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Neuroaesthetics

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It. *Neuroestetica*; Fr. *Neuroesthétique*; Germ. *Neuroästhetik*; Span. *Neuroestética*. The term results from the combination of the prefix 'neuro-' with the term 'aesthetics', the former indicating a neurobiological approach and the latter identifying the object of such approach, i.e., philosophical aesthetics. 'Neuroaesthetics' thus literally means the 'neuroscience of aesthetics' and aims at the investigation of the neural basis of the aesthetic experience. Over the last decades – the "golden age of brain exploration" (Gewin 2005) – life sciences, such as neurobiology and bioengineering, devoted increasingly research effort to study brain functioning. At the same time, relevant topics in social sciences and philosophy started to be investigated from a neural perspective. Neuroaesthetics can be considered part of this latter line of investigation, together with other recent trends of research in "neuroculture" (Mora 2015), such as neuroethics, neurotheology, and neuroeconomy.

Historical Origins and Conceptual Foundations of Neuroaesthetics

Neuroaesthetics arises from the combination of research in psychology, neuroscience, and evolutionary biology with philosophical aesthetics (Nadal, Pearce 2011). In such an attempt to lend an empirical perspective to the understanding of aesthetics, neuroaesthetics can be broadly defined as the study of the neural basis of the production and appreciation of arts (Changeux 1994; Zeki, Lamb 1994), using brain techniques, such as electroencephalography (EEG), functional magnetic resonance imaging (fMRI), magnetoencephalography (MEG), positron emission tomography (PET). More recently, Nadal and Pearce (2011) provided a more detailed definition of neuroaesthetics as "the study of the neural and evolutionary basis of the cognitive and affective processes engaged when an individual takes an aesthetic or artistic approach towards a (western or non-western) work of art (used in the broad sense to include music, film, theater, poetry, literature, architecture and so on), a non-artistic object or a natural phenomenon" (Nadal, Pearce 2011: 173).

Precursors of neuroaesthetics have been recognized in evolutionary biologists such as Darwin – who extensively wrote about beauty perception in humans and animals from a biological point of view – and Nineteenth's century experimental psychologists, such as Fechner and Wundt, who were among the first to empirically investigate sensory perception. In the last decades, research in neuroaesthetics has increased a great deal, fostered also by the diffusion of non-invasive neuroimaging techniques that has permitted to study aesthetic experience of healthy participants in a wide variety of experimental conditions.

One of the foundational assumptions of neuroaesthetics is the parallelism hypothesis, namely the idea that artistic production and brain organization share some fundamental properties. Zeki (1999) claimed that both the nervous system and the artists are driven to understand essential visual attributes of the world. The parallelism approach fostered empirical research in visual arts on how the work of art is created (e.g., Conway, Livingstone 2007) and appreciated (e.g., Kawabata, Zeki 2004).

Over the years, neuroaesthetics has gradually challenged traditional accounts of aesthetic experience that privileged the primacy of cognition in our responses to art. In fact, it has been recently proposed that a crucial element of the aesthetic experience consists of the ability to embody actions, emotions, and corporeal sensations that are represented in artworks (e.g., Gallese 2005). Such a paradigm shift recently opened neuroaesthetics' investigation also to non-visual arts, providing significant insights into the way listening to and performing music generates aesthetic experiences (Brattico, Pearce 2013) and studying the neural underpinnings of the aesthetic appreciation of dance (Cross, Ticini 2012).

BEAUTY IN THE BRAIN

The appreciation of beauty is likely the topic of philosophical aesthetics that has been first addressed by neuroaesthetics. In Kawabata, Zeki (2004), 10 adults viewed in the scanner different categories of paintings, that were previously rated by participants and classified into beautiful, neutral or ugly. Results showed that the perception of beautiful vs ugly paintings elicited activity in the medial orbitofrontal cortex, and also in the anterior cingulate gyrus for beautiful vs neutral stimuli. Using a similar protocol, Ishizu, Zeki (2011) exposed participants to beautiful and ugly pictures and music while recording their brain activity. Results showed that only one cortical area, located in the medial orbitofrontal cortex, was active during the experience of both musical and visual beauty. Interestingly, the strength of activation in this area was proportional to the declared intensity of beauty. Taken together, these studies suggest that medial orbitofrontal cortex activation is crucial for the experience of beauty.

Regarding the factors that affect perceived beauty, studies on vision showed that symmetric, well-proportioned and regular pictures (especially of human figures) are judged more beautiful than asymmetric and irregular ones (e.g., Di Dio, Macaluso, Rizzolatti 2007). Results showed activation of different brain areas during symmetry vs aesthetics judgments. In particular, symmetry judgments elicited activations in several areas related to visuospatial analysis, including superior parietal lobule and intraparietal sulcus as well as dorsal premotor cortex. On the contrary, aesthetic judgments elicited activations in the medial wall and bilateral ventral prefrontal cortex, i.e., regions which have been previously reported for social or moral evaluative judgments on persons and actions.

The perception of symmetry has been studied also in non-human primates. In a behavioural study, Rensch (1957) investigated visual preferences in a capuchin monkey and a vervet monkey, using stimuli that either contained symmetry on one or two axes ("regular") or were asymmetrical ("irregular"). Findings revealed a bias in both species towards the symmetrical shape. Using more complex symmetric and random dots configurations, a recent fMRI study by Sasaki and colleagues (2005) found robust activity in higher order regions of visual cortex among humans, but a much weaker response was found in analogous regions of macaque.

Several studies focused on the appreciation of *natural* beauty, i.e., human physical beauty and landscape beauty. As far as concerns the perceived beauty of the body, a prominent role is played by symmetry (Chatterjee 2014). Averageness, symmetry, and sexual dimorphism have been identified as factors that affect facial beauty (Rhodes 2006). Studies showed that universal principles of *facial* beauty are likely to biologically rooted (Etcoff 1999; Perrett, May, Yoshikawa 1994) and are shared across cultures (Langlois et al. 2000). For example, studies showed that men find high cheekbones, small chin, small lower face area, full lips beautifully attractive in women (Rhodes 2006). Additionally, clear, smooth skin, large eyes, and shiny hair are also attractive and evolutionary psychologists suggested that these attributes are attractive since they indicate youth, fertility and health (Buss 2015). Apparently, such preference for symmetric faces of the opposite sex is uniquely human. In fact, although findings demonstrated non-human primates (i.e., capuchin monkeys) ability to discriminate between symmetrical and asymmetrical faces, such ability was found only among males (and towards male faces), whereas findings did not reveal any discrimination ability based on symmetry in females (Paukner *et al*. 2017).

As far as concerns landscape beauty, the pioneering paper by Orians and Heerwagen (1992) presented "the Savanna Hypothesis". According to this hypothesis, human aesthetic preference for landscapes such as the savannas and woodlands of East Africa might be biologically explained considering the amount of food available, the presence of water, an unimpeded view into the distance but with trees and bushes for shelters, and presence of animals and greenery. As Dutton (2009: 19-20) points out, "savannas contain more protein per square mile than any other landscape type".

To summarize, combining elements from evolutionary psychology with neuroaesthetics, the empirical literature supports the existence of aesthetic universals in the appreciation of natural beauty and suggests the biological reasons of why humans naturally evolved for such universals.

OPEN ISSUES

Scholars do not agree about the value of neuroaesthetics' findings for the understanding of traditional issues in philosophical aesthetics. For example, Brown and Dissayanake (2009) argue that research in neuroaesthetics might be biased by a narrow, culture-bound sense of aesthetics. They claim that neuroaesthetics' findings apply to a much wider range of objects than art objects, since humans have "aesthetic relationship" based on dichotomies, such as like/dislike, beautiful/ugly, attractive/repulsive, with many ordinary objects and situations besides painting, music or dance. More generally, they hold that aesthetic experience is much more pervasive, fundamental, and unbound than the experience of artworks. Conversely, Noë (2015) argues that neuroaesthetic approach is too broad and therefore unable to bring art into focus as a subject of investigation. For instance, findings suggesting that viewing paintings engages not only systems involved in visual representation and object recognition but also structures underlying emotions and internalized cognitions (e.g., Vartanian, Skov 2014) likely reflect very general mechanisms that affect visual perception.

The risk of any reductionist approach is to hide the object of inquiry behind methodological criteria. In the experimental literature on beauty, for example, aesthetic appreciation is often measured through preference ratings. Although questions arise about the reliability of scale ratings for assessing aesthetic appreciation, such methodological questions should not override conceptual and more radical questions about the relationship between preference and aesthetic experience. Every attempt to reduce the complexity of an aesthetic experience to quantifiable measures exposes at the risk of losing the core of the problem for the sake of measurability. However, as Chatterjee (2011) points out, such problem affects experimental aesthetics in general, not just neuroaesthetics.

A further objection can be raised against traditional tenets of neuroaesthetics which ascribe to experimental findings a concrete nature contrasting with abstract philosophical reflections. However, it should be observed that even consistent findings, such as the activation of the medial orbital frontal cortex elicited by the perception of beauty (Ishizu, Zeki 2011), might be more abstract than philosophical reflections when trying to describe the first-person experience of art. What should be guiding here, is that the discovery of biological roots of aesthetics experience should foster novel conceptualizations of arts. As Chatterjee (2011) observed, research in neuroaesthetics has to face the challenge of being both scientifically sound and relevant to aesthetics. Therefore, increasing the understanding of aesthetics using neuroscience, is the most important challenge for the future of neuroaesthetics.

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All the entries in this Lexicon provide an account of the contemporary aesthetic debate. Some entries, however, are conceived as a presentation of the authors' theories on the topic addressed and are marked with an asterisk.Â Via Monfalcone 17/19, 20099 Sesto San Giovanni, MI - Italy +39 - 02 24861657 / 02 2441638 mimesis@mimesisedizioni.it Working time: Monday - Friday: 09:00 - 18:00. International Lexicon of Aesthetics. How to contribute to ILAe. Author Guidelines. The International Lexicon of Aesthetics (ILAe) is intended as a fully open access dictionary of major concepts and authors that have fuelled the aesthetic debate. It also aims at offering a constant and updated outline of current studies, critical positions and salient issues in contemporary aesthetics. Latest entries. Explore. Carl Dahlhaus. Explore. Ecological Aesthetic Explore. List of Aesthetics. A master list of named aesthetics, sorted from A - Z. The list is by no means complete, so if you cannot find a particular aesthetic on this list, feel free to write a short article and add it here. We rely on the help of contributors like you to expand, so every article is appreciated. If you have any questions on how to use the Wiki, feel free to ask any of the admins. We'll be more than happy to either help you personally or point you in the direction of somebody who can. If you... Here are some of the most great Glossaries of Aesthetics Vocabulary. Dictionary and Lexion of Aesthetics Terms, Acronyms and Abbreviations.Â Japanese Sword Glossary Japanese sword glossary of sword terms. Aesthetics Glossary Bourriaud Relational Aesthetics Glossary. Glossaries and Terminologies INTERNATIONAL LEXICON OF AESTHETICS Spring 2018 Edition, DOI 10.7413/18258630017 ICONOSPHERE by Michele Di Monte (First published March 31, 2018) It. Iconosfera; Fr. IconosphÃ¨re; Germ. IkonosphÃ¤re; Span. Iconosfera. The concept of iconosphere was first introduced by the French philosopher Jean Wahl (1955) in a conference devoted to the cultural problems connected to the diffusion of the mass media.Â As Martin Jay has repeatedly 2 INTERNATIONAL LEXICON OF AESTHETICS argued discussing the â€œform of visual lifeâ€, â€œthere may never be an â€˜outsideâ€™ beyond a cultural filter, allowing us to regain a â€˜savageâ€™ or â€˜innocentâ€™ eye, a pristine visual experience unmediated by the partial perspective implied by the very term â€˜scopicâ€™â€ (Jay 2011: 62).