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PART IV

EDUCATION

1. CREATIVITY AND PROBLEM FINDING/SOLVING IN ART

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Abstract: *Creativity is a complex process that invites to action, both the conscious and the unconscious mind. The work proposed by us puts into question a new aspect of the process of creativity: finding and solving problems, inserting the cognitive and ideational elements into the artistic creative process. Artistic personality represents a complex interaction between diverse psychological factors: intellectual (lateral, creative-thinking and convergent thinking) and nonintellectual factors (temperament, character, motivation, affectivity, abyssal factors, special aptitudes). To these are added also, the biological factors (heredity, age, gender, mental health) and social factors (economical condition, historical epoch, socio-cultural conditions). In the same time, the artist's success also appears to be linked to his ability to find and solve new problems in artistic themes, to his ability to correctly formulate questions, and then to find original, genuine answers. This paper explains the link between the multitude of solved problems and the artistic success.*
Key words: *creativity factors, finding / solving problems, art, evaluation, artistic success*

1. Introduction - Creativity Factors

A. Psychological factors. We can speak of an ascending path of interpreting creativity, starting with the one that reduces creativity to a single factor - *the intelligence*, for psychologist J. P. Guilford (1967), who expands the manifestation of creativity, placing it under the influence of intellectual factors, especially, the *divergent thinking* (DT) but intuiting also the contribution of non-intellectual factors and, finally, the personalist orientation that rebalances the score between intellectual and non-intellectual factors, treating creativity as a synthesis of the whole personality.

a) Intellectual Factors. In this category we combine *divergent thinking* (GD), *convergent thinking* (GC) and *perceptual* (appreciative) *style*. Although it functions as a unitary process, thinking involves two distinct but related subspecies: *the divergent thinking* - which Guilford designates as the *lateral (creative)* one, and *convergent thinking* - known in the same author's sense, as the *vertical (logical) thinking* . Thus, for divergent thinking, the problem is vaguely outlined, transfer refresh is required, and the output is branched. On the contrary, for *convergent (algorithmic) thinking*, the problem is rigorously defined, using the reproductive information update, and the *output* is linear.

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b) Non-intellectual factors. This category aligns a wide range of subcomponents, of which we will mention the most engaged in the dynamics of creativity: *motivation, character, affectivity, temperament* and a *style factor* (intimate resonance).

Motivation feeds and sustains the creative effort, being a basic ally of the individual in the struggle with the various obstacles that arise. As a rule, between the two types of motivation - *extrinsic* / primary and *intrinsic* / secondary - the defining role in creativity fulfills the *intrinsic motivation* that gathers the springs from the inner tank of the individual, from the thirst to explore and discover new shores in knowledge.

Character is lapidaristically defined as a set of different attitudes directed towards oneself, others, to work, norms and values. One of the causes for which many endowed individuals are not creative lies also in their inability to abandon themselves to creation in their entirety, to make their work the center of their preoccupations. According to Romanian researcher Mihaela Roco (1979), tenacity in work is a common feature for any creator, no matter what his field is.

Affectivity. Many of the characteristic dimensions are energized by the influence of affectivity. From the emotional momentum to the passion for work and truth, there is a whole array of affective states. R. Zazzo (1946) notes that *"genius is this QI plus something without which the best-ended subjects would never be more than dry fruits. This element (this "something") ... has an affective nature."*[251]

Temperament. As a primary matrix of personality, temperamental characteristics can not remain unrecognizable over creativity. The question is whether a temperamental type is more apt to become more creative than another. Following analyzes, we will say that there is a *relative independence* of creativity from temperament. Given the tremendous compensatory capacity of the factors involved in creativity, we can say that there is no temperamental type inappropriate for creation. It is possible that, depending on the nature of the domain, one type is more appropriate than another.

Inner resonance (RI). While apprehension is a stylistic indicator of the cognitive segment, intimate resonance is a stylistic factor of the personality, in general, which shows how the individual's life experience reflects on his inner background. It demonstrates whether the individual belongs to the *centripetal type* (directed to its inner world) or *centrifugal* (to the outside world).

c) Special skills. Beyond a general creative potential, there is also a specific creative potential. The latter refers to the set of special skills, that is, a complex of attributes that allows the achievement of performance in specific fields such as science, technique, art, literature, human relations, etc. The role of special skills is to channel, specialize and shade the overall creative potential (Anca Munteanu, 1994). Their list is quite comprehensive: organizational, scientific, technical, mathematical, pedagogical, literary, musical aptitude for the performing arts for theater, choreography, sports, etc. Any special skill is an

[251] Zazzo, R., (1946), *Le devenir de l'intelligence*, P.U.F., Paris, p. 124.

alloy of several variables that can essentially be grouped into four categories: *sensory* (visual acuity, auditory, etc.), *psychomotor* (manual dexterity, visual-tactile coordination, etc.); *intellectual* (intelligence, etc.); *physical* (physical force, kinesthetic memory, etc.).

d) Abisal Factors. The immixture in the creation of some elements of an abyssal nature has long been suspected but this idea gained strength due to *psychoanalysis.* From this perspective, the creation itself unfolds under the direction of the *unconscious*. A problem that remains open is whether the abisal factors in creation are of *unconscious or pre-conscious nature*. Attempts to topography the states of consciousness, for example, eventually imposed the variant that opts for four main consciousness states (visible electroencephalographically through a certain spectrum of brain waves) (Anca Munteanu, 1994): *waking state, dream, deep sleep and ecstasy*. It has thus been rediscovered, a millenary yogi truth. From the point of view of creativity, this fourth state of consciousness, which, under different names, more or less picturesque (*Nirvana, Buddha, transcendental experience, cosmic consciousness, ecstasy*, etc.) is also present in oriental spirituality, daoism, tantrism, transcendental meditation, etc.) as well as in the Western one (from the Bible, to HP Blavatsky's theosophy and R. Steiner's anthroposophy). Under the name of *transpersonal state*, it becomes the cornerstone of psychology with the same name, developed in 1969, and as founders being A. Sutich, A. Maslow, S. Grof, V. Frankl, J. Fadiman (apud Grof , 1976).

B. Biological factors mainly refer to the psychophysiological date of the individual.

a) Heredity traces the maximum limits to which our native potencies can evolve without guaranteeing their attainment. Today we are speaking more and more, about the plasticity and the versatility of predispositions at birth. It seems that talent and genius are always versatile, even if the environmental selection is manifested in one field, through a remarkable special aptitude (Anca Munteanu, 1994).

b) Age - we may ask: is creativity age-dependent? Some authors argue that it even evolves on an inverse trajectory depending on age: the more age it grows, the less creative it is. E. P. Torrance (1962) found a crescendo of up to 9 years; between 9-12 there was a stagnation process; from 12 to 17 years old a remarkable shot, after which, the curve gradually decreases. By studying comparatively, the curve of evolution of creativity and age-based intelligence, authors such as I. Căpâlneanu (1978) and H.C. Lehman (1953), show that the 30-40-year-old scale represents, for both creativity and intelligence, the period of apotheosis in creativity evolution.

c) Sex (gender). The implications of gender peculiarities on creativity have a particular resonance that transcends the boundaries of science through their moral effects. The cultural history of mankind is still predominantly masculine. At the end of a frivolous struggle of feminists in many countries of the world, the woman conquered in the second half of the nineteenth century the right to

vote, which later became legitimate along with the right to education, which for millennia had been considered a strict male masculine.

d) Mental health. The idea of mental integrity in creation is preserved over time and acquires a broad theoreticism through C. Lombroso's work - *L'uomo di genio* (1888). The analogy between genius and insanity gains ground through the conception of S. Freud (1980). For the psychoanalysis mentor, in both cases, due to the imposed barriers to the obscene tendencies of the individual, there is a disposition for *sublimation*, that is, the ability to satisfy them by imaginative compensation. *"The assumption that the artist is a romantic rebel, becomes a superficial stereotype that refers to the primitive artist and expresses, through a minimal knowledge, the consciousness of the traditional group. Motivation, aesthetic sensitivity and concern seem to mark everywhere the artistic personality and individuality is important from this perspective "*[252]*(M. Rusu, 2015).*

Therefore, matters the point of view that researcher poses when starts analyzing the creative personality, as it is possible, at some point, that *normal and pathological* to coexist. But that does not mean that psychopathological strengths are preconditions for creation. In conclusion, solidarizing with the position promoted by Al. Roșca (1981), we can say that the creative process is for the man of genius the way in which he can channel, constructively and densely, the immense inner combustion that he possesses, in order to defeat himself and to give meaning and nobility to his own existence.

C. Social factors. Every creator carries the mark of the age, class, family, work group, and friends to which he belongs. There is a "creative situation", but also a creative climate that encompasses the totality of environmental peculiarities (both material and psychosocial) that can influence creativity.

2. Finding and solving problems in art

Creativity is a complex process involving both the training of the conscience and the unconscious. Recent studies have focused on different elements that complement the image of creativity. It has been found, for example, that a key-element in creative thinking is *the formulation of a new problem*, rather than solving an already existing problem. The mental operations involved in the original thinking are preceded by a period of diffuse dissatisfaction, by the feeling that somewhere in the dilemma that someone is attracted to, there is an unspecified problem that still needs definition and contouring. As Wertheimer points out, *"The function of thinking is not only to solve a current problem, but to discover, to imagine, to penetrate deeper questions. Often, in great discoveries, the most important thing is that a particular question is asked. By intermingling the imagination, putting the right question, it is often a more important fact and an achievement greater than the answer to a particular question"*[253] (Wertheimer, 1945, p. 123).

[252] Rusu, Marinela, (2015), *Personalitatea artistică din perspectiva integrării socio-culturale, Review of Artistic Education*, Artes Publishing House, Iași, nr. 11/2015, p. 263.

[253] Wertheimer M., (1945), *Productive thinking*. New York: Harper & Row, p. 123.

The same idea is mentioned by the researchers Einstein and Infeld (1938, p. 92): *"The formulation of a problem is often more important than solving it ... To find new questions, new possibilities, to look at the old interrogations from a new perspective, presume creative imagination and represents a real progress for science."*[254] This approach can be applied not only in science, but also in the field of art. The above observations suggest that apparently, the process of rationally solving problems in creative thinking is preceded by, or exists in parallel with, another dimension of mental activity, that consists in *discovering the problematic themes*. Probably, this second process has a *metacognitive* nature in the sense that it involves unconscious or subconscious affectivity and motivation, as well as cognitive elements. These general ideas, regarded as working-hypotheses in the broader framework of creativity research, can generate the following assertions:

1. First of all, the process of thinking should vary depending on the relationship between the formulation of the problem and its resolution. A sequence of thinking that contains relatively more problem formulations should be more creative than one that contains them to a lesser extent.
2. Problem situations should also vary depending on how much or how little we are focused on finding new problems. For example, a student confronted with the investigation of factual truth, who will have to define in a more permissive essay a certain problem he identified. Consistently, problematic situations can be represented by a specific pattern, as a continuity, starting from the *"Problem Situation Presentation"* in which the problem, method and solutions themselves are known in advance, to the *"Discovering Problem Situations"*, where neither the problem, the method or solution are not yet known (Getzels, 1964).
3. Assuming that people differ according to their tendencies to engage in problem finding, we come to the conclusion that individuals who typically engage in *problem-finding* will generate more original ideas or products and will be considered more creative. Thus, *problem-finding* can be seen as a feature of the processes of creative thinking, problem-situations and creative people.

Achievements in the field of visual arts provide a good example of the difference between *problem solving* and *problem finding*. Works of art can also be seen as being aligned along a *continuum*, from accurate copies to original, unique pieces. Copies are the result of solving existing problems, while the originals result from the discovery of new problems. To make a copy, the artists take over the purpose or issue as if they were addressed to them; only that, in the given situation, they know exactly what they need to get. The result is predetermined and will not contain anything new. To create an original artwork, artists need to discover what their purpose is, which means they themselves have to define the problem. The work of art obtained may or may not be considered valuable by others, but if the problem is truly discovered, it will undoubtedly constitute an original element. In fact, the purpose of a painting may vary, from being perfectly understood beforehand - as when an artist stands in front of

[254] Einstein A., and L. Infeld, (1938), *The evolution of physics*. New York: Simon and Schuster, p. 92.

Mona Lisa in the Louvre with the intention of copying it - to being confused and indecisive as described, for example, by the sculptor Henry Moore: *"I sometimes start a drawing without having a preconceived problem to solve, but only with the desire to put the pencil on the paper to draw lines, tones and sprouts, without a conscious purpose, but just as the mind exhorts me . Thus, they come to a certain point that some ideas gain contour, become conscious and crystallized, ideas that I then control and order them in a coherent space."*[255] *(Moore, 1955, p. 77)*

This is the difference between Louvre's copy and Moore's creative method, captured in a study by J. W. Getzels and Csikszentmihalyi, where students of the Chicago Art Institute in 1963, 15 years later, were asked these questions: 1. What is the relationship between the amplitude of finding problems involved in making a drawing and the originality of the drawing? 2. What is the relationship between the amplitude of problems finding by students of Arts and their success as professional artists 10 years after the end of the art school? 3. What is the relationship between problems finding and artistic achievement in the middle age? (Getzels and Csikszentmihalyi, 1969).

3. Evaluation and problem formulation

Before the young artist begins to draw, he has to decide which is the problem he will start working on. It is assumed at this stage that differences in the orientation discovery would be easier to detect. The person who will act as if the problem has already been presented, that is, which has started with a certain problem in mind, will select some attractive objects and start drawing without any further additions. If he approached the problem with a discovery attitude, which means that the problem he was going to work on was open, and still in pre-research, he could analyze more objects, explore more past products, and select the least obvious. The specific behavioral variables included in measuring problems at this stage of *problem formulation* were, as follows (Getzels and Csikszentmihalyi, 1969):

1. The number of **objects handled**; there were as many as 27 objects, taken by the artist and analyzed, before starting work; the frequency was from 2 to 19. The assumption was that, in order to discover an original problem, rather than designing an already familiar design, one must consider a greater number of possibilities, be open to a greater deployment of objects.
2. The **uniqueness** of the chosen objects. Although an artist may, of course, create an original work from the most banal objects, the assumption was that, however, the less common the objects were, the more likely the problem was more original.
3. **Exploration behavior** during the selection. A score of 1 was given if the artist took the object from the first table and placed it on a second table. Additional scores were granted if he was observed taking the object in front of

[255] Moore H. (1955), *"Notes on sculpture"*, In B. Ghiselin (Ed.), The creative process. New York: Mentor, p. 73-78.

the eyes, measuring weight, texture, etc.; or, for active experimentation - for example, putting the hat in different positions, changing the position of the mannequin's legs, or putting parts of the gear shifter into action. The assumption was that, in order to create or find a more original problem, the artist should not only be open to a wider variety of objects but also, must have the mood, the curiosity to explore them in a more great depth.

The basic assumption was that certain behaviors such as choosing, manipulating, exploring, or arranging objects in the problem-finding area, indicated more clearly what are the mental processes underlying creation and behavior, as for Vygotsky, Piaget, Binet, the *tasks* described the underlying mental processes in case of problem solving situations (Getzels and Csikszentmihalyi, 1969). If this assumption or statement about the role of *finding problems* in creative thinking is not fully supported, experimental results will be canceled; thus, there can be no talk about the existence of a relationship between the *frequency* of finding the problems and the *quality* of the students' drawings or the amplitude of finding the problems and the success of the students as artists.

4. Evaluation of artistic success - The relationship between finding problems and success

The central problem which informs us about the collection and analysis of data, is the relationship between *finding problems* and the *success* of Art students in making a drawing, influencing the success of their realization as artists after graduation and, more importantly, if only hypothetically, their success as artists at maturity. If the theoretical model is valid, there will be the expectation that young artists who have approached the creation in a much more open-dialectic way, who have discovered *problematic situations* (in contrast to those colleagues who have approached the creation in a way more stereotypical, only imaging in mind - as an already existing problem) – are expected not only to produce more original objects within the experimental test/conditions but to gain a greater success in the artistic career, directly dependent on the quality of their creativity. A perfect correlation between the necessary attitude of finding the problem or the way of work and success in an artistic career is not a necessary correlation.

A person needs much more than original thinking to be recognized as creative in art as in any other field. As presented in the introduction of the paper, there are *personality factors* that influence the life of a creator as much as the fluctuation in supply /demand ratio in the art market, which can discourage even the most talented creators from pursuing a career in art. Marriage and family responsibilities can take precedence over their unique dedication to art. However, despite the great number of circumstances that may interfere with the achievement of artistic talent, it seems useful to ask the following question: Art students who understand that finding problems is needed in their work, are more successful as artists to maturity?

We were reminded of the distinction between the problem solver and the one who discovers problems. The creative way of artist’s of cntinuing his activity, once again proved that information does not enter into his consciousness in clearly labeled categories, eachone having a certain meaning, without ambiguity. Instead, consciousness contains a wealth of uncorrelated impressions, often very little identifiable. The problem solver is hurrying to simplify and organize the content of his consciousness by applying standard labels to the combination of perceptions, sensations, thoughts that exist at one point in his consciousness. The creative artist does not. He can not make himself believe that, by imposing a simple set of abstract categories, he will understand the complex inner reality of his experience. So, he strives to find a more authentic, more organic expression of that reality.

The arguments and the data we have presented here converge to suggest that creative achievement in art depends largely on what we call the *problem identification attitude.* This attitude consists in opening up to a wide range of meta-cognitive events - including visual, auditory and kinesthetic sensations; feelings of embarrassment and inappropriate emotions; ideas formulated more or less clearly - accompanied by a deeply felt need to bring personal order to this conglomerate of problematic experiences. Artwork is the attempt to discover a visual symbolic expression for this ordering process.

Artists present the attitude of finding problems at three different levels: first, in their approach to *a single work.* This can take only a few minutes or develop for a longer period. Secondly, this attitude intervenes in the development of the artist's works or symbolic production, thematically interconnected, over time, as is the case with artists who have created a characteristic style, almost as a signature. And thirdly, addressing this attitude in shaping an artist's choices throughout his life.

Identifying problems before or during a single job makes work "more original" and "aesthetically valuable" in the eyes of experts. The attitude of finding problems as a systematic approach over time, gives the artist the reputation for his creativity. The avantgardists, for whom life itself is a process of finding problems, are more likely to avoid an existence determined by conventional goals, and instead, choose the independent lifestyle that facilitates artistic productivity.

Can we say that these conclusions apply only to artistic activity or do they imply other areas? Reading of the literature in this domanin suggests that this is true. Scientists and mathematicians insist that ways to enhance creativity in their fields can be achieved through increased attention to problem solving. In response to an estimation made several years ago, more than 90% of scientific innovation was made by less than 10% of all scientists, and probably, because, few scientists are creative, some of the most distinguished scientists of the world have come together to agree on the question: how can creativity be improved?

Most people felt that the process of creativity could be improved by apprenticeship in the direction of a successful scientist, but all, without exception agreed that the most important thing to learn is *how to address*

productive questions. Mr. Hans Krebs, a Nobel prize-winning biochemist, spoke about this when he described the relationship he had with his professor Otto Warburg: "He taught me how to address the right questions - always choosing a question that deserves to be put forward and can be addressed with the tools available at that time." Warburg taught Krebs that creative research is "the art of finding problems that can be solved"[256] (Maugh, 1974, p.184).

Indeed, scientists and mathematicians often describe the initial stages of their creative work, in the beginnings of the *problem-finding approach* delineated by Henry Moore in plastic art. Einstein, for example, which I have already quoted, about the importance of problem formulation, wrote in the letter that contributed to the description of scientific creativity (in Hadamard's study, 1949) that he never came to his creativity through form of words or scientific symbols. Instead, it manifested itself in the form of *visions, sounds, or tactile sensations*. These experiences, though convincing, could not be identified by standard cognitive categories.

Words or languages as written or spoken seem to play no part in the mechanisms of thought. The physical entities serving as elements in inner thinking are certain, more or less, clear signs and images that can be reproduced and combined "on a voluntary basis". From a psychological point of view, this combinatorial game seems to be the essential element of productive thinking - before there is a construction in words or other types of signs that can be communicated to others. The above mentioned elements are, however, visual and muscular. Conventional words or other signs must be explored laboriously, only at a secondary stage, when the mentioned associative game is sufficiently stable and can be reproduced at will.

Accordingly, the game with the above mentioned elements is intended to be analogous to certain logical connections that one seeks (quoted in Hadamard, 1949, pp. 142-43)[257]. Kekule, the chemist who discovered the hexagonal structure of benzene is a well-known classic case; he described his own vision as an image in which molecules "played" with each other, changing their "partners," combined into a chain of dances that eventually closed in a circle "like a snake bites its tail" (Findlay, 1948, pp. 36-42). The physicist Faraday, whose activity led to the exploitation of electricity, conceived the nature of the electromagnetic forces, first through a *visual model* that emerged in the form of arcs of radiation radiating in space and penetrating the entire universe (Koestler, 1964, p. 170).

Hadamard (1949) concluded his survey of how eminent mathematicians work, with these words: "Virtually, everyone ... avoids not only the use of mental words but, like me, the mental use of algebraic or any other specific sign; as well as in my case, they use vague images ... Mental images ... are most often visual, but can also be of a different kind, for example, kinetics. They may also be auditory, but even in this case, they generally retain their vagueness".(p. 85)

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[256]Maugh T. H. (1974), *"Creativity: Can it be dissected? Can it be taught?"* Science 184:184.

[257]Hadamard J. (1949), *An essay on the psychology of invention in the mathematical field,* New York: Dover.

Clearly, the conclusion is that in art, creativity - more than physics, chemistry or mathematics - is to have vague visions. In each field, a conscious, intense and sustained effort must be made after the problem has been formulated / elaborated enough to become susceptible to symbolic attempts - a different process in the specific fields of research. In art, it involves graphic talent, colors, cloth, but also a visual vocabulary; in many other sciences, knowledge is required in relevant discipline, logic of experimentation, or mathematical language. But in both cases the solution is preceded by an understanding of unexpressed relationships without which it can not be formulated.

5. Conclusions

Indeed, that part of human activity that is given the greatest respect - pure science, plastic art, systematic philosophy - is dedicated both to discovering, creating and formulating problems, and solving them. This activity is not undertaken to overcome problems as obstacles that pose a threat to personal well-being; problems are often sought even with the threat to personal well-being and sometimes to life itself (Getzels, 1979). This commitment of human beings who are problems-seekers, starting from the child's play to the highest conquests/discoveries in art and science, makes human thinking unique, and the deeper the problems found and presented, and finally solved, the more the human realization and maturation is. As Bunge (1967) shows, all animals have the ability to see problems as obstacles to a goal; machines too, can be programmed to perceive problems as obstacles.

But human beings not only feel the problems as obstacles in their way but use such circumstances to discover and create new problems. Human individuals are not only those who solve problems, but also those who find them, are beings that "put the question"; besides, solving the problems present in our natural and social habitat, man feels the need and the pleasure to pose problems - which ensures the main achievements in art, science, philosophy and technological invention.

If this is partly true, then the concept of intellect arising from cognitive sciences and artificial intelligence is not the most prolific model to describe the productive forms of human thought. Approaching thought as a *purely logical process* that responds to problems as obstacles, separated by the human mind, striving to bring new information to the limit of the unknown, will be incapable of facilitating the discovery of relationships, other than those that logic permits (M. Rusu, 2017). In this sense, *finding the problem* attested by scientists and so clearly highlighted in the work of artists is a border of human thinking, at the limit of which, is trying to assimilate and express a reality that can not yet be understood.

This achievement should make educators somewhat prudent in having total confidence in instructional practices inspired by the *hard-wire* wisdom of computers. We are all, obviously, impressed by the discoveries of the mind, and we are fascinated by the way our logic is reflected in the shining machinery of

human creation. However, it would be reducible to think that logic alone is at the heart of the thinking process.

As shown by a study on truly unique intellectual contributions (Getzels J. W., 1979), the originality of thought is embraced both in emotions, curiosity, imagination, and in confused cognitive structures, expressions of a reality beyond what we can ever conceive; like the artist, the truly creative thinker must be concerned not only with the problem of the solution, but also with the problem of the *problem itself*. If educators lose sight of this circumstance, the originality of future generations is likely to be negatively affected.

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