Art and Reality – Towards a Neuropsychological Theory of Aesthetic Perception

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In recent decades, neuroscience and particularly some fields of research under a common name of "neuroaesthetics" have exaggerated their possible contribution to humanities and the theory of the work of art. There are statements such as: "I am convinced that there can be no satisfactory theory of aesthetics that is not neurobiologically based. (...) I shall be surprised if such an understanding does not modify radically our view of ourselves and our societies' (Zeki, "Artistic Creativity and the Brain" 52). Claims such as this – though formulated after more than ten years of fast growing research – should still make us, and indeed they do make us, suspicious. On the other hand, claims similar to the one expressed by John Hyman that neuroaesthetics "does not say anything distinctive about artists. It tells us nothing about Picasso and Cezanne that doesn't apply equally to Häagen Dazs and MacDonalds" (245) also destroy our hope for a dialogue between disciplines. Nevertheless, out of all possible interests of aesthetics, aesthetic experience seems to be fairly compliant with empirical and experimental methods and has been the main point of interest of experimental aesthetics dating back to Fechner's *Vorschule der Aesthetic* (1876). As such, it could be a departure point for recreating a common ground between humanities and sciences.

In the above quote, Hyman formulates the most crucial accusation against neuroaesthetic inquiry into art. The author claims that neuroaesthetics reduces perception of art to perception of reality. However, what kind of tools – if not empirical methods – can help compare these two? Scientists know more and more about perception and attention, both on the psychological and the neurobiological

Citação: Katarzyna Kaczmarczyk, "Art and Reality – Towards a Neuropsychological Theory of Aesthetic Perception". *Via Panorâmica: Revista Electrónica de Estudos Anglo-Americanos / An Anglo-American Studies Journal*. Série 3, Número Especial (2014): 163-178. ISSN: 1646-4728. Web: http://ler.letras.up.pt/.

level. If empirical research was used differently, that is, not as an end of the journey, but as a point of departure, than neuroscience could, possibly, serve as a tool to verify the already existing theories and become an inspiration for subsequent speculative inquiry.

This paper aims, thus, at addressing a few key questions: (1.) What can neuroscience tell about the difference between perceiving art and everyday reality?; (2.) Are there commonalities between perception of various forms of art (literature, painting, music) which differentiate them from perception of non-artistic objects?; (3.) What (on a neurobiological level) is the difference between artistic and non-artistic messages created through the same medium? The answer to these questions will, hopefully, lead to the creation of a preliminary neuropsychological sketch of aesthetic perception.

1. Aesthetic attention

The obvious seems to be a good starting point: both the perception of art and the perception of reality are attentional processes. The difference must lie in types of attention or in their proportions. However, attention is problematic when it comes to defining it accurately, let alone creating a coherent typology. There appears to be a tentative consensus when it comes to a classical distinction between bottom-up, stimulus driven, and top-down, goal driven attention. The first type, also known as involuntary, describes processing which is initiated by properties of the object, that is, we attend to them whether we want to or not. The second – voluntary – is under the control of the person who is attending to the stimulus.[1]

In the everyday world the goal of this selective concentration on one aspect of the environment or subject's own states is to guide him towards survival and reproduction. It is reactive towards unpredictable events in the world and someone's own short and long term goals. Attention must be selective in order to

"act as a means of focusing limited mental resources on the information and cognitive processes that are most salient at a given moment" (Sternberg 69).

Regarding the perception of art, we can distinguish two key stages: 1. discerning the work of art from the rest of the world; 2. focusing our attention on its content. Firstly, we have to recognize an object as a gestalt qualitatively different from the rest of the world by means of its physical properties and (or) by our understanding of its different ontological state, or using Danto's term, its affiliation to the "artworld' (571-584). The author of "The Transfiguration of the Commonplace" argues that the reason for the object to be perceived and attended to as art is not any physical property of that particular object, but the current state of the philosophy of art and our knowledge about it.[2]

The second stage is the attentional process guiding the person's encounter with the work of art: following the plot of a narrative, studying the painted images, focusing on a cinematic screen or theatrical stage. Some neuroaestheticians claim that in the case of art (at least in the initial stage of our encounter with it) the involuntary (bottom-up) attention can override voluntary processes (Markiewicz and Przybysz 120). This seems to be the logical extension of the belief that the structure of an artwork is designed to guide its addressees through itself by means of continuous alternating of anticipation and confrontation. However, the claim about the primacy of involuntary processing needs further developing and differentiating.

Polish philosopher Władysław Tatarkiewicz proposed two ideal types of aesthetic experience: dream and focus. These correspond to two types of attention: bottom-up and top-down:

> The difference between them is clear. When I try to penetrate the essence of these things or others, systematically juxtapose their properties, group them into general classes, compare them with other things, recognize their relations, their causes and purposes –

> then I take on an approach of a scholar. [focus] (…) A different attitude [dream], distinct even because of being more passive, is the one taken on by a person who merely watches an object, experiences it, absorbs its nature and beauty. This is the behavior of a wanderer towards the landscape, a viewer in a gallery, a listener of a concert, a reader of a novel. (Tatarkiewicz 72)

Tatarkiewicz refers to types of attention dominating in aesthetic experience. His classification is useful because it is broad enough to accommodate different forms of art. However, it should not lure us into believing that this distinction describes accurately the relation between an artistic object and its viewers' attention. The final attentional process is the result of the interaction of different variables: 1. "the artworld", canons, theories, socially acceptable forms of production and perception of art, all these influence the creation of artworks bearing specific properties and they can predispose the audience towards specific behavior, form of reception and type of attention;[3] 2. the artwork itself, which carries the influence of aesthetic theories and the intentionality of the author; 3. the viewer, who – to some extent – has control over his own attention and the way of engaging with art; the viewer's knowledge of "the artworld", his mental and physical state, which can shift his attention away from the aesthetic object or make him concentrate on its different aspects; 4. the environment, in which the person comes in contact with an artwork – it can favor or disfavor certain attitudes; it is often the outside environment, which can attract attention, by means of bottom-up processing, away from the work of art and towards some new external stimuli.

It is the viewer, who is in charge of his voluntary attention, type and length of his focus, the way of engaging with the object, but his decisions are based on the previous knowledge of art – which could be perceived as "the internalized artworld". Both the artwork as an external stimuli and the environment can override voluntary attention when presenting to the subject novel, unexpected and interesting stimuli. However, the claim that in perception of art involuntary

attention can override voluntary attention falls into the trap described by Hyman: it does not say anything new about art apart from stating that, as a part of the physical world, it follows the same biological rules. In everyday life there constantly are situations where involuntary processing overrides voluntary processing (Gerrig and Zimbardo 121-2). Art appears to do more: through the influence of both the artworld and the artwork, it guides the relation and proportion of voluntary and involuntary attention as a component of aesthetic experience.[4]

The ultimate shape of aesthetic attention – similarly to every attentional experience – is the outcome of 'negotiating' between the amount of information from the aesthetic object, the environment and the subject's own body and mind, as well as his limited mental resources and decisions how to spend them. The difference between perception of art and the everyday world is then a difference in the way we allocate mental resources and the way it influences our own mind.

2. Art and neural activation

It appears that, in comparison to reality, proportions of bottom-up and top-down processing are changed, although differently in various types and styles of works of art. In fact, Peirce and Nadal pointed out that both bottom up and top down processes are enhanced in the perception of art in comparison to perception of reality (Nadal and Pearce n. pag.). It would seem that this enhancement occurs both in the intensity and extent of neural activation and can be achieved through intensive selective stimulation of particular areas of the brain or extensive activation of areas 'normally' responsible for a particular modality and activation of additional areas – less active during the perception of non-aesthetic objects in the same modality.

Semir Zeki regards the works of artists such as Mondrian, Malewicz or Kandinsky as a means of selective intensive stimulation of the visual cortex. According to the scholar it can happen because "the artist is trying to represent the

essentials as constituted in his visual perception (…) - the brain" (Zeki, *Inner Vision* 111). The scholar shows how visual art not only intensively activates the whole visual cortex, but also activates – selectively – its specific areas:

1. V1 – primary visual cortex specializing in detecting edges and the direction of line movements,
2. V2 – prestriate cortex reacting to orientations of lines and some more complex patterns,
3. V3 – taking part in perception of shapes and movement,
4. V4 – responsible for the perception of colour,
5. V5 (MT) and V5a (MST) – reacting to movement (Zeki et al. 641-9).

Zeki, emphasizing a relative autonomy of some structures of the visual cortex and showing that they are not only places of processing information but also places of perception, tries to prove the hypothesis that selective activation of these areas can contribute to the feeling of aesthetic enjoyment (Zeki, *Splendors and miseries of the brain* 65-72).

Ramachandran believes that the difference in intensity of neural activation between non-artistic and artistic objects arise not only from selective activation, but also from such properties of works of art as peak shift principle, perceptual grouping, contrast, symmetry (15-51). He proposes to look at the transition from reality to objects depicted in artworks as a process of creating a caricature (a super-stimulus).[5] Following his chain of thoughts and applying it to other arts, one could characterize literature as the shift from daily language to its enhanced form acting as a super-stimulus. Of course, many similar theories have been formulated in the course of history. One such example is the concept of literariness which was developed among the representatives of the Russian formalist school (cf. Shklovskij 3-24) and redefined by Roman Jakobson in his concept of poetic function (Jakobson 350-77). Ramachandran's concept of art as a super-stimulus enhancing neural processing is surprisingly similar to the concept of literarieness. Both have a

comparable effect on neural activity: the enhanced communication activates the brain more intensively than a non-aesthetic one formed in the same modality.

The way the shift from ordinary to enhanced language is achieved according to formalists is through the process of defamilarization through the use of language devices such as metaphor, irony, alliteration, synesthesia, among other. On the neurobiological level such a change causes intensification of processing in the right hemisphere, which plays an important role in connotation coding. Howard Gardner describes in his book *A shattered mind* how difficult the perception of this enhanced language would be without the work of the right hemisphere, that is, when the right hemisphere does not perform its functions due to lesions or corpus collosotomy: "The patient is responsive chiefly to linguistic input, to the denotations of words and not to their nuances or connotations; he is glaringly insensitive to such factors as tone of voice, the spirit in which a query is put, and other environmental cues that might suggest one as against another response" (Gardner 372). Current research reaffirms the role that the right hemisphere plays in connotation coding. Remote associations between words are identified faster, if they are presented to the left visual field (Beeman 267; Kane 21-59).

Defamiliarization engages in processing some parts of the brain which ordinarily would be less involved. It can happen on the preconscious or conscious level, and the best example of the journey from one to the other is priming: an implicit memory effect in which exposure to a stimulus influences a response to a later stimulus. It can occur following perceptual, semantic, or conceptual stimulus repetition and plays a crucial role in understanding metaphors (Gagne, Friedman and Faries). Patrick Hogan links priming and the problem of emotional reaction to events in fictional worlds – he believes that when we observe the narrative unfolding, our own memories are primed causing us to feel real emotions towards fictional events (Hogan 164-79; Kohn 121-33). Our emotional reaction, according to

Hogan, would be than a peculiar fallacy of a false attribution and could be described as yet another example of enhanced neural activation.

All mentioned processes (selective activation, greater involvement of the right or left hemisphere in processing commonly more reliant on the other hemisphere, perceptual grouping, priming) do not explain the phenomenon of art on their own. However, they add to the described process of intensyfying neural activation in aesthetic perception.

3. "Costly" aesthetic attention

The previous considerations raise the following issue – the enhanced aesthetic attention and perception happens at the expense of the observation of the outside world – it closes viewers to it and makes them more prone to dangers coming from it. In other words – perception of art changes reactions to the outside world – it weakens them (of course only up to a point when the stimulus from the outside world exceeds the threshold of the involuntary attention and draws the attention out of the 'artworld' to the 'real-world') and slows them down.

Following the theory of a costly signal, we can – after Jean-Marie Shaeffer – call aesthetic attention 'costly attention'.[6] It is then the type of mental activity which takes up a lot of a person's resources and makes him or her vulnerable to danger by prolonging his or her time of reaction. However, being able to pay the price of sending such a signal can be profitable for an individual.[7]

Distance towards non-aesthetic reality is derivative from attention to the content of the work of art. As a result one can often lose oneself in the depicted world, forgetting about one's surroundings, a feeling similar to the one experienced during meditation or the experience of flow ceased by inhibition of some bottom up signals in the thalamus.[8] Habituation can be also connected with the feeling of 'loosing oneself' in the work of art. We define it as the decline in response caused by repeated exposure to the stimulus. Such a prolonged attention to the work of art

gradually desensitizes us to some stimulus from the outside world, helping us to forget about it. This is a common experience of book readers and cinema goers, and the feeling can happen easier if an individual is not moving and does not have to control actions of his or her body.

In terms of discussed types of attention we could describe the state of loosing oneself in a work of art as a partial inhibition of the bottom-up processing caused by voluntary focus on all that comes from one stimulus. What is than enhanced is top-down processing and bottom-up processing coming from an area defined as artistic. It means following the work of art and letting it guide the process without interruptions from the outside. Tatarkiewicz would call this state dream-like and associate it with a more populist way of experiencing art. On the other side of his distinction was "focus", which is associated with predominance of top-down control and means both distancing oneself from the outside world and one's own involuntary perception.

Both sides of this imaginary axis share an important property: an individual, while concentrating on the described events, does not react to them. This remark justifiably reminds us of Kant's term "Interesselosigkeit" (Part I, bk 1.2). However, Kant's term is connected with not using the work of art for any reason extraneous to the aesthetic enjoyment. According to the subject that occupies this paper, "not reacting" means rather not acting on events occurring in the described work, like running away from a shot fired from a rifle in a painting or answering a character asking a question in a movie. It does not seem to be a problem worth studying, but, as it turns out, there is a complicated mental process enabling perceivers not to react to depicted or described events.

4. Neuropsychology of "not reacting"

It turns out that imitation and action impulses are a constant part of our functioning. They are caused by cells called mirror neurons discovered in the 80s

and the 90s by a group of Italian scientists. These neurons fire both when an animal performes an action and when it observes the same action performed by another. Thus, the neurons "mirror" the behavior of the other, as though the observer was itself acting and by doing so they play a fundamental role in action understanding and imitation (Rizzolatti and Craighero 169-192). Scientists found these neurons directly in primates and birds. In humans, brain activity consistent with that of mirror neurons has been observed in the premotor cortex, the primary somatosensory cortex, the supplementary motor area and the inferior parietal cortex. What is even more important is the fact that impulses to actually act and mimic the scene observed precede the mirror neurons reaction. We do not do it because they are immediately inhibited by the orbitofrontal cortex. As Rizzolatti and others point out: "The parieto-frontal circuits that control action are, in normal individuals, tonically inhibited by frontal lobe. (...) It has been shown that during action observation, in parallel with motor cortex excitation, there is an inhibition of motor neurons in the spinal cord" (Rizzolatti et al. 142-3). Marco Iacobini suggests that there are special mirror neurons which inhibit imitative impulses send by other mirror neurons, and similarly to Fuster, localizes them in the orbitofrontal cortex. Interestingly enough, imitative impulses are not necessarily completely inhibited while appreciating art. Vittorio Galleze and David Freedberg evoke the reaction of viewers that, while looking at Michaelangelo's sculptures, feel an increase in the tension of the same muscles highlighted by the sculpted figures in their poses and movements (Galleze and Freedberg 197).

Inhibition of action perfectly exemplifies the problem of integrating a neurobiological and (here) a sociological perspective. On the one hand, damage to prefrontal cortex can lead to the inability to inhibit impulses, which makes all kinds of concentration (including the aesthetic) impossible. This is called a dysexecutive syndrome (Fuster 165). On the other hand, the ceasing of inhibition can be the result of a lack of knowledge regarding the conventions of art. Stendhal provides a

good example when he recalls a disturbing event which took place in Baltimore in 1822: a soldier who went to the theatre to see *Othello* became out of control and actually killed the actor playing Othello to punish him for his mistreatment of Desdemona on stage (Stendhal 22).

Inhibition of action is connected with ceasing reality testing. This psychoanalytic term represents the whole conglomerate of processes which enable us to differentiate reality and other products of consciousness (such as fantasies or memories) and consequently makes it possible to tell the difference between reality and fiction (Avery 228-261). This ability of Homo sapiens played a crucial role in its survival. No wonder that children as young as six months understand the concept of reality, probability and casual relations (Leslie and Keeble 265-88; Watson 152-60).

Nevertheless, when we watch a movie, read a novel or look at a painting, we often surrender to the illusion and believe without a constant process of reality testing. The more we believe, the easier it is to emotionally respond to the work of art. This paradox can be connected with one evolutionary determined characteristic of reality testing. When our ancestors, wandering around in search of food and shelter, thought they saw a wild animal or a snake their first reaction was to ran away and only later, when they felt safe, would they check if the thing from which they had ran away was actually real or simply an illusion. This order of actions was and still is safer. Daniel T. Gilbert suggests, that first we believe in everything we see to subsequently disbelieve (107-19). Norman Holland formulates another hypothesis: he argues that during our encounters with art, we switch off our reality testing system, because we treat a work of art as something that we cannot change or act upon it (59-75). Inhibition of action would be then directly connected to ceasing reality testing. As Prentice and Gerrig explain: “Belief in fiction is determinated not by a critical analysis... but instead by the absence of motivation or ability to perform such an analysis” (542). Holland expands the argument:

> We believe because we do not reality-test, and we do not reality-test because action on the stimulus is ontologically impossible. (...) A brain serves one basic purpose, moving a body in the real world toward survival and reproduction. Intending to move in the real world involves imagining counterfactuals, and therefore testing reality and judging probabilities. If we know that, by its very nature, we cannot affect what we are paying attention to, as is the case with literary and artistic works, we inhibit motor impulses from our frontal lobes. We may then disregard whether what we are perceiving is true or not. We may shut down our judgements of realism or probability. If we do, we have granted 'poetic faith' in Coleridge's sense. (Holland 66, 72-3)

The aim of this paper was to explore the notion of aesthetic perception from a neuropsychological perspective by focusing on what distinguishes it from non-aesthetic perception. What emerges is perception characterized by:

- different proportions of voluntary and involuntary attention;
- intensification of both bottom-up and top-down processes;
- engagement of some parts of the brain which ordinarily would be less involved in the processing;
- limited attention towards the outside world;
- inhibition of imitative and reactive signals;
- ceasing reality testing and thus believing in fiction, that is, having real emotional reaction towards fictional characters and events.

These characteristics, based on existing neuroscientific inquiry into perception of art while not complete, shows important differences between perception of art and perception of reality. The mentioned points – here only tentatively presented – should be understood as propositions for further inquiry; the kind of inquiry in which both humanists and neuroscientists should be engaged in dialogue.

[1] This classical distinction was introduced by William James in "The Principles of Psychology" first published in 1890. Nowadays it appears simplistic, but still serves a purpose of distinguishing some characteristics of attentional processes.

[2] Danto, while addressing the problem of relation of art and reality, shiftes our attention to the outside factors, external to the work of art itself. These factors enable an object to be perceived as artistic. Some neuroaesthetic reasearch could be complementary to this line of thinking. Scientists currently test the influence of contextual information on aesthetic experience (cf. Lengger, Fischmeister, et al.; Kirk, Skov, et al.).

[3] Behaviour towards art is also culturally coded and as such undergoes changes in time. A good example of it is literature. Silent, private reading, as a basic form of contact with literature, definitely influences attentional processes engaged in the activity, and further distinguishes a literary reading from other forms of language communication. However, forms of engaging with the literary work are subjected to historic change. According to Karin Littau, silent reading spreaded in 18th century and initialy met with a wave of criticism towards the effect of "loosing yourself" in the book and getting engaged and immersed in the plot (20).

[4] The inherent part of research on genres and styles should be an examination of the type of aesthetic perception provoked by them.

[5] Arguments made by Ellen Dissanayake force us to compare the neurobiological perspective to the evolutionary one. The difference between artistic and non-artistic communication is similar to the difference between communication between adults and between adults and infants, where signals are stereotyped, exaggerated and repetitive. According to Dissanayake this type of 'enhanced' communication appeared about 1.8 million years ago, when – with the shorter gestation period – natural selection favoured strategies developed by mothers in order to provide care during the period of early infancy of their children.

[6] Jean-Marie Schaeffer presented this thesis during a lecture entitled *Aesthetic relationship, cognition and pleasure*, which was held on April 19, 2012, at the Faculty of Polish Culture, University of Warsaw.

[7] "Costly signals", such as peacock's tails, unable other subjects to distinguish between true and false signals of sexual attractiveness. They give a bigger chance of proving genuine, because they are difficult to imitate. There are theories, which recognize altruism and religious practices as "costly signals". Schaeffer claims that art production and appreciation also can be studied as a "costly signal" (cf. note 6).

[8] This part of the brain can be called a base transceiver station, because majority of ingoing information must go through the thalamus to get to the cortex.

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