

CREATIVITY AND PSYCHOSIS IN SCIENTIFIC RESEARCH

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The stereotype of the scientist, so different from how a creative artist is usually perceived, is perhaps one of the factors that hinders the study of creativity in the field of science. Features such as rationality, skepticism, and obsession for accuracy and objectivity seem in fact far removed from both creative and psychotic activity. The real scientific innovator, however, does not base his task on the features named above—which can be criticized as belonging to "scientifists" rather than to scientists— but rather on a series of special cognitive processes that transform or substitute conceptualizations of reality, which up to then had been universally accepted.

Early descriptions of some of these processes are the work of Freud, who classified them into primary and secondary processes. The primary process, the oldest from the ontogenetic perspective, operates by means of displacement, condensation, and substitution. The action of this process prevails in dreams, psychopathological conditions such as psychosis, and during the early stages of normal cognitive development. Secondary processes overlap and tend to substitute for the primary ones early on, and constitute the so-called conceptual thought, which follows the rules of logic and of inductive and deductive methods.

Arieti (1964) adds to the above the tertiary process, which he considers specific to creativity, and it consists of special combinations of primary and secondary forms of cognition. The function of creativity, according to this author, is to allow the individual to transcend, in an adequate and desirable way, his usual ways of feeling, understanding, relating, and doing things. The activity of normal people tends to follow fixed, repetitive, and predictable patterns governed by the laws of logic and custom, whereas the creative process allows one to break free from such rigidity. Creativity is not merely originality and liberty, but it imposes its own restrictions. To begin with, even if its cognitive

method differs from that which is specific to secondary processes, its results must agree with these. Lack of this agreement would result in bizarre and eccentric productions, not in creative ones.

Second, creativity must aim to broaden human experience, either through aesthetic pleasure, such as in art, or by enhancing the usefulness, understanding, and predictability of nature, such as in science. Third, the creative process tends to satisfy a desire or a search for a new object or a new state of experience or existence that is not easily found or developed. Freud pointed out that the urge to create stems from an attempt to solve fundamental biological conflicts, but, as we shall see later when we discuss two clinical cases, it may also constitute a response to the need to restore or recover a lost object, transferring to the creative act the cathexes previously attached to that object.

Summing up, the creative act constitutes a synthesis of primary and secondary processes and is used to satisfy, in a positive and adequate way, intrapsychic and sociocultural requirements. In scientific creativity, however, the mere formation of this synthesis is not in itself sufficient; it has to correspond also to objective aspects of external reality. In this respect, the term creation is perhaps more correctly applicable to the fine arts or literary creations, whereas discovery is more appropriate for scientific creativity. Hence, consensual validation is an unavoidable step in the process of scientific research, whereas in artistic creation the appreciation or understanding by others of one's work could be deemed to fulfill a similar role.

Observation, experimentation, and data collection are usually considered to be the fundamental factors of scientific research. However, in my view, these are merely secondary supporting activities that allow the integration of discoveries in the general context of science, and their understanding and validation by other re-

searchers. The real starting point of a scientific discovery, just as with artistic works, is a moment of creative illumination. A famous example is provided by the mathematician Poincaré, who tells us how the idea of the similarity between Fuchsian functions and non-Euclidian geometry transformations, two fields which up to that point had been considered to be independent and unrelated, suddenly dawned on him (Poincaré, 1970).

This feeling of sameness between two different and unrelated concepts that emerges not from comparative logical thinking but from a primary perception resembles to a certain extent the delusional apophonous perception of schizophrenics. According to Schneider (Jaspers, 1963), in this delusional perception a link is established between the perceived object and a new and unusual meaning that is automatically attributed to it, and thus the perception takes on its delusional nature. The major difference between delusional perception and creative intuition is found not so much on their initial formal aspects, but rather on the development of their consequences.

The creative person makes a strenuous effort -of the kind usually considered as appropriate to scientific research- to outline and explain his intuition in such a way that it can be shared and understood. The schizophrenic does not get beyond his own conviction -which he maintains against all evidence- and he is regarded as insane precisely because of his unfruitful attempts to convince others. Perhaps it could be possible to trace a slope or gradient, which starts in the psychotic subject whose visions lack the elements of coherence and correlation necessary to constitute a good interpretation of reality, and culminates in the renowned creative scientist, who manages to elaborate a widely accepted new vision of the world.

The unsuccessful scientist, whose intuitions might open new areas that are not accepted because of his inability to translate them into the logical language of the secondary process, would be located at a halfway point along this continuum. This is so because the core of the scientific method is based on the requirement that every discovery must be translated into secondary processes and backed with objective data. Popper's entire theory concerning knowledge is based on the idea that no matter what our mode) of the universe is, we are mistaken and

thus we need further conceptualizations to adapt ourselves better to ultimate reality. This is why the essence of all scientific activity is the possibility of formulating an idea or hypothesis that can be tested experimentally. The idea or hypothesis must be falsifiable in the sense advocated by Popper. This is precisely the major difference between science and psychosis, where conviction alone suffices. Incidentally, it is also one of the differences between science and belief, given that knowledge acquired via the latter is accepted because of the authority of the one who imparts it rather than as the result of objective testing.

In spite of the difference between creative and psychotic processes, it should be emphasized that both can coexist within the same person, as illustrated in the two clinical cases presented below.

Z, a biologist, called me long distance in order to tell me that he had discovered the ultimate secret of nature. It all started while he was contemplating the tall trees beneath his window. He felt the movement of the leaves in his own body and became acutely aware that he was a living being, like the tree, and not an inert one, like the table. Full of joy, he seriously considered jumping out of the window in an attempt to achieve greater union with nature. Fortunately, he decided to call me instead. He wanted to give me advice about some neuroendocrine research I was undertaking at the time, as he felt that his flash of illumination would be of tremendous assistance to me.

He talked to me at length about plants and mosses, the future of humankind, and his unhappy love affair. His conversation was interspersed with technical comments on neuroendocrinology which, unlike the rest of the content, did not seem so senseless to me. His speech was fast and he appeared to me as being in a rather excitable mood. In an attempt to calm him down, I told him several times in different ways that things that seemed so obvious to him were not easily understandable and that he should further develop and clarify his ideas in order to be understood by ordinary people. Suddenly he asked me, "You don't think I'm crazy, do you?" and I answered honestly, "I think so. But I'm not sure. We have to talk more. Why don't you come over here for a couple of days?" He replied that the call was costing him a fortune, that he could not come since he was very busy with

his discovery, and that he would drop me a line shortly.

I did indeed receive a series of letters that contained the same elements present in his telephone call: references to his affective life, comparisons between the vital processes of a wide range of living things, and theological and cosmogonic lucubrations. The general tone of those letters gradually became less delusional and more understandable, and by the time he actually came to see me, I did find but the slimmest evidence of psychotic thinking. And shortly afterward, some top journal accepted for publication Z's well-constructed scientific papers on the respiration of cancer cells. Even though there were no references to mosses and trees in the papers, I could recognize that at the root of the hypotheses tested experimentally there were some elements of Z's arboreal delusion, albeit translated into terms of secondary processes.

The second case involves another researcher whom I will call Y. I first met Y at a social gathering, during which he confided to me that some of his scientific ideas and discoveries had been "whispered to him by God." Later on, he asked me to treat him for a chronic insomnia syndrome. During the course of the treatment, I managed to learn more about some of the various psychotic episodes from which he was suffering. They all seemed to be related to situations of life stress and to have been preceded by periods of near-total insomnia, during which he was devoted to intense intellectual activity. These short periods of psychotic disintegration were followed either by a return to creative and fruitful scientific activity or by depressive phases consisting of dejection, apathy, and self-recrimination, during which he would use complaints such as "God has abandoned me" or "the voice has gone quiet." During his creative periods he would hear a voice that gave him advice and suggestions concerning real life problems, experimental protocols, and solutions to research problems. Those suggestions often proved extremely valuable.

Y considered theories regarding creative processes to be euphemisms, and that the word intuition is used because "the world is not yet ready to know that God talks directly to the wise." This remark was an interesting reply to my interpretation that his "voices" were the projection of his own ideas onto a superior being,

whom he was building out of his own intuitions in order to feel protected and loved. On another occasion, following an interpretation of mine that he accepted as particularly correct, he exclaimed in enthusiasm: "I'm glad you're one of us at last: it was the Lord who told you that." In spite of his psychotic activity, Y's scientific works are beyond reproach, from an experimental and explanatory point of view, and they have been acknowledged internationally.

It is not easy to classify the psychopathology of these patients applying the usual diagnostic criteria. The coexistence of affective and delusional disorders can lead one to suspect the presence of schizoaffective syndrome, particularly in Y's case. A diagnosis of hypomania with psychotic features could be acceptable in the case of Z, in view of the initial features and subsequent development. In both cases, however, the presence of common features that differ from those usually present in schizophrenic and in affective psychoses enables them to be classified provisionally into a conceptual unit that we will denote creative psychosis. As we shall see later in greater detail, creative psychosis is in my view characterized by a process of dissolution of the ego in which libidinal drives in search of an object prevail, evolving toward a creative structuring of the psychotic experience.

What is striking in both cases is not only the preservation of empathy and affective contact, but the ability of these scientists to ignore their own troubles in order to try to help others. I am not referring to some grandiose elements, such as saving humankind or eradicating all illness, which are common to messianic delusions, but rather to the specific concern for concrete personal matters, as for instance my own biological research or my professional development.

During their psychotic episodes, their interest and advice contained elements dictated not by the needs of their delusions but rather by their interpretation of my scientific needs. Clearly, an intense and therapeutically beneficial transference process was established in each case, which presented some uncommon characteristics. In place of the engulfing transference envy that psychotics usually develop, both were really willing to give something of themselves. This desire was countertransferenceally identifiable and, from my point of view, was crucial to the interpretation of the psychosis-creativity dichotomy.

Whereas, according to Jacobson's (1964) elegant formulation, in schizophrenic psychosis the boundaries of the ego are broken down by hate and envy, the highest point of the creative experience would be characterized by the opening up of the self to the impulses of love. The possibility of translating delusional experiences into logical functional constructs of the real world, which are accessible and beneficial to others, depends to a large extent on libidinal-nourishing drives prevailing over the aggressive-destructive ones. The benevolent nature of the delusional contents confirms this predominance of the life instincts in the two patients presented, as opposed to the persecutory and destructive elements usual in psychotic delusions.

Thus, Z's happiness during his delusional experience with trees is more akin to a mystical experience than to a schizophrenic crisis, and the voice that proffered such valuable advice to Y is a far cry from the threatening persecutory or demeaning voices of the paranoid hallucinatory experience. The protective, benevolent character of the internal object, in contrast to the destructive character of the persecutory object activated in common psychoses, points to an important psychodynamic difference. This balance between the relative predominance of good and bad objects of the internal world is also observed in toxic psychoses caused by psychodisruptive drugs, depending on whether the subject would relate the experience as a "good" or a "bad" trip.

Indeed, in the two cases outlined briefly above, persecutory and depressive aspects were by no means absent, and perhaps the triggering of and subsequent development of a compensating internal object constitutes the core of their creative capacity. In short, in my view the logical destructuring and dissolution of the boundaries of the ego does not appear to distinguish creative psychoses from the rest. The difference stems rather from the instinctual as opposed to the cognitive aspects, with a relative predominance of neutralized libidinal drive.

Moreover, if the creative act is to be actualized, psychic energy must be applied to the elaboration of stable cognitive structures that can be expressed externally in an adequate manner. Creative tension is the part of *libidinal energy attached to the new cognitive construct that tends to the production of equivalents of that cognitive construct in external reality*. Hence, what is created constitutes a new object to which

a previously unsatisfied drive can be directed. The externalization of this inner object requires an enormous effort that can only be undertaken if a functionally healthy area able to operate in reality is preserved within the self. This is true of both Z and Y, and thus they can lead reasonably normal lives and deal with mundane aspects such as the cost of long-distance calls and the preparation of research budgets. It would appear that somewhere between the healthy and the psychotic spheres is a third sector with blurred frontiers. It is here that scientific creative activity is carried-out.

At this point it is necessary to try to explain the function of the creative act with regard to maintaining a balanced psychic economy. To do so we will use some data from our patients' clinical history. Z, an only child, had lost his father at an early age and his mother some years prior to the psychotic experience. During an extended period of grief of probably pathological characteristics, Z met a young woman and soon fell deeply in love with her. The fact that she was also in love with him not only enabled him to overcome his state of depression, but also to launch himself into a bout of intense professional activity that had an almost hypomanic tinge to it. Z left on a research grant to a foreign country and, just when doubts arose as to how long his research fellowship could be continued, he received news that his girlfriend had decided to break off their relationship. During the months that preceded the psychotic episode described earlier, Z alternated periods of depressive inactivity with other periods marked by intense sexual and professional activity.

With hindsight, it would seem obvious that Z was unable from an early age to bear the absence of the object and, following the death of his mother, he made desperate attempts to establish new cathexes with real objects. When everything failed, abandoned by his girlfriend, in a foreign country and when he was experiencing professional difficulties, Z found a brilliant, albeit delusional, solution: the fusion with nature, the source of all life, would assure him the eternal permanence of the object. It was only when Z began to gradually temper his need for fusion, to tolerate his frustration at the absence of the object, and to overcome the tendency to immediate discharge of cathexes that he was able to commence his creative activity in his field of research.

It is important to emphasize once again the conspicuous absence of persecutory inner objects. Absence is often perceived as intentional harm, and hence upon the loss of the real object it is usual to create by way of response internat persecutory objects, and this is the source of the symptoms of anxiety and depression characteristic of pathological conditions. The capacity to experience the absence of the object as an absence, rather than as the presence of a persecutory object, is essential for the creative evolution of psychosis. When Y projects his better aspects onto a personified god in order to establish a bi-personal relationship with this powerful and benevolent object, he is merely doing the same as Z, who dissolves his self by merging with nature, that is, he is creating a good object to replace the one he lost.

The delusions of both patients represent solutions to very regressive states of object loss, and these solutions differ in essence from the usual one that involves converting the absent object into a bad object invested by aggressive drives. For these patients scientific creation, represents another mode of solution in which they use delusional elements but forsake autistic gratification to pursue an object -scientific discovery- that can be shared. It could be argued that delusional omnipotent objects to a certain extent are defensive in nature. However, it is obvious that if aggressive drives were prevalent, creative processes aimed at enhancing the understanding of

life and improving the health of humankind could not be implemented.

In my view, these two cases are but particular instances of a more general principle, namely, that the predominance of love-nourishing drives is essential if the creative phenomenon is to take place. On the other hand, the deprivations, traumatic experiences, and frustrations that often mark the lives of creative individuals may be required in order for the need to be felt to recreate internat objects in the externat world, a need that constitutes one of the basic characteristics of creativity.

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