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Moving Toward Emotions in the Aesthetic Experience

Cinzia Di Dio and Vittorio Gallese

Comment on: Di Dio C., & Gallese, V. (2009). Neuroesthetics: A review. *Current Opinions in Neurobiology, 19*, 682–687.

Our brain does not work in watertight compartments. It is an intricate network of neural activities and areas whose functions are intimately entangled. In our 2009 review, we provided a synthesis of what the new discipline of neuroaesthetics had accomplished in its first 10 years. When considering aesthetic experience, we cannot refer to the activation of a single brain area. We must refer to the joint activation of different brain structures responsible for the analysis of specific aspects of visual stimuli, be they artworks or not. When observing a work of art, our brain is engaged in parallel processes: our perception is not the mere "visual" copy of what is before our eyes, but the result of a complex construction whose outcome depends on the contribution of our body and its motor potentialities, our senses, and our emotions, imagination, and memories. There have been attempts made to address aesthetic experience from a psychological and/or functional point of view. Among these, one of the most comprehensive is the model developed by Leder and collaborators (e.g., Pelowski et al., 2017; see also Chapter 3), who support the idea that aesthetic experience goes from visual to semantic processing, up to the effect of the context, the observer's experience, emotional engagement, motor resonance, and so on. In this chapter, we focus on the emotional and motor aspects.

Our neurophysiological and psychophysical research highlighted both the affective component that characterizes aesthetic experience and the motor component: both are underpinned by embodied simulation processes; that is, the neural reuse of cortical areas activated by the performance of actions, the experience of emotions and sensations, to map them in others (see later discussion). For the emotional component, we used the Golden Ratio (i.e., the harmonic division of a line in extreme and mean ratio where the

Cinzia Di Dio and Vittorio Gallese, *Moving Toward Emotions in the Aesthetic Experience* In: *Brain, Beauty, & Art.*
Edited by: Anjan Chatterjee and Eileen R. Cardillo, Oxford University Press. © Oxford University Press 2022.
DOI: 10.1093/oso/9780197513620.003.0005

relationship between the greater and the minor sections is approximately 1.618) as a manipulable variable to create samples of more or less aesthetically beautiful stimuli (Di Dio et al., 2007). The goal was not to measure the effect of proportion per se (others have done the job for us), but to appreciate the aesthetic sense evoked by the parameter. In the context of Classical and Renaissance sculpture, where canonical proportion does contribute to the "objective" aesthetic quality of these masterpieces, we anticipated that the Golden Ratio could evoke a clear and unambiguous brain response in the viewer. Thus, we highlighted at least two dissociable components in aesthetic experience: one related to proportion that defined *objective beauty* (possibly linked to the aesthetic sense) and another associated with the emotion that aesthetic experience evokes through idiosyncratic associations between the stimulus and personal memories. This second component has been named *subjective beauty*. Objective beauty activates a series of cortical areas involved in the analysis and evaluation of the parameters of the artwork (e.g., the Golden Ratio), such as primary and high-order visual processing areas, as well as prefrontal areas and relay cortical areas, like the anterior insula. Subjective beauty, on the other hand, involves the activation of areas such as the amygdala.

Both objective beauty and subjective beauty contribute to the development of the aesthetic experience in a holistic sense. Preference for proportions conforming to the Golden Ratio, entrenched in Classical masterpieces, seems to emerge very early in development (Di Dio et al., 2018). This does not necessarily mean to claim the innate sensitivity to particular forms of beauty (in fact, cultural differences have never been investigated in children), but it certainly indicates an early inclination to particular visual patterns considered aesthetically attractive and, in fact, recursive in nature. Early preference for the proportioned stimuli may then stem from early development of infants' visual knowledge of the human body structure and of the relative size of the body parts. This is further evidenced by a tendency in very young children to prefer realistic rather than abstract representations, as well as prototypical rather than altered representations of the world. This propensity changes with age, as children become cognitively more "flexible." With age, they come to accept the idea that images do not necessarily have to faithfully reproduce reality but can be subject to modification, thus opening up to the recognition of alternative representational possibilities, perspectives, and artistic intentions.

The Golden Ration paradigm has also been used to *quantify* the "objective" aesthetic abilities in Alzheimer's patients, autistic spectrum disorder individuals, and sleep-deprived individuals. Aesthetic ability in these individuals correlates with the psychological construct of empathy. This is not surprising, as experiences of "objective" aesthetics and empathy share a common neural substrate—the anterior insula. It would be interesting, in this respect, to move forward neuroaesthetics research to include the constructs of morality and ethics, which also involve activation of emotion-related brain processing areas, including the amygdala and insular cortex. After all, empathy is considered the moral emotion par excellence, which nevertheless requires a full integration between affective and cognitive development. In studying prosocial behavior, Nancy Eisenberg explored the relationship between empathy and morality, a relationship that can ultimately be translated into the construct of sympathy; that is, a feeling that arises from empathy but which also includes a feeling of concern (care) toward the condition of the other. Already Plato associated beauty with morality, and, all things considered, this would make sense if you think that phylogenetically we need to *feel attracted* to morally healthy relational environments to grow socially.

As for the motor component of aesthetic experience, virtually all the studies conducted so far observe appreciable activation of the brain areas involved in processing movement. Even when we observe static images, if their artistic construction represents a movement, the implied dynamics resonate in our brain via a particular class of neurons, *mirror neurons*, so called because they are activated when we observe another person's actions as well as when we ourselves act. The movements and actions of others are mapped as schemas onto our own motor systems, enabling recognition of what the other is doing and the feelings associated with those movements. We build predictions about others' behavior and "feel/live" their actions in ourselves: we embody them by simulating them, and, by simulating them, we experience them. Through embodied simulation, we retrace the sensation evoked by the observed movement, even when represented in total stillness. This "feeling" of movement also determines, through integration with other brain areas like the insula, an emotional appeal (for a review, see Gallese, 2019).

The involvement of motor areas in aesthetic experience has been now consistently shown by several studies (for a review, see Gallese, 2019). In the study by Di Dio et al. (2016), for example, we found that observing representational works of art with human content activates frontal and parietal motor areas, corresponding to the areas associated with the mirror system. These areas are particularly activated when the representation of human figures is perceived as dynamic. When the representation of movement is instead perceived as more static, the central and posterior insula are activated, bilaterally. The activation of motor areas also occurs when observing pictorial representations of natural landscapes perceived as static. Viewing the static scene from a first-person perspective invites or automatically provokes movement planning in the viewer. It is important to stress that these activations occur during an aesthetic judgment task, suggesting that attributing aesthetic qualities to artworks also implies motor processing. The involvement of motor activations during aesthetic appreciation has also been demonstrated in psychophysical studies exploring the association between sensorimotor engagement and the emotional content of works of art. The results of these studies generally show a match between the aesthetic assessment of paintings showing specific emotional facial expressions and a first-person enactment of the corresponding facial expressions. Additionally, positive correlations between participants' empathic traits and the effect of motor enactment on aesthetic judgments further delineate the role of sensorimotor processes in one's aesthetic experience.

To conclude, we would like to introduce a more recent line of research, further exploring the role of embodiment in architecture (Gallese & Gattara, 2015). The motor system is not only triggered when observing others performing an action, but also by elements in the environment within which we move and toward which we act. Of course, there can be many "affordances" in the environment that may lead to different courses of action (see Chapter 45, by Djebbara and Gramann). To react quickly and efficiently to environmental opportunities (or even jeopardies), our brain develops associations between environmental elements and prototypical actions and movements likely to produce the most desirable outcome. The latter is indexed by an individual's feeling of physical and psychological comfort induced by the physical context within which actions are lived. Architectural settings can orchestrate environmental elements to trigger an *embodied simulation* of human behaviors together with their rich emotional layers. The magnetism exerted on us by the places where we feel good can now be penetrated—at least in part—thanks to the notion of embodied architecture and its neuroscientific investigation.

References

Di Dio, C., Ardizzi, M., Massaro, D., Di Cesare, G., Gilli, G., Marchetti, A., & Gallese, V. (2016). Human, nature, dynamism: The effects of content and movement perception on brain activations during the aesthetic judgment of representational paintings. *Frontiers in Human Neuroscience*, *9*, 705.

Di Dio, C., Berchio, C., Massaro, D., Lombardi, E., Gilli, G., & Marchetti, A. (2018). Body aesthetic preference in preschoolers and attraction to canons violation: An exploratory study. *Psychological Reports*, *121*(6), 1053–1071.

Di Dio, C., Macaluso, E., & Rizzolatti, G. (2007). The golden beauty: Brain response to classical and renaissance sculptures. *PLoS ONE, 11*:e1201.

Gallese, V. (2019). Embodied simulation: Its bearing on aesthetic experience and the dialogue between neuroscience and the humanities. *Gestalt Theory*, *41*(2), 113–128.

Gallese, V., & Gattara, A. (2015) Embodied simulation, aesthetics and architecture: An experimental aesthetic approach. In S. Robinson & J. Pallasmaa (Eds.), *Mind in Architecture: Neuroscience, Embodiment and the Future of Design* (pp. 161–179). MIT Press.

Pelowski, M., Markey, P., Forster, M., Gerger, G., & Leder, H. (2017). Move me, astonish me . . . delight my eyes and brain: The Vienna Integrated Model of top-down and bottom-up processes in Art Perception (VIMAP) and corresponding affective, evaluative and neurophysiological correlates. *Physics of Life Reviews*, *21*, 80–125.