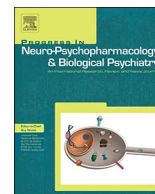




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Creativity and psychiatric illness: A functional perspective beyond chaos



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1. Introduction

1.1. From creativity toward mental disorders

It is widely suggested that there is a link between creativity and mental disorders. However, although it has great potentials to enhance the understanding of psychopathology as well as to enrich treatment programs, this link has been rarely investigated in a systematic way. The aim of the present article is to the literature concerning the hypothesized link between creativity and mental disorders. Unlike previous approaches, here we specifically address this issue on a neuro-psychoanalytical perspective, as it is increasingly argued that psychoanalysis and the neurosciences can be productively involved in a prolific dialogue to understand psychiatric disorders (Salone et al., 2016).

Psychoanalysis and creativity have always had a fruitful balance in the artistic and the creative dimension featuring a psychoanalytical setting, if the "illusion of thought" in its freedom and stop are to be considered (Russo, 2006). In the development of human thought, the psychoanalytic history speaks of creativity as well, with sublimation pathways going beyond symptoms as described by Sigmund Freud. Also, the reparation of a destroyed internal object expresses itself through creativity as Melanie Klein stated and "hallucinated objects" created through creative processes near to "real object" are a transitional passage to experience (Rosati et al., 2004; Winnicott, 1994). Otherwise the expansion of a thought releases chaotic primordial sensory movements that are felt as chaotic and that finding their expression in bionian beta elements could be though (Bion, 1962).

To explore the in-between processes that could connect creativity and mental disorders, we will focus this article particularly on psychotic

and affective disorders, as well as the brain resting state activity, that is, the intrinsic functioning of the brain when it is involved in free thought.

In line with the idea that a delusional frame could be related to building another reality, scientific data suggest that not only are high dopamine plasma levels linked to creative states, but they are also connected to delusional crisis. The schizophrenia-spectrum disorders, along with the affective disorders and schizotypal personalities are frequently connected with creativity. Literature data report that sometimes the temporal and narrative unities are lost in acute phases and the resulting state resembles a creative process (Nelson and Rawlings, 2010; Olugbile and Zachariah, 2011; Goldman-Rakic et al., 2004; Soeiro-de-Souza et al., 2011; Sass, 2000). Moreover, the divergent thinking processes are considered features of both creativity and psychosis (Takeuchi et al., 2015), where divergent thinking is related to diffuse attention and comes up with many responses (Andreasen, 2011; Andreasen and Ramchandran, 2012; Takeuchi et al. 2011).

However, no definite liaison has been reported between genius-like abilities and psychic health or illness, and no direct evidence supports the tautological assumption that the genesis of highest genius-like abilities depends on psychic differences, mental abnormalities or specific creativity features (Juda, 2006). Hence, the association "genius and insanity" remains a critical topic (Juda A, 1949; Juda, 2006).

From a neurobiological perspective, creativity and psychiatric illnesses may have a similar basis. For example, the subjective inhibition of the environmental stimuli is frequently reported as characteristic of creative people, whereas it is also associated with high levels of dopamine (DA) (Carson et al., 2003; Swerdlow et al., 2003). DA is implicated in mood, cognition (Cousins et al. 2009), and in the kind of divergent

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thinking that is typical of creative subjects (Reuter et al., 2006).

Functional neuroimaging studies further contribute to elucidate the neurobiological basis of creativity (Burch et al., 2006). Such research field focuses on healthy participants, while specific studies in clinical samples present a lack of this element. The Default Mode Network (DMN) seems to be particularly involved in this context. It is a network that is mainly investigated through resting state neuroimaging studies, where the participants undergo functional neuroimaging when thinking freely, without being engaged in a specific task. Functions associated with the DMN include self-referential and introspective activities, autobiographical memories, and divergent thinking, the latter being a typical feature of creativity (Buckner et al., 2008; Jung et al., 2013; Fink et al., 2010, 2012a, b, 2013; Takeuchi et al., 2012; Wei et al., 2013). In healthy participants, a decreased filtering of irrelevant information seems to be related to creativity, allowing the combination of unusual and diverging ideas through intrusive thoughts (Takeuchi et al., 2011).

Literature supports an inconsistent relationship between creativity and mental disorders (Kyaga et al., 2011). Furthermore, healthy geniuses speak against the link between “genius and insanity”, as while on the one hand psychoses seem to be detrimental to creative ability, on the other hand milder psychic abnormalities within the limits of psychoneurosis, emotional instability or psychic tension could have a stimulating influence (Juda, 1949). In such a perspective, skills, flexibility, and creative adaptation, as well as expression represent the creative process of how mind could change in unexpected life events (Galderisi et al., 2015; Tracy et al., 2015).

Meta-analyses and the systematic revision of the literature that have been carried out, so far provide a fragmented view on “how” and “if” creativity play a role in the healthy mind and in psychiatric illnesses. How creativity could be implicated in determining mood, cognition, and psychiatric disorders is yet to be studied, especially on a neuroscientific perspective. In addition, a psychoanalytical perspective could give an interpretation of how creativity could be useful in healthy and ill brains and it could also take on a therapeutic role.

It would be relevant to note in this context that the resting state is compared to free association, because in both states an individual is required to let her/his mind wander freely. In particular, the lateral prefrontal cortex (PFC) appeared to be organized along a rostro-caudal axis, with rostral regions involved in combining ideas creatively and more posterior regions involved in freely generating novel ideas (Gonen-Yaacovi et al., 2013).

1.2. Psychoanalysis and creativity: free association and rest

In our present study, we will offer a more in-depth view on how mental illness and creativity could find a “solid ground” in their relationship with free association, which represents a main feature of psychoanalysis. This is also expected to have clear therapeutic implications.

Adapting to environmental change through the creation of new ideas in real time drives innovation and is a special feature of human thought (Barbeya et al., 2013; Oppezzo and Schwartz, 2014). This is partly based on a continuous balance between old and new, as stored ideas and memories can be recalled and associated, thus generating novel ideas by a multi-level dynamical search in both familiar and unfamiliar contexts (Marupaka et al., 2012; Iyer et al., 2009).

Each creative process moves step by step, beginning with a *preparation* and proceeding with an *incubation* and an *inspiration* time, when the person suddenly sees the solution - the “eureka” experience-. Finally, it concludes with the *production* time, when the insights are put into a useful form. Andreasen (2011) explain to us that creativity is something very spontaneous, which lets the mind wandering:

“I can't force inspiration. Ideas just come to me when I'm not seeking them (...).” “It happens like magic.” “I can just see things that other people can't, and I don't know why.” “The muse just sits on my shoulder. (...) If I

concentrate on finding the answer it never comes, but if I let my mind just wander, the answer pops in.” (Andreasen, 2011).

Neuroscientific findings suggest that the quality of neural processing supporting outer perceptions is tied to the quality of neural processing that supports the system for one's own internal perception (reference?). Efficiently moving between these two *worlds* could be hypothesized to make one person more creative than another. It is also reported in literature that the quality of neural processing during “looking inwards” is related to the social-emotional functioning and the dimensions of thought going beyond the “here and now” based on traces of memory. Moreover, when at rest, the *mind is not idle* but it is absorbed in a *dynamic stream of free-form thought* (Immordino-Yang et al., 2012), including mind wandering and the spontaneous recollection of memories. As revealed by brain imaging research, some brain regions, especially in the DMN, are highly active during a so-called resting-state.

The idiom *constructive internal reflection* is used to describe educational practices promoting an effective balance between external attention and internal reflection to facilitate idea creation and creativity. Specifically, the internal reflection describes creativity-related skills and their relation to supporting processes such as attention, memory, identity information and abstract thinking (Immordino-Yang et al., 2012).

Additional literature reports that creative people have a higher associative fluency and more uncommon responses underlying the ability to generate ideas. Therefore, it has been proposed that *creativity* may not be related to a specific organization of *associative memory*, but rather to a *more effective way of accessing its contents* (Benedek and Neubauer, 2013).

More insight in creativity could come from free association in a psychoanalytical perspective (Andreasen, 2011). Freud considered free associations as the *esprit* of each psychoanalytical process being considered a way to access “other” deep mental processes named as “unconscious other”. In a therapeutical psychoanalysis setting it is that internal collaboration between a conscious analyzed patient and his/her *unconscious other* –that is other than conscious visible and felt by the patient-through free associations bring to the achievement of the ‘*psychoanalytic function of the personality*’, that is ‘*dis-illusionment*’ evolving in a perspective where ‘*The ego is not master in its own house*’ as Freud said (Rather, 2001). Different parts of personality show, so each intrapsychic piece starts to communicate. The final acquisition for an analyzed person is that the *unconscious other* comes into being experienced as an internal presence, an object. It goes through a process of ‘*dis-illusionment*’ that evolves in a perspective where ‘*The ego is not master in its own house*’ as Freud said (Rather, 2001).

Available data motivate an integrative framework as neural foundations of creativity and human flexibility come from a distributed network in different brain regions. Lesion mapping analysis confirms the hypothesis that convergent processes depend on a shared network of frontal, temporal, and parietal regions, including white matter association tracts, which bind these areas into an integrated system (Barbeya et al., 2013). Creative subjects have a richer and more flexible associative network, as this is identified by broader associations (Kenett et al., 2014).

Several frontal and parietal - temporal regions seem to support the cognitive processes sustaining diverse creativity tasks so that some regions may be specialized for distinct types of processes. Namely, lateral PFC (prefrontal cortex) appear to be organized along a rostro-caudal axis, with rostral regions involved in combining ideas creatively and more posterior regions involved in freely generating novel ideas (Gil Gonen-Yaacovi et al., 2013).

After examining scientific data, novelty processing seems to involve functional areas for procedural memory (caudate), mental rewarding (substantia nigra, SN), and visual-spatial processing, declarative memory (hippocampus), emotional/arousal related to the amygdala. All of these elements have a central role in feelings (Huang et al., 2015).

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