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EVOLUTIONARY CONCEPTS OF CREATIVITY

The author presented in the article two most important evolutionary models of human creativity: adaptive model and sexual selection model. These models help us to understand the adaptive role of human creativity, both in the sense of surviving (including also surviving of the group) and reproduction. The author proposes that the concept of cultural evolution could play the role of advancement of the traditional evolutionary approach. The basic assumption of the concept of cultural evolution is, that the process by which creative ideas change over time as they pass from person to person, can be described in evolutionary terms. The dual transmission model (coevolution of genes and culture) allows us to connect together the concepts of biological evolution and culture at the same time indicating to their interaction. However, the author finally pointed out, that currently cultural evolution is much more important and faster, than biological evolution, and in cultural evolution human beings play active and creative role.

Key words: Evolution, cultural evolution, creativity, adaptive model of creativity, sexual selection model of creativity, dual transmission model, coevolution of genes and culture.

1. Introduction. An evolutionary orientation

Evolutionary orientation is nowadays very popular not only in natural science but also in humanistic and social sciences, especially sociobiology and evolutionary psychology. Both are the heirs of the achievements of European ethologists (Nikolaas Tinbergen¹, Konrad Lorenz²) and American sociobiology

(Edward Osborne Wilson³).

A sociobiological thought emerged from the reflections of naturalists who were based on the biological theory of evolution and engaged in natural research (eg genetics), turned to primatology, paleoanthropology (anthropogenesis) or physical anthropology, to finally address the behavior of modern man. That is why the backdrop of modern evolutionary psychology is today the work of the aforementioned fields.

1 Tinbergen, N. *The Animal in Its World: Explorations of an Ethologist, 1932–1972*, vol. 1, Field Studies. London: George Allen & Unwin, 1972,

2 Vicedo, M (2009). "The father of ethology and the foster mother of ducks: Konrad Lorenz as an

Expert on Motherhood". *Isis*. 100 (2): 263–291.

3 Wilson, E.O. *The Meaning of Human Existence*, 2014, Liveright,

Among the most representative works in evolutionary psychology include the works of American psychologists: David M. Buss⁴, Geoffrey Miller⁵, Robert Plomin⁶, Steven Pinker⁷, Nancy Etcoff⁸, Harris Judith Rich⁹, Michael Tomasello¹⁰, Helen Fisher¹¹, anthropologist Pascal Boyer¹² and philosopher Daniel Clement Dennett¹³.

In the field of evolutionary psychology, many important specializations have already emerged. Evolutionary social psychology (William Donald Hamilton¹⁴, Robert Trivers¹⁵), seeks to answer the questions of why people live in groups, how friendship and partnership are when conflicts arise, and when solidarity.

Evolutionary developmental psychology (Lesli White¹⁶, Jay Belsky¹⁷)

seeks to explain the evolution of individuals, society, culture, morals, psychological and social pathologies. Evolutionary psychology of personality (David M. Buss, Del Thiessen¹⁸) tries first to explain the individual differences between humans. Evolutionary clinical psychology (Steven Pinker, Joseph Chilton Pearce¹⁹), the causes and mechanisms of mental disorders, starting from the assumptions of evolutionism. Evolutionary cultural theory is very important nowadays, with some assumptions discussed below.

Two models of the evolution of creativity can be presented. One of them assumes that creativity has evolved as an adaptation to cope with environmental threats. The second one says that creativity was created as a result of a special type of selection, ie sexual selection. Most likely, both scenarios have evolved in the evolutionary process, the common denominator of which is the general adaptation - both extending life and extending the species. The first factor seems even more important because adaptations that enhance the adaptation of an individual to the environment are important criteria when selecting a partner.

2. Evolutionary models of creativity. Adaptive model

That is why it is essential to discuss the concepts of creativity as a factor that enhances and improves adaptation. According to this model, creativity emerged in the process of evolution as a consequence of mechanisms that

- 4 Buss, D., & Schmitt, D. (2011). Evolutionary psychology and feminism. *Sex Roles*, 64, 768-787.
- 5 Miller, G. (2000), *The Mating Mind: How Sexual Choice Shaped the Evolution of Human Nature*, London: Heineman,
- 6 Plomin, R. *Behavioral Genetics*, together with John C. DeFries, Valerie S Knopik, Jenae M. Neiderhiser, Worth Publishers; 6th edition
- 7 Pinker, Steven (2011). *The Better Angels of Our Nature*. Allen Lane. p66
- 8 Etcoff, N. *Survival of the Prettiest: The Science of Beauty* Paperback – July 11, 2000
- 9 Harris, J. R. (2006). *No Two Alike: Human Nature and Human Individuality*. W.W. Norton,
- 10 Tomasello, M. (2016). *A Natural History of Human Morality*, Harvard University Press.
- 11 Fisher, Helen (2004). *Why We Love – the Nature and Chemistry of Romantic Love*. Henry Holt and Company.
- 12 Boyer, P. (2010), *The Fracture of an Illusion: Science And The Dissolution Of Religion*. Gottingen: Vandenhoeck & Ruprecht. p. 10.
- 13 Dennett, D.C. (2017) *From Bacteria to Bach and Back: The Evolution of Minds* W. W. Norton & Company
- 14 Segerstrale U. (2013). *Nature's Oracle: The Life and Work of W.D.Hamilton*. OUP Oxford. p. 383.
- 15 Trivers R (2015) *Wild Life: Adventures of an Evolutionary Biologist*. Plympton
- 16 Leslie A. White: *Evolution and Revolution in Anthropology* by William Peace. University of Nebraska Press, 2004
- 17 Belsky, J., & Pluess, M. (2009). *Beyond*

- Diathesis-Stress: Differential Susceptibility to Environmental Influences. *Psychological Bulletin*, 135(6), 885-908.
- 18 Thiessen, D. (Wolf). *Psychopaths Rising: Unholy links between civilization and destruction*, In Press, Amazon.com. Create Space, 2013
- 19 Pearce, J. Ch. (2012) *The Heart-Mind Matrix: How the Heart Can Teach the Mind New Ways to Think* (2012)

generate unpredictable behaviors. Lukasik this concept calls zigzag theory (from the rabbit's movements fleeing the wolf)²⁰. According to this theory, living organisms that behave unpredictably have a better chance of survival because they are surprisingly predators, accustomed to the constant behavior of their antagonists. Unpredictability of potential victim behavior is a serious impediment for the predator until he or she creates coercive behavior that responds to the unpredictability of the victim's behavior.

If we compare the behavior of humans with animals, then it turns out that we are the most unpredictable beings. But people very much differ in their unpredictability. Groups with very high unpredictability are, for example, people suffering from ADHD. Williams and Taylor have stated that many factors suggest that ADHD can bring paradoxically many benefits²¹. Children with ADHD require much more care from their mothers, families and care and education institutions, which may give them an adaptive advantage. This disorder is generally associated with increased creativity (but not a regular dependency). The unpredictability of behavior is also associated with risk-taking tendencies and the search for novelty. These qualities already clearly correlate with creativity. Pinker argues that art, music, humor, fiction, religion, and philosophy are not real adaptations, but evolutionary spandrels: side-effects of abilities that evolved for other purposes²². He likens these forms of creativity to cheesecake and pornography – cultural inventions

that stimulate our senses in novel ways, but do not improve our biological fitness. Others similarly suggest that the cognitive abilities for planning and remembering important ecological facts extended into our uniquely human capacities for art, poetry, music, story-telling, and humor²³. The 'spandrels' explanation assumes that what drives creativity is biological selection forces operating at the individual level, and there is some empirical support for this. Some forms of human creativity, such as art and music, indeed demonstrate the features of a naturally selected adaptation²⁴. For one, many forms of creativity are ubiquitous. Although styles differ, every culture creates works of art and music. Second, many forms of creativity are pleasurable for both the artist and the audience, and evolutionarily adaptive behaviors are usually pleasurable. Third, many forms of creativity in humans require effort to produce. Costly behaviors usually do not evolve by accident.

Very important is also the question of the group bonding. Even if creativity is at least in part driven by individual level biological selection forces, other forces may also be at work. Natural selection is believed to operate at multiple levels, including gene-level selection, individual-level survival selection, individual-level sexual selection, kin selection, and group selection. Although there is evidence from archaeology, anthropology, and ethnography that individual-level survival selection plays a key role in human creativity, other levels may have an impact as well. For example, some anthropologists view

20 Łukasik, A. (2007). *Ewolucyjna psychologia umysłu*. Rzeszów: Wydawnictwo Uniwersytetu Rzeszowskiego

21 Williams, J.O.H., Taylor, E. (2005). The evolution of hyperactivity, impulsivity, and behavioural diversity. *Journal of the Royal Society Interface*.

22 Pinker, S. (1997). *How the mind works*. New York, NY: Norton.

23 Kauffman, J.C., Lee, J., Baer, J., & Lee, S. (2007). Captions, consistency, creativity and the consensual assessment technique: New evidence of reliability. *Thinking Skills and Creativity*, 2(2), 96-106.

24 Dissanayake, E. (1992). *Homo aestheticus: Where art comes from and why*. Washington: University of Washington Press.

the function of forms of creativity such as art and music as strengthening a group's social cohesion. For music in particular, Mithen presents evidence that the melodious vocalizations by our earliest ancestors played an important role in creating and manipulating social relationships through their impact on emotional states²⁵.

Creative behaviors are related to the search for novelty, curiosity and exploratory behavior. Curiosity gives you many benefits in terms of adaptation, such as collecting information about food, shelter, escape routes. It can stimulate social groups to migrate and allow them to find new ecological niches. Thanks to it, the homo sapiens species has spread throughout the world.

Williams and Taylor carried out a computer simulation using an evolutionary game involving groups of similar size to the former gathering and hunting groups (10 to 40 people) and differing in the number of unpredictable individuals²⁶. At the same time, the conditions in which food availability is being altered. The conclusions of this study were that the group was condemned to extinction, consisting of only individuals presenting predictable behaviors as well as groups consisting exclusively of individuals with unpredictable behaviors. The best thing about the mixed compositions. Emerging in the group of unpredictable individuals increases its vitality, as new sources and places of food are explored. According to the authors, women maximize their adjustment by choosing men who are characterized by high predictability of behaviors that benefit

them and their children, and at the same time unpredictable to the benefit of the group. Undoubtedly, creativity was (and continues to be) a survival factor for homo sapiens. In the African savanna, where this species was formed about 200 thousand. Years ago, he had enormous numbers of enemies and competitors, with far greater physical strength. Innovations like tools and weapons have made it possible to compensate for all the weaknesses of the body and make it the strongest of all species. But competition with other animals has replaced much stronger and more intangible intra-species competition. Individual tribes have outpaced innovation in weapons and tools to survive in battle. On the other hand, interaction within the groups, especially the emergence of language, has played an important role in brain and human intellect. With the development of the brain, the capacity for creativity and innovation increased, with intergroup competition continuing to grow.

3. Sexual selection models of creativity.

Miller argues that group bonding accounts of creativity ignore the possible role of sexual selection in shaping creative behavior, and cannot account for the sexual attractiveness of various forms of creativity²⁷. According to the sexual selection account, there is competition to mate with individuals who exhibit creative traits that are metabolically expensive, hard to maintain, not easily counterfeited, and highly sensitive to genetic mutation because they are the most reliable indicators of genetic

25 Mithen, S. (2006). *The singing Neanderthals: The origins of music, language, mind, and body*. London: Weidenfeld and Nicolson

26 Williams, J.O.H., Taylor, E. (2005). The evolution of hyperactivity, impulsivity, and behavioural diversity. *Journal of the Royal Society Interface*.

27 Miller, G.F. (2000). Mental traits as fitness indicators: Expanding evolutionary psychology's adaptationism. In D. LeCroy & P. Moller (Eds.), *Evolutionary perspectives on human reproductive behavior* (pp. 62-74). New York: New York Academy of Sciences.

fitness²⁸. Miller argues that sexual selection has played a much greater role than natural selection in shaping the most distinctively human aspects of our minds, including storytelling, art, music, sports, dance, humor, kindness, and leadership²⁹. He contends that these creative behaviors are the result of complex psychological adaptations whose primary functions were to attract mates, yielding reproductive rather than survival benefits. Miller notes that cultural displays of human creativity satisfy these requirements. According to this account, cultural displays are the result of efforts to broadcast courtship displays to recipients: "art evolved, at least originally, to attract sexual partners by playing upon their senses and displaying one's fitness"³⁰. Thus Miller's theory emphasizes the role of sexual selection in the emergence of human creativity and innovation. Creativity could be seen as a male ornament (the equivalent of deer antlers) attracting women because of his level of alignment. Miller claims that culture is generally a byproduct of sexual selection. Two phenomena should therefore occur - on the one hand there should be sexual dimorphism, manifesting itself in cultural participation and, on the other, cultural enrichment should be greatest in early adulthood when the level of competition between men and women is greatest.

These assumptions were then

tested by Kanazawa³¹. He analyzed the biography of 280 scientists and found that 97.5% of them were men, and only 2.5% of women. This analysis confirmed sexual dimorphism. Kanazawa further endeavored to confirm these assumptions with the observation that those scientists who had been married had a drop in productivity from the age of 35, while researchers in the free state demonstrated this decrease much later. Kanazawa also stated that in men, the relationship between age and creativity is analogous to the relationship between age and crime³². This may indicate that the underlying biological makeup is at the root of both relationships, so both creative and criminal behaviors were once adaptations that allowed men to win the competition for women.

There is also one distinct biological factor that combines the tendency to crime, high sexual drive and creative behavior. This factor also drew Kanazawa attention³³. It is testosterone levels in men. Its relationship to sexuality is obvious, correlations with tendency to aggression are fairly well proven, though ambiguous and more complex. Testosterone levels and levels of creativity have so far been poorly understood, but some studies indicate that such compounds exist. Both Kruger³⁴ and Reuter's³⁵ research indicate a

28 Gabora, L. & Kaufman, S. (2010). Evolutionary perspectives on creativity. In (J. Kaufman & R. Sternberg, Eds.) *The Cambridge Handbook of Creativity* (pp. 279-300). Cambridge UK: Cambridge University Press

29 Miller, G.F., (2001). Aesthetic fitness: How sexual selection shaped artistic virtuosity as a fitness indicator and aesthetic preferences as mate choice criteria. *Bulletin of Psychology and the Arts*, 2, 20-25.

30 Miller, G.F. (2000c). Sexual selection for indicators of intelligence. *Novartis Foundation Symposium*, 233, 260-270; discussion 270-280.

31 Kanazawa, S. (2000), *Scientific discoveries as cultural displays. A further test of Miller's courtship model*, *Evolution and Human Behavior*, 21, s. 317-321.

32 Kanazawa, S. (2003), *Why productivity fades with age: The crime-genius connection*, *Journal of Research on Personality*, 37, s. 257-272.

33 Kanazawa, S. (2000), *Scientific discoveries as cultural displays. A further test of Miller's courtship model*, *Evolution and Human Behavior*, 21, s. 317-321.

34 Krug, R., Mole, M., Dodt, C., Fehm, H.L., Born, J. (2003). Acute influences of estrogene and testosterone on divergent and convergent thinking in postmenopausal women. *Neuropsychopharmacology*, 28, 1538-1545.

35 Reuter, M., Panksepp, J., Schnabel, N., Kellerhoff, N., Kempel, P., Hennig, J. (2005). *Personality*

positive correlation between testosterone and creativity. Similarly, the search for impressions is positively correlated with testosterone levels³⁶. There is also a relationship between over-optimism and the tendency to overestimate own strengths and testosterone levels, as demonstrated by Johnson's research on the phenomenon of positive illusion. At the same time, Johnson pointed out that excessive optimism favors creativity³⁷. Nevertheless, the views of Miller and Kazan should be addressed critically. There are no intellectual differences between women and men that would justify less female creativity and the creative motivation of modern women is getting higher. Kazanawa analyzed the biography of 280 scientists who lived primarily in the eighteenth and later centuries, but then women were not admitted to a scientific career. Kazanawa's observation that in marital men is less scientific activity compared to bachelors³⁸, it can be explained by the fact that they take on a tremendous amount of home-keeping and child-rearing responsibilities.

Feist notes that Miller focuses on sexual selection so much that he excludes the evolution of scientific creativity and technology, which Feist argues is much more likely to have been shaped by natural

selection pressures³⁹. Indeed, Feist argues that natural selection has driven mainly the more applied or technological aspects of creativity that have clear survival benefits, such as advances in science and engineering, whereas sexual selection has driven more ornamental or aesthetic aspects of creativity, including art, music, dance, and humor; forms of creativity that have come along more recently on the evolutionary scene⁴⁰. Miller's focus is mostly on novel creative displays that attract the attention of potential mates. Lastly, to make the argument convincing it would be necessary to show that creative people are indeed considered more attractive, and have greater reproductive success.

While there is some evidence that intelligent and creative individuals are indeed considered more attractive and have a higher number of sexual partners⁴¹, Feist notes that there is also evidence that creative people tend to be less likely to marry and when they do, have fewer children⁴², a factor that surely also impacts on reproductive success. Moreover time spent on creative projects may be time taken away from mating and child-rearing. Additionally, Mithen (2006) presents evidence that the musicality of our ancestors and relatives did in fact have considerable survival

and biological markers of creativity. *European Journal of Personality*, 19, 83-95

36 La Grange, L., Don Jones, T., Erb, L., Reyes, E. (1995). Alcohol consumption: Biochemical and personality correlates in a college student population, *Addictive Behaviors*, 20, 93-103.

37 Johnson, D.D.P., McDermott, R., Barrett, E.S., Cowden, J., Wrangham, R.McIntyre, M.H., Rosen, S.P. (2006). Overconfidence in wargames: Experimental evidence on expectations, aggression, gender, and testosterone, *Proceedings of the Royal Society, Series B.*, 273, 2513-2520.

38 Kanazawa, S. (2003). Why productivity fades with age: The crime-genius connection, *Journal of Research on Personality*, 37, s. 257-272.

39 Feist, G. (2001). Natural and sexual selection in the evolutionary of creativity. *Bulletin of Psychology and the Arts*, 2, 11-16.

40 Gabora, L. & Kaufman, S. (2010). Evolutionary perspectives on creativity. In (J. Kaufman & R. Sternberg, Eds.) *The Cambridge Handbook of Creativity* (pp. 279-300). Cambridge UK: Cambridge University Press

41 Griskevicius, V., Cialdini, R.B., & Kenrick, D.T. (2006). Peacocks, Picasso, and parental investment: The effects of romantic motives on creativity. *Journal of Personality and Social Psychology*, 91, 63-76

42 Harrison, A., Moore, M., & Rucker, M. (1985). Further evidence on career and family compatibility among eminent women and men. *Archivo di Psicologia, Neurologia Psichiatria*, 46, 140-155

value as a means of communicating emotions, intentions, information, and facilitating cooperation, and thus sexual selection may well not be the sole or primary selective pressure for musicality⁴³.

Additionally, he notes that while it may appear at first blush that creative men have more short-term sexual partners because of their creativity, their attractiveness may be more the combination of good looks, style, and an anti-establishment persona. Mithen also points out that the finding that males produced at least ten times more music than females and were most productive around the age of 30 (in which men are in their peak mating effort and activity), could more parsimoniously be explained by the particular structure and attitudes of twentieth-century Western society.

Perhaps the most reasonable conclusion is that sexual selection helped ramp up the evolution of creativity, exaggerating certain forms, or making them not only functional but also ornamental. In this way they went beyond the realm of practicality to the realm of aesthetic functionality⁴⁴.

4. Cultural evolution

The basic assumption of the concept of cultural evolution is, that the process by which creative ideas change over time as they pass from person to person, can be described in evolutionary terms⁴⁵. This concept is very important in explaining the phenomena of human creativity, creativity and innovation. The issue of

cultural evolution was already familiar to such philosophers as Hegel and Spencer, and in the anthropology they have set the path of such great scholars as Lewis Henry Morgan, Edward Burnett Tylor, John McLennan, Henry Main, James Frazer, John Lubbock, Adolf Bastian and Johann Bachofen. Morgan has divided the evolution of culture into three epochs: "wilderness", "barbarity" and "civilization."⁴⁶ The distinctive factor, and the factor of progress, was the technology used. Bastian put forward a thesis on the psychic unity of the human race, which causes similar cultural phenomena in all cultures at different times, and possible local differences are due to environmental factors⁴⁷. For nineteenth-century cultural evolutionists, the concept of progress in culture has been crucial for development from simple to more complex. All cultures go through identical stages of development (in this sense, cultural evolution is universal), and different societies vary in their development pace for different reasons, so that some are more advanced, others less common (though all go in the same direction). The differences between the communities resulted only from the fact that they had reached different stages of development at different rates and at different times. These theses have caused criticism of the paradigm of cultural evolution in the twentieth century. Franz Boas⁴⁸, then

43 Mithen, S. (2006). *The singing Neanderthals: The origins of music, language, mind, and body*. London: Weidenfeld and Nicolson

44 Gabora, L. & Kaufman, S. (2010). Evolutionary perspectives on creativity. In (J. Kaufman & R. Sternberg, Eds.) *The Cambridge Handbook of Creativity* (pp. 279-300). Cambridge UK: Cambridge University Press

45 Aunger, R. (2000). *Darwinizing culture*. Oxford: Oxford University Press

46 Morgan, L.H. (1887), *Spółczesność pierwotne czyli badanie społeczeństwa ludzkiego od dzikości, poprzez barbarzyństwo do cywilizacji*, Warszawa: Druk K. Kowalewskiego.

47 Bastian, A. (1860), „Der Mensch in der Geschichte

48 Moore, Jerry D. (2009). "Franz Boas: Culture in Context". *Visions of Culture: an Introduction to Anthropological Theories and Theorists*. Walnut Creek, California: Altamira. pp. 33–46.

Margaret Mead⁴⁹, A.R. Radcliffe-Brown⁵⁰ and finally Claude Lévi-Strauss⁵¹ accused the evolutionists of cultural imperialism (the notion that certain human groups are less developed and that they all go to the highest form of Western civilization). Instead, they proposed a concept of cultural relativism, in which all cultures are equal.

The criticism of concept of cultural evolution was political in nature, which was related to the decolonization movement in the mid-twentieth century.

Since the 1970s, cultural evolution has regained its position, avoiding all ideology, and striving to maintain maximum scientific objectivity. White and Steward considered technology a fundamental determinant of cultural development. Leslie A. White in his work "The Evolution of Culture" proposed the criterion of evolution, which is the amount of energy effectively used per capita⁵². Marvin Harris in his concept of materialist culture argued that social organization, beliefs and values are determined by material living conditions⁵³. A strong stimulus for the paradigm of cultural evolution was the emergence of Wilson's sociobiology⁵⁴. Wilson concluded that human behavior

is not merely a result of learning and forming habits in the process of enculturation but, to a great extent, by the patterns of genetic coding behavior in the DNA structure. Therefore, sources of human behavior should be sought first of all in the genotype of the individual⁵⁵.

According to R. Dawkins, cultural transmission, even though it is generally conservative, may be subject to a certain evolution, and it is similar to genetic transmission⁵⁶. Culture can thus evolve just as biology has clear reproduction and selection mechanisms. The essence of evolution is always reproduction and variability within this reproduction. Dawkins introduced the concept of meme as an element of cultural development analogous to the gene⁵⁷. Examples of memes are melodies, ideas, circular phrases, clothes patterns, tools for building tools. Just as the genes are spreading in the gene pool, so are the memes spread in the pool of memes, passing from one brain to another in the imitation process⁵⁸. Man strives to leave a trace of himself: genetic and cultural. Dawkins rightly pointed out that cultural inheritance is much more effective. There is probably no gene left after Socrates, but the mimes of his work are still unchanged and eternal⁵⁹. The creator is the person who leaves behind most memes, so he is the most successful evolutionary, even if he did not have his own children.

5. The dual transmission model (coevolution of genes and culture)

Biological and cultural evolution are mutually interacting with each other and

49 Shankman, Paul 2009 *The Trashing of Margaret Mead: Anatomy of an Anthropological Controversy*. Madison: The University of Wisconsin Press

50 A. R. Radcliffe-Brown. 1951. *The Comparative Method in Social Anthropology*. *Journal of the Royal Anthropological Institute of Great Britain and Ireland* 81(1/2): 15-22.

51 Moore, Jerry D. (2009). "Claude Levi-Strauss: Structuralism". *Visions of Culture: An Introduction to Anthropological Theories and Theorists*. Walnut Creek, California: Altamira. pp. 231-247.

52 White, L.A. (1959), *The Evolution of Culture*,

53 Harris, M. (1977), *Cannibals and Kings: The Origins of Culture*, New York: Random House

54 Yudell, Michael; Desalle, Rob (2000). "Sociobiology. The New Synthesis. by Edward O. Wilson". *Journal of the History of Biology*. 33 (3): 577-584.

55 Urbanek, A. (1984), *Między egoizmem, altruizmem i agresją* W: S. Nowak (red.) *Wizje człowieka i społeczeństwa w teoriach i badaniach naukowych*, Warszawa: PWN s. 157

56 Dawkins, R. (1996), *Samolubny gen*, Warszawa: Prószyński i S-ka, s. 262.

57 Ibidem, p. 266

58 Ibidem, p. 267

59 Ibidem, p. 276

influencing each other. This approach is sometimes referred to as 'dual inheritance theory', the idea being that we inherit cultural as well as biological information, and the units of cultural information are sometimes referred to as 'memes'. The rationale is clear; since natural selection is useful for explaining the astonishing creativity of nature, perhaps it is also useful for explaining the astonishing creativity of human culture. The approach that describes the common activities of these two evolutions is called dual transmission theory or the theory of co-evolution of genes and culture. It was proposed by Cavalli-Sforza and Feldman⁶⁰, developed by Stone and Lurquin⁶¹. They claimed, that the basic element of culture, subjected to change, is not the "mem", but rather the "idea". The idea is to design a specific object or a specific faith, while the object itself or the cult is the expression of the idea. Expression of ideas is like phenotype on the basis of genotype.

That "ideas" do not have as discrete and elementary character as genes, are more comprehensive and more fluid. Innovation is, in the concept of double transmission, nothing else but a mutation in cultural evolution, the equivalent of a mutation in biological evolution. However, it is not accidental, it is made by men. Innovation is a major change in an existing idea or a completely new idea. Cultural selection determines the acceptance or rejection of innovation. Usually (though not always) innovation is accepted when it exhibits a sufficiently high level of "cultural fitness". Then the culture changes. If innovations are

evaluated rationally and carefully, before they are adopted, cultural evolution is progressing. On the other hand, in the areas of customs, beliefs, interpersonal relationships, the process is more spontaneous, often without accurate and objective assessments, so cultural change may be sometimes unfavorable.

For example, Stone and Lurquin give a cultural mutation to the Fore, consisting in eating ancestral brains, which almost completely led to extinction of the entire ethnic group due to prion infection⁶².

In his coexistence theory, Durham notes that where choice is relatively free, cultural selection usually favors such innovations that increase biological adjustment⁶³. On the other hand, where choice is subject to constraints or force is imposed, innovations that aggravate biological adjustment may occur and spread. It is worth noting, that this is a serious argument for the biological and evolutionary superiority of democratic systems over undemocratic.

The most important thing is that cultural evolution takes place much faster than biological evolution. The enormous progress in the development of the homo sapiens species over the last hundred and thousand years, which gave it a total advantage over all other species (often much stronger), is largely the result of cultural evolution (biological evolution at that time was negligible). Culture evolution is much more flexible, tailored to the situation. In cultural evolution, accidental phenomena are much less frequent, (though sometimes they also occur), conscious human activity is the most important.

Unlike biological evolution, which has

60 Cavalli-Sforza, L.L., Feldman, M.W. (1981), *Cultural Transmission and Evolution: A Quantitative Approach*, Princeton University Press, Princeton.

61 Stone, L., Lurquin, P.F. (2009), *Geny, kultura i ewolucja*. Synteza, Warszawa: Wydawnictwa Uniwersytetu Warszawskiego, s. 167-183

62 Stone, L., Lurquin, P. F., & Cavalli-Sforza, L. L. (2007). *Genes, culture, and human evolution: A synthesis*. Malden, MA: Blackwell.

63 Durham, W. H. (1991), *Co-Evolution: Genes, Culture and Human Diversity*, Stanford: Stanford University Press, s. 181

the character of “Darwinian” (acquired traits do not inherit), cultural evolution is “Lamarckist” (acquired traits are inherited). This gives cultural evolution a tremendous power - it can develop, according to Newton’s sentence, “on the shoulders of giants.” Features, experiences, acquisitions that do not die with the death of the individual, but is passed on. Innovation can create the next innovation, it can be refined, developed, adapted, inspire others.

The duality model indicates that both these evolution, biological and cultural mutually influence each other. The impact of biological evolution on culture is evident - the latter can only arise through the mutation of biological evolution, through which the human brain has become so complex that it can create, develop and inherit culture at all. But cultural evolution, in turn, also has a secondary effect on biological evolution. An example of this is the genetic change, which is the increase in lactose tolerance that occurred in humans along with domestication of cattle⁶⁴. Cultural evolution has led to the development of medicine, which has significantly weakened the natural selection mechanism - people with defective genes can now reach reproductive age and pass on to them. This should not be condemned, but appreciated, because in man culture (including cultural evolution) is more important than biology (including biological evolution).

6. Selection of natural neural connections as the third type of human evolution

The natural selection of neural connections between brain cells is also

some sort of evolution. G.M. Edelman proposed the theory of selection of neuronal groups and demonstrated that this process fulfills all the features of evolution, but that it takes place on a limited ground and in a short space of time⁶⁵. This process is based on the selection of the neuronal population engaged in topological rivalry. They can survive only the most effective and effective neural connections. Connections are not good, ineffective are dying. The population of diverse neuronal groups that make up the neural networks as a result of somatic selection is called the primary repertoire. On the other hand, in the body responding to external stimuli and internal cognitive processes, synaptic connections are selectively reinforced or weakened to form a secondary repertoire.⁶⁶ The basis of human behavior is the selective coordination of complex patterns of interconnection between neuron groups by feedback signals. This process takes place in three phases: developmental selection, experiential selection and reentry.

Developmental selection is the formation of the anatomy of the brain, controlled by genetic factors. In any individual the connectivity between neurons at the synaptic level and their organization into functional neuronal groups is determined by somatic selection during growth and development. This process generates tremendous variability in the neural circuitry – like the fingerprint or the iris, no two people will have precisely the same synaptic structures in any comparable area of brain tissue. Their high degree of functional plasticity and the extraordinary density of their interconnections enables neuronal groups

64 Burger, J., Kirchner, M., Bramanti, B., Haak, W., and Thomas, M. G. (2007). Absence of the lactase-persistence-associated allele in early Neolithic Europeans. *Proceedings of the National Academy of Sciences USA* 104(10):3736-3741.

65 Edelman, G.M. (1998), *Przenikliwe powietrze, jasny ogień. O materii umysłu*, Warszawa: PWN, s. 118

66 Gerald M. Edelman, Jean-Pierre Changeux (2001). *The Brain*. Transaction Publishers.

to self-organize into many complex and adaptable “modules.” These are made up of many different types of neurons which are typically more closely and densely connected to each other than they are to neurons in other groups.

Experiential selection is a continuous process of synaptic selection, which occurs within the diverse repertoires of neuronal groups. This process may strengthen or weaken the connections between groups of neurons and it is constrained by value signals that arise from the activity of the ascending systems of the brain, which are continually modified by successful output. Edelman argues that this dynamic selective process is directly analogous to the processes of selection that act on populations of individuals in species, and he also points out that this functional plasticity is imperative, since not even the vast coding capability of entire human genome is sufficient to explicitly specify the astronomically complex synaptic structures of the developing brain⁶⁷.

Reentry, the third tenet of Edelman’s thesis is the concept of reentrant signaling between neuronal groups. He defines reentry as the ongoing recursive dynamic interchange of signals that occurs in parallel between brain maps, and which continuously interrelates these maps to each other in time and space⁶⁸. Reentry depends for its operations on the intricate networks of massively parallel reciprocal connections within and between neuronal groups, which arise through the processes of developmental and experiential selection outlined above. Edelman describes reentry as “a form of ongoing higher-order selection that appears to be unique to animal brains” and that “there

is no other object in the known universe so completely distinguished by reentrant circuitry as the human brain.”

Thus, the unit of the selection in the brain is the neural group. The basis of “neural evolution” is the idea of neuronal groups competing for interactions with neighboring neurons by strengthening their synaptic connections. Even a small cycle of events involving the selection of neuronal groups leads to different phenotypic behaviors in different subgroups of the same species. This diversity of behavior is the basis of natural selection in a large “cycle” of evolution.

In this way, both Darwinian and Edelman selection systems work together. It should be added that at the same time they cooperate with cultural evolution, after all, every innovation that causes cultural mutation and the development of culture arises in some human brain. There is, therefore, an isomorphism between the idea emerging in the brain and the new network connections it creates. Each idea corresponds to a specific neural configuration that has led to a certain process of neuronal evolution.

This process always arises on the basis of biological evolution and cultural evolution. The result of this process is influencing cultural evolution, and this is turning to biological evolution, and together they launch neural evolution again. In this way, the “development spiral” arises, all three of which interrelate, and above all, determine human development. Therefore the theory of triple message (“Darwinian”, “Edelman” and culture) should be created. This gives the opportunity for interesting theoretical reflections and topics of empirical research.

67 Gerald Edelman, *Bright Air, Brilliant Fire* (Penguin, 1992), p.224

68 Gerald Edelman: "From Brain Dynamics to Consciousness: A Prelude to the Future of Brain-Based Devices", IBM Lecture on Cognitive Computing, June 2006

7. Author's criticism of the evolutionary approach

The fact that evolution has shaped human behavior in a certain way and has made people behave in a certain way over the ages, does not mean that they will behave in a similar way in the future. Evolution has provided our species with a high level of aggression and a strong territorial instinct, which led to a large majority of human history leading to bloody wars - but that does not mean that we are condemned to wars forever.

First of all, in our times there are completely new adaptations. We already have other evolutionary forces, and cultural dynamics are evolving in their role, evidently differing in their mechanisms from biological evolution. Secondly, the development of subjectivity and human intelligence causes it to be able to withstand biological pressure.

Evolutionary psychology can reasonably explain why, for the greater part of humanity, men were actually more creative than women, at least in the sense of public, scientific or artistic creativity (although from a neurobiological point of view their brains are the same). The creative man was usually in need of a group, so his position was often too high and therefore attractive to women. The other way, for a long time, this mechanism was unlikely to work. In traditionally patriarchal societies, women are reluctant awarded a higher social position, when showed their creativity.

At the moment, we are living in a time when women have not only become independent from men (their lives no longer depend on their adaptability), but they can raise themselves their creativity. Moreover, nowadays their creativity clearly raises their attractiveness. A wealthy woman for many men is very attractive (as it always has been, except that wealth formerly was usually

inherited, and now they can achieve it by their own creativity). Secondly, the creative woman could clearly shows how wonderful the genes are, through their creative work, which also rises their reproductive attractiveness. Finally, a woman can liberate aesthetic delight and personal pleasure through her creativity. No wonder more and more women are showing more and more creative motivation.

In short, it can be argued that creativity can still be a factor in favoring genetics, with the fact that this factor is no longer dependent on sex nowadays, it is equally attractive for women and men.

The disadvantage of a traditional evolutionary approach is its unilateral understanding - that is, the conviction that man is merely an object of controlling evolutionary processes, in which the genes play an intermediary role. On the other hand, the person himself becomes an object of development, not only individual, but also the development of his whole species. The role of mediator plays here his creativity.

Man starts to control his evolution. For the time being it does mainly by influencing cultural evolution, but over time it will increasingly intervene in its biological sphere. Thanks to cultural evolution, medicine will probably be able to cope with this problem by treating distorted genes. Cultural evolution has also led to a sharp decrease in infant mortality and a significant increase in the length of human life. Man naturally aspires to leave something behind, and more and more energy drives the creation and leaving of new memos, new ideas, works and innovations.

We are dealing with the increasingly strong shift from biological evolution to cultural evolution. One may even say that the biological evolution of man stopped because the natural selection mechanism

ceased to function. Development of medicine has significantly weakened the natural selection mechanism - people with defective genes can now reach reproductive age and pass on to them. But from a moral point of view this is justified - we save a sick child even if his illness is due to the wrong genes. This does not necessarily lead to the degeneration of the human species, since cultural attainment of people is far more important than the presence of diseases.

The author of this monograph claims that natural biological selection was replaced by the selection of things and ideas created by people. For example, the evolution of cars is naturally Darwinian - the natural selection mechanism works here - only the best cars remain, unsuccessful models are mercilessly displaced.

The same applies to all other human products. The sick man is being treated, but the failed product is withdrawn. Natural selection is therefore permeated from human bodies to human products, which is at the same time much more moral and effective. This is a final victory of cultural evolution.

8. Conclusion

Evolutionary approach allows us to explain some aspects of creativity. First and foremost, it allows us to understand how creativity can occur at all. It is linked to hard work, high energy, and high risk, so there must be serious reasons to appear. The author presented in the article two most important evolutionary models of human creativity: adaptive model

and sexual selection model. These models help us to understand the adaptive role of human creativity, both in the sense of surviving (including also surviving of the group) and reproduction. However, creativity is much more than only adaptation. To deepen our understanding of its mechanisms and its inner attractiveness, we must go beyond traditional evolutionary psychology (eg in the direction of cognitive or humanistic thinking), or significantly upgrade the evolutionary approach, understanding that man is no longer the subject of evolution, but also her active and conscious player and even designer. The author proposes, that concept of cultural evolution could play the role of upgrading the traditional evolutionary approach. The basic assumption of the concept of cultural evolution is, that the process by which creative ideas change over time as they pass from person to person, can be described in evolutionary terms. The author's interpretation of this idea is that natural selection is therefore permeated from human bodies to human products, which is at the same time much more moral and effective.

The dual transmission model (co-evolution of genes and culture) allows us to connect together the concepts of biological evolution and cultural at the same time pointing to their interaction. However, the author finally pointed out, that currently cultural evolution is much more important and faster, than biological evolution, and in cultural evolution human beings play active and creative role.

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