some aspects highlighted by Scorza and Cavalheiro¹ that is neuronal connectivity and neurogenesis. However, there are more players in the field. The glial cells mainly astrocytes and microglia are resident cells of the brain that also interact with neurons, have high adaptive capacity and prompt respond to the synaptic neurotransmitters fluctuations caused by physiological or pathological stimuli. Astrocytes, more than neurons, have immense capacity in proliferate and migrate, then giving metabolic and trophic support to adult and newborn neurons. Interestingly, interventions that classically improve neuronal plasticity such as play musical instrument, enrichment environment and physical exercise also promote glial plasticity^{4,5}. Thus trying to add more pieces to this puzzle it is important to consider the potential of psychoanalysis in improve neuronal-glial interactions⁶. One important issue at this level of scientific development is determining in terms of clinical, electrophysiological, neuroimaging and psychological outcomes what is the correlate or biomarker for neuroplasticity for humans. Finally, from the beginning to the end of text, Scorza and Cavalheiro¹ make the readers prone to be convinced that there is no need for bla bla bla anymore.

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Scorza and Cavalheiro¹ raise an interesting question, namely the question if psychoanalysis has an effect on brain structures in particular on the hippocampal neurogenesis. They and other supporters of a neuro-psychoanalytical approach expect to provide empirical evidence for psychoanalytical theory and practice from studies of the brain. Some researchers hope that such brain research might stimulate revisions of the psychoanalytical theory or practice². Others even wish that neuro-psychoanalytical research could possibly elevate the scientific status of psychoanalysis. But not all share this enthusiasm. Opponents question the relevance of neuro-scientific data for psychoanalytic theory and practice. They criticize that such an integration is unnecessary, misguided or at best premature^{3,4}.

The neuro-psychoanalytic approach suggests that only what is measurable in terms of brain activity is real. But even if we accept that mental activity is always somehow reflected in brain activity, it does not mean that neuroscience would be the best or even the only way to test empirically psychoanalytic theory and practice. It does not even mean that what we cannot illustrate in a brain scan, is “a simple bla, bla, bla”. If we would apply this argument to serious mental illnesses like depression or schizophrenia, we inevitably would have to characterise these illnesses as non-existing, as in the last 30 years no structural or functional markers in brain imaging or other biological markers for these illnesses have been identified.

We have to acknowledge that there are different approaches to science, which do not share the same models how scientific knowledge is obtained. The psychoanalyst David Rapaport published already in 1960 a brilliant and to date unsurpassed seminal analysis of “the structure of psychoanalytic theory”⁵. He stated that psychoanalytical evidence is mostly based on accumulated clinical observations. The collection of these observations does not follow explicated rules – a prerequisite for a scientific theory. These clinical observations also do not allow constructing testable deductions, which on their part would permit to falsify these observations. Theories, which cannot be falsified, can explain everything and predict nothing⁶.

Hence, how would Scorza and Cavalheiro¹ operationalize the criteria to prove the “benefits” of some psychoanalytical schools (not even discussing, which “school” they eventually mean)? How would they break down psychoanalytical theory and practice to testable hypotheses? How would they control for significant factors, which might also impact on the hippocampus? What would they propose how to exclude alternative explanations for observed brain changes? And even Scorza and Cavalheiro¹ think that all these obstacles would be superable, do they think psychoanalysts would still recognise what they consider to be “psychoanalysis”?

These and other questions make it obvious that the reconciliation of psychoanalysis and brain research presumably remains a dream.

We should leave psychoanalysis what it is: a fascinating dialogue of two (or sometimes more) persons to understand (not to explain) the world and themselves. The “truth” knows more than one way.

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