

## CONCEPTION AND CREATIVITY – A COGNITIVE NEUROPSYCHOLOGY APPROACH

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### ABSTRACT

Exploring the superior cognitive processes through cognitive neuropsychology methods, seconded by the technique offered by the functional neuroimaging, provides interesting hypotheses on the relationship between perception, abstraction and conception. The ability to form metaphors or, in other words, to synthesize information and to create a pattern is the result of a connectivity established between different cerebral areas and represents the basis of the creative process.

### INTRODUCTION

We can define conception as a result-oriented process that does not yet exist. It is an action that corresponds to the original creation of a new object or phenomenon. Conception refers to all directions of intellectual creation and manifests itself in all areas of human expression. The word conception refers to the notion of *concept*, as general idea of a class of objects or phenomena in the surrounding reality. (1)

For human creativity and for conception processes, perception and perceptual mechanisms play an extremely important role. As we can deduce from the etymology of the two words perception and conception, they are complementary actions. The word perception comes from the Latin “perception”, “percipio” and means the action of taking possession, receiving, collecting through the mind or senses, whereas the word conception comes from the Latin “conceptum”, meaning something imagined (2). The act of taking possession is preceded by perception, through which information is received, and followed by conception, through which the information received creates something new. In other words, perception and conception cannot be separated, whether we talk about the cognitive

processes of the creator or about the cognitive processes of the receiver of the artwork.

### NEURAL CONCEPT FORMATION

Semir Zeki says that we are still far from knowing the neural basis of the laws that dictate artistic creativity, achievement and appreciation, but that we can trace the origins of art to a fundamental characteristic of the brain, namely its capacity to form concepts. (3) This capacity is itself the by-product of an essential characteristic of the brain. That characteristic is abstraction, and is imposed upon the brain by one of its chief functions, namely the acquisition of knowledge. Semir Zeki tries to investigate, from a neurologic point of view, the concept of *idea* and its formation in the brain. Ideas are a subject that has been discussed and debated by philosophers for over two millennia. They spoke in terms of the *mind*, not the brain. Zeki argues that the formation of ideals is the necessary and unavoidable by-product of an efficient knowledge-acquiring system, which is what the brain is. The task for the brain thus becomes one of acquiring knowledge about the essential, permanent and constant properties of objects and situations, when the information reaching the brain is never the same. (4) Zeki says

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that Plato himself believed in a world of *Ideas* that have an existence independent of man and that true knowledge can only be knowledge of those *Ideas* and that the only way of obtaining that knowledge was through a thought process, since *Ideas* were supra-sensible. How the brain abstracts is only partially known, for simpler constructs only. What is clear is that the neurological processes underlying these abstractions are ones that occur automatically; we are not usually conscious of the processes themselves but only of their results. The capacity to abstract is not a characteristic of higher areas of the brain, or limited to them. It is characteristic even of early visual areas, as becomes evident when one considers the physiological properties of cells in the visual brain which are specialized for lines of specific orientation, or to detect motion in specific directions, or specific colours. (5)

Zeki gives the example of a cell in the primary visual cortex, area V1, that responds to a straight line of specific orientation no matter what its contrast or colour may be, and even if it is a line or an edge or object against a specific background. The cell, in brief, abstracts for verticality, without being concerned about what is vertical. That the properties of such cells are largely innately determined implies that the abstractive process is also innate, even if the selective responses of such cells require visual nourishment during critical periods to maintain their selectivity and hence their abstractive powers as well.

Recent experiments linked to object knowledge prove that, through some neural mechanism about which we know little, a sort of an *ideea of the object* is built into the responses of a minority of cells situated in the inferior temporal cortex, such that their responses are no longer determined by a single view. (6)

It is plausible to suppose that the result of this abstractive process is the creation of an *ideal*, in which all the sensory experiences have been combined synthetically to generate a construct which, though dependent upon many particulars in its construction, is also independent of a given particular. This idea corresponds to Plato's concept of *Ideal*, which meant the universal as opposed to the particular, where the ideal does not represent a particular object, but is a construct of all objects of that category that the brain has experienced. From this, it follows that the ideal formed by a brain is dependent upon its neurological machinery as well as upon the experience acquired by the individual. That neurological machinery, as well as the experience, varies between individuals. Hence the ideals

formulated by one brain are not necessarily identical to those formulated by another. Zeki quotes Frazer in that "generalization, while the highest power of the human intellect and a mark of its strength, is no less a mark of its weakness. Generalization is but the compendious and imperfect way in which a finite mind grasps the infinity of particulars." (7) In other words, the mind must pay a price for this: abstraction leads to an Idea or concept, but our experience remains that of the particular, through perception, and the particular that we experience may not always satisfy the Idea formed in and by our brains. One way of obtaining that satisfaction is to 'download' the Idea formed in the brain, into a work of art.

## CREATIVITY

A team of neuroscientists, led by John Kounios and Mark Jung-Beeman, conducted in 2006 two experiments in which they attempted to peer into that *Eureka!* or *Aha* moment, when a solution to a difficult problem seemingly descends from thin air – that is, the moment of a creative breakthrough.

Wiring their subjects first to electroencephalography (EEG) and then running them under functional Magnetic Resonance Imaging (fMRI), the experiments gave their subjects a series of word problems that demanded a series of semantic associations. One of the first areas of the brain to become involved was the anterior cingulate cortex (ACC), which is deemed to be one of the executive centres of the brain that focuses attention by suppressing irrelevant thoughts or secondary perceptual activity. Another area to become active was the language-processing area of the left temporal lobe (Wernicke's area), which begins the process of actually wrestling with the semantic problem. Sometimes it solves it without fanfare, but other times it struggles and reaches an impasse. The "*Eureka!*" moment arrives when the impasse is suddenly broken. (8)

Edelman's theory of neuronal group selection suggests that, if half of the neural circuits are formed after birth, then the more we develop neural circuits, through experience gained in contact with people, environment, architecture, by contemplating, discussing, reading, in a practice as varied as possible, the richer and more efficient will become our mental processing and associative network.

The EEG studies conducted by Heilman allowed him to argue that in the creative process inputs are recruited from spatially distributed brain areas. (9) Creativity by metaphor launched by Heilman is

supported by the Eureka experiments and seems linked also to the phenomenon of synaesthesia. Ramachandran, studying this phenomenon, says that its incidence is seven times higher among artists, poets, writers than among people not related to arts. “And what artists, novelists and poets have in common is their ability to engage in metaphorical thinking, linking seemingly unrelated ideas”. (10) Ramachandran argues that creativity is a result of hyperconnectivity that predisposes the individual to metaphor. It is not a phenomenon restricted (like

synaesthesia) to one or two sensory areas of the brain accidentally related, but a deeper capacity. In other words, concepts are represented through mental maps and artistic personalities, by means of additional connectivity, may make associations more fluidly and effortlessly than ordinary people. Ramachandran traces the source of this capacity in the angular gyrus and in the temporo-parietal-occipital junction and launches the hypothesis, based on preliminary tests, that this region is specialized in a certain type of metaphor in each hemisphere.

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