JOAQUIM BRAGA
SIMONE GUIDI (*Editors*)

QUANTIFYING BODIES AND HEALTH

INTERDISCIPLINARY APPROACHES

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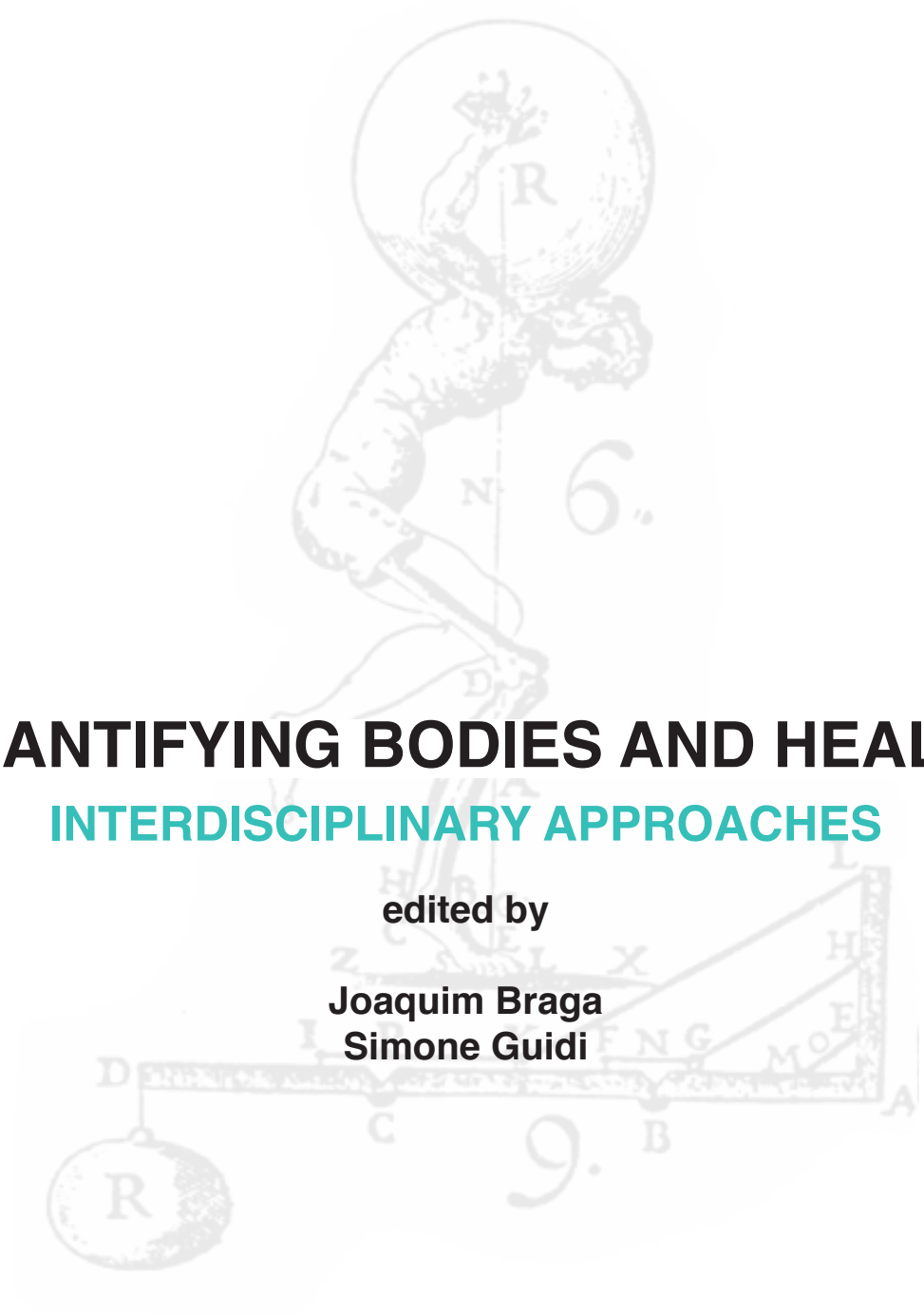

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INTERDISCIPLINARY APPROACHES

edited by

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Chapter 10

Is there an Aesthetic Brain? A brief Essay on the Neuroaesthetic Quantification of beauty

Paulo Alexandre e Castro[1]

Abstract: It is possible today to determine, with some precision (according to the most recent studies in neuroscience and evolutionary psychology), the areas of the brain and the neural networks involved when an individual contemplates art, when feeling pleasure, or when judging about aesthetic experience. However, many questions remain open. First, the philosophical question about the subjective nature of this kind of judgments. Then, what happens in the mind (or should it be said, in the brain?) of the beholder when contemplating art or judging in favor (or not) of the beauty of an object. And the ultimate question, if we have an aesthetic brain.
Another issue that must be addressed is if bioart and especially neuroart can contribute to this analysis and if they can be effectively quantified as art. Thus, this brief essay seeks to provide some understanding about this questions but most importantly about the existence of an aesthetic brain, which may ultimately contribute to open doors to other problems of philosophy such as the hard brain-mind problem.

Keywords: Aesthetic brain, Beauty, Neuroaesthetics, Neuroart, Judgments.

When most of the people think about aesthetic experiences, they think (one way or another) immediately about art. It is as if we have a kind of natural predisposition to put those aesthetic experiences in an exclusively artistic setting like seeing a painting exhibition or listening a classical music concert. The truth is that we are ignoring that it is in our daily lives that most of these experiences take place. We are so far from thinking about this that we do not even notice that we already have an aesthetic brain to feel those experiences: only a brain adapted to feel them could express itself in so many different ways: of generating hormones to the intensity of emotions. A brain that remembers

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and repeats this type of experience whenever possible (repetition seems to be at the heart of the aesthetic content – it implies a tension between repetition and novelty – of those types of experiences). So, as strange as this may sound, it may even be the case that this brain wants to "feel" again a whole roll of hormones, amino acids and neurotransmitter circuits communicating within itself, in the same way that we could say that we contemplate inside us a beautiful sunset with the eyes of our soul or spirit.

This may sound awkward and it will certainly be a controversial thesis in many ways. First of all because, at first sight, two words with opposite meanings are glued to the same concept: brain and aesthetics (the first refers to physical matter while the second points to the domain of subjectivity). Secondly because the thesis of an aesthetic brain do not follow a certain paradigm that places this aesthetic experience at the core of the affective level and in the field of subjective sensations that take place in spirit or soul, which in contemporary terms it may be seen at the level of psychological or mind experiences (that strange and abstract entity) that the Latin term *qualia* translates brilliantly (since it is about exploring the quality of these mental / subjective experiences). Thirdly because we are indeed assuming a reconfiguration of perspective that place the experience of feeling beauty in neuro-aesthetic terms, and this means that we are trying to unravel from the neuroscientific point of view the foundations of the aesthetic experience of beauty, and possibly, about (aesthetic) life itself as Gabrielle Starr suggests.[2] In saying this, we are not saying that perceptions and emotions are not important to the aesthetic experience – they are indeed and they even take place in the brain – but that understanding the experience of feeling beauty requires a different approach that only a neuro-aesthetic quantification framework can provide. Fourthly and to finish, it is a controversial thesis because when it is said that we have an aesthetic brain it seems to be clear that we are assuming a certain reductionist perspective at the centre of a vast and hard problem to solve, the mind-body problem, but it might not be the case at least in this sense: even a reductionist approach can admit a certain degree of metaphysical components in the world, such as love or intimacy.

We start this essay saying that in our normal daily life we have a roll of aesthetic experiences and to understand them in a more deeply way, we have to not only know them but to feel them, as Voltaire would say.[3] In a very particular way, that's what aesthetics is all about: one knows where to look at and what can be felt. But, in another sense, this is also the trickiest part:

2 Take, for instance, the words of Starr about this approach: "a neuroscientific account of aesthetic experience that invokes concepts of emotional, reward, and imagery can do this, helping to explain the relations among the Sister Arts and the idea of aesthetics as a coherent discipline; it also offers a way of understanding the interrelations of the ever-expanding world of aesthetic life". (Starr, 2013, p. 20)

3 "To constitute taste, it is not sufficient to see and to know the beauty of a work. We must feel and be affected by it. Neither will it suffice to feel and be affected in a confused or ignorant manner; it is necessary to distinguish the different shades; nothing ought to escape the promptitude of its discernment; and this is another instance of the resemblance of taste, the sense, to intellectual taste". (Voltaire, 1836, p. 347).

since we do not know exactly what the core of the investigation is – and we do not know it because of our cognitive limitations –, this demand is, on the one hand, driven by a set of scientific premises that seek finding results that confirm them and, on the other hand, because the philosophical search is full of puzzles in both the questions it asks and the answers it provides.

Let us start with the simplest and most challenging question sat by neuro-aesthetics: what happens in the brain of the beholder when he sees art? We should start saying that it is important to grasp the warning to which Arthur Shimamura draws attention, because "experiencing art is a whole brain phenomenon. There is no *art center* in the brain", meaning that the brain works in a very interconnected and dynamic way and as we all are aware, there are areas with specific functions, but there are not a centre or an exact location to investigate the relation with art.[4] The brain works as a whole, whether for art appreciation, to do some math or just to live the daily stress.

So, going back to our question about what happens in the brain when an individual has an aesthetic experience or, in simplistic terms, when he senses beauty around them, we must say that it is not easy to provide an answer that meets the criteria of what is asked. We know that there are several circuits, brain regions (with their own specific functions) and neural pathways – and probably what we know about it does not even come close to what we don't know –, but we can still provide a general answer to satisfy our curiosity. We already know that when having an aesthetical experience, we feel things, we have emotions, we remember some other things and we make judgments; in other words, we are using our brain capabilities at their high level. Being aware of those kind of feelings, emotions and thoughts, we can say that the most important set of brain structures are amygdala, cingulate gyrus, limbic thalamus and hippocampus, that is, *grosso modo*, the limbic system (in fact, all of our emotional life is housed in the limbic system) the prefrontal cortex,[5]

4 Note the explanation of Shimamura: "Experiencing art is a whole brain phenomenon. There is no *art center* in the brain. Neurons are highly interconnected and dynamically interact to drive experiences. There is, however, a division of labour as different brain regions serve different functions. Visual information from the retina enters the cerebral cortex at the most posterior part of the occipital cortex. From there processing takes two major paths. The ventral path manufactures forms by accentuating and organizing lines, edges, and shapes. The dorsal path constructs a first-person view of space by interpreting the image on our retina as a window to a 3-D world. These two visual paths work together to place objects into a coherent spatial environment. To guide visual processing, the prefrontal cortex sends feedback signals back to regions along the dorsal and ventral paths. These signals modulate processing by enhancing some sensory features and suppressing others. In this way, the prefrontal cortex acts as a CEO, ensuring that the entire machinery is working in a coherent manner. This kind of top-down or metacognitive processing allows us to focus on specific sensory features, move our eyes to relevant locations, and consider the spatial environment as an organized whole". (Shimamura, 2013, p. 258).

5 One way to understand the importance of the prefrontal cortex is to recognize their performance before and after brain damage: "In retrospect, the notion that the prefrontal cortex plays a role in emotional control should have come as no surprise. (…) As we already know, damage to the frontal lobes often produces profound emotional dysregulation: extreme emotional disinhibition (sometimes referred to s *Witzelsucht*) in the orbitofrontal syndrome". (Goldberg, 2009, p. 116)

and the posterior parietal cortex, among several other bodily responses such as hormone segregation. Shimamura give us a small description:

> The prefrontal cortex controls our thoughts and memories by maintaining and updating the contents of what is in consciousness. It selects and retrieves pertinent memories and links them to sensory inputs. A painting may remind you of a past experience or a style of a specific artist or period in art history. When you evaluate an artwork and intermix thoughts, personal experiences, and past recollections, there is a dynamic interplay between the prefrontal cortex and posterior regions. A particularly important region in the cortex is the posterior parietal cortex, as it acts as a convergence zone that integrates cortical processing. Whenever we think about the past or future or take another's perspective, the posterior parietal cortex is involved in creating an imagined scenario. Other brain regions infuse our experience with emotions. Neural circuits buried in subcortical regions arouse bodily responses, such as increasing heart rate, muscle tension, and body temperature, thus preparing the body for fighting, feeing, or mating. The amygdala interprets sensory signals and determines if a situation is threatening or arousing. In the cerebral cortex, the insula, anterior cingulate cortex, and orbitofrontal cortex are particularly involved in emotional responses. The insula processes gustatory responses associated with our reactions to disgusting stimuli, whereas the anterior cingulate cortex registers pain and emotional conflict. The neurochemical dopamine and its activation of the reward circuit plays a vital role in experiences of pleasure. (Shimamura, 2014, p. 259).

For Shimamura and for us, it seems that there is no doubt about brain circuits implications in art experiences in the same way they are implicated in other similarly pleasant experiences that occur in everyday life (according to Chatterjee, when it comes to emotions and feelings, there are still doubts about the readings of all these brain areas).[6]

Taking this into account we can now add an extra question that is also challenging: how different individuals (naturally with different brains), with their naturally differing aesthetic judgments, can shape an almost universal sense of beauty? We all know the answer provided by Kant in the *Critique of the Judgment* – that such judgments would be (in some way) necessary and universal –, but that does not deliver any valid indication for our field of analysis (what Kant told us is that an aesthetic judgment is subjective, meaning that it relates to the internal feeling and not

6 "When we consider emotions, we find that the pleasure evoked by viewing beautiful art activates the orbitofrontal cortex, the anterior insula, the anterior cingulate, and the ventral medial prefrontal cortex. These are the same brain structures that good food, sex, and money engage. However, there is much that we do not know about these pleasures. Some studies find activations in some areas, like the orbitofrontal cortex, and not in others, like the ventral medial prefrontal cortex. What distinguishes the experience of these different patterns of activation evoked by different works of art? We know very little about nuanced emotions that can be evoked by art, such as mixtures of fear and disgust, and wonder and whimsy". (Chatterjee, 2014, p. 140)

to any qualities in an external object; Marcus Woo used in his book popular expression, beauty is in the eye of the beholder).

The answer should not be in the exclusively field of metaphysics neither in the field of neurosciences but in the between, and neuroaesthetics can be the that field. Thus, it is possible to risk some progress: on the one hand, admitting that there are things that go beyond the frontier of neuroscience and, on the other hand, making use of scientific conclusions to produce valid theses or explanations for (neuro)aesthetics. In this sense, it is possible to say, for example, that there is a general sense of beautiful, since people use the same brain structures to pronounce this judgment of taste while sharing a general idea of beautiful (like enjoying a baby's smile or a sunset). But can it be that simple? Let us return to this paradox question.

Aesthetics since Baumgarten presents the enormous challenge of explaining what taste or sense of beauty means. It examines the so-called judgments of feeling (physical sensation) and taste, which in modern terms can be considered subjective and sensory-emotional values. Gabrielle Star was sensible to this challenge and wrote that

> The very idea of the aesthetic poses a problem of cohesion. It is almost a riddle: how is a sonata like a sunset or a beloved face? The broader question of why we might call all these things beautiful, sublime, or heart-breaking has an analogous one in the domain of the arts: while many of us, specialists and amateurs alike, associate music, painting, poetry, and other kinds of creative works together, perhaps it ought to strike us as strange that we do. Why should works that address different senses, using differing means, seem to produce the same set or class of feelings? Why, in other words, should we feel beauty across the arts at all? (Starr, 2013, p. 2)

We must keep in mind for the purpose of this essay that it is about analyzing the possibility of the existence of an aesthetic brain. In this sense, it is important to see what possible responses the brain neuroanatomy can provide. David Freeberg and Vitorio Gallese say something that is closely linked to this but at the same time, detached from it: beauty is not in the object but in the brain of the beholder.[7] Note, in the brain of the beholder. We have to go deeper to understand this challenging question. As we all know, there are different aesthetic experiences in terms of quality, intensity, sensations. For example, imagine some sublime experience of X in Z. All individuals have a sublime experience of X in Z even though they may be experiencing it in different ways (in neuronal terms they are linked to a certain area of the brain – the same area in all individuals – but the neuronal paths and hormone segregation that each one experienced has been certainly different). Note that the neural networks (in a single cubic centimeter) in each individual can vary in millions of possibilities, even if restricted to the same specific area of the brain. So, the question about why do we have different aesthetic experiences

7 *See* Freeberg and Galesse, 2007.

(even that the sublime experience of X in Z is the "same") if the brain areas are similar or why they do not produce equal results, can be rhetorical. It can be because no one can say how or what kind of connections were produced in his own brain, and most importantly, can say nothing about the reason of having the sublime experience of X in Z as the other individuals (said they had) if he is unique. One can say that just as we have unique fingerprints it can be the case that we also have different neuronal and emotional signatures:

> It is important to realize that not all aesthetic experience is created the same, and being moved by a work of art means different things to different people. In part this reflects the variety of kinds of behavioral responses, neural processes, somatic sensations, subjective feelings, and evaluations that make up emotions, as well as the varying ways in which these are integrated into personal histories and cultural contexts.
>
> Differences in the emotional signature for aesthetic pleasures are one neural finding that helps us understand the individuality of responses. But a shared neural response tells us something more compelling about how aesthetics can matter differently for different people. (Starr, 2013, p. 57)

The Caltech researcher, Marcus Woo demonstrated that is possible to electric stimulate regions of the brain that are responsible for dopamine production, for pleasure activity, for recognizing and evaluating beauty, which means that the regions are clearly identify. So, different arts (music, fine arts, etc.) are "processed by different brain centers such as the dorsolateral and ventromedial prefrontal cortex region", which are "linked through neural connectivity to a deep region in the ventral midbrain thought to be responsible for dopamine and secretion" (Woo). Marcus Woo is providing a path to understand the relations between aesthetic experience and brain activity once dopamine is known as a pleasure substance produced in the brain and responsible for delightful feelings concerning aesthetic experiences such as creating art or enjoying music, having pleasant sex or having a nice meal at a sunset. Gabriele Star says that knowing that "aesthetic experience relies on a distributed neural architecture, a set of brain areas involved in emotion, perception, imagery, memory and language", also allows us not only the understanding of what happen in the body-brain subject but also provides a perspective for our future activities within the world we create.[8] He says:

8 Gabrielle Starr give a short neuro-anatomical explanation about what happens in the aesthetical experience: "The minute sequence of the neural events in aesthetic experience requires further experimental elaboration, but in general anatomical terms, neural activation moves from sensory cortex forward toward the basal ganglia (reward processes) and toward the hippocampus and amygdale (memory and emotion – though these functions are not exclusively carried out in these structures). Activation in the orbitofrontal cortex

> Aesthetic experience emerges from networked interactions, the workings of intricately connected and coordinated brain systems that, together, form a flexible architecture enabling us to developed new arts and to see the world around us differently. Systems for emotion and reward, along with the default mode network (an interconnected set of brain areas that contributes to our sense of self-identity, as well as to our ability to imagine other worlds and other people, among other functions), work to enact the necessarily dynamic, constantly reevaluative neural processes that underpin aesthetic life. Through this architecture, aesthetic fundamentally involves our ability to wrest pleasure from the unpredictable and to refine, continually, how we imagine the borders between the world of sense and our sense of self. (Starr, 2013, p. XV)

We see that Starr is pointing out to something that goes much further than just an academic-scientific study about neural correlates of aesthetic experience, that is, he is showing the importance of feeling beauty in everyday life. He is aware of the fragility and limitations that surrounds such a fresh area of study. The fundamental premise of neuro-aesthetics is the use of imagery equipment to view which parts of the brain are activated when experiencing art. But even if we know those parts of the brain activated that does not tell anything about why they are activated. Even so, neuro-aesthetics as already produced some important insights that goes beyond the traditional approaches of aesthetics. One of those studies is the one of Anjan Chatterjee, appropriately called *The Aesthetic Brain*. In it, the neurologist gives us an explanation based on evolutionary psychology and brain imaging linking the concept of beauty with pleasure, that allows him to say that "we find things beautiful because they activate the reward system in the brain. Sex, food and patterns". From this point he says that in the same way art appeals to that brain areas - that is to say, that humans experience pleasure with the curiosity and figuring something out like a piece of conceptual art or a new sound of music -, also the world and their intricate connections with others do the same. The key to understand this perspective is to assume that our brains evolved to desire beauty and enjoy art in the same way we did with food and sex. In fact, the major part of this perspective comes from Arthur Shimamura in his book *Experiencing Art*.

The main concern of Shimamura´s book is with the aesthetic judgment, meaning with the appreciation of art. So, he starts to consider the relation between the artist and the beholder, according to his (own) model on art appreciation in visual arts, the I-SKE, which means the I for Intentions of the artist to be consider by the beholder in three levels: sensations, knowledge and emotions (SKE).[9] In this model, from the point of view of neuroaesthetics, it

follows, but there are interactive loops that reach between these frontal areas and the basal ganglia so that higher-order, complex processes, may continually feed into one another". (Starr, 2013, p. 24)

9 "Art excites, surprises, and humours us by creating an imaginary world filled with ideas and feelings. In this manner, aesthetic experiences arouse our perceptions, memories, and emo-

is implied the existence of perceptual experiences with aesthetic judgments, and the memories of those events, assuming that both artist and beholder are themselves social and cultural products of the human species. That is why for Shimamura the way we see art and have aesthetics experiences it is not just about having a perceptual experience; he says that it should be consider the culture, knowledge acquired by individual experience and knowledge of the artist.[10] A few problems arrive from this model but that require another agenda. For now, one topic must be underline here, because like Semir Zeki says in his works, one should not be making the emblematic confusion of physical beauty with moral beauty. Take for instance the following sentences: "beauty is good" and "ugly is bad"; this sort of quantification between moral or ethics qualities with aesthetical concepts delivers a model that have been lasting for at least 2400 years old, that is, at least since Plato and followers. But to return to our interest, the question (according to our framework theme) can be the same exposed by Clive Bell when asking what is common when experiencing beauty, and we can provocatively add, what happens in neuro-aesthetics terms when having an aesthetic experience (not necessarily about beauty), what is the common ground of these aesthetical experiences?

As we have been seen and now know, from the studies of Jean Pierre Changeux to Semir Zeki, that the main area signalized by the MRI techniques are the medial orbital-frontal cortex, which according to Elkhonon Goldberg is where executive brains functions take place. For the author, in fact, frontal lobes are the most "human" region of the brain, once it is from there that complex mental processes like judgments, decisions making in moral, ethical and aesthetic judges take place (creating memories of it). Like Shimamura said "the orbitofrontal cortex modulates and interprets emotional signals and links them to social-cognitive factors" (Shimamura, 2013, p. 259).

As Joseph LeDoux writes, emotions forge strong memories. One of the brain regions strongly involved in the emotions-memory interaction is amygdala. As has been implied previously, amygdala is involved in processing the emotional meaning of facts/events. It connects with the other brain regions that deal with sensory experiences, and it also seems to emotionally influence perception (which is why it alerts us to perceive emotionally significant events, even when we are inattentive). Knowing this, we understand the importance of memory in aesthetic experiences, mainly in its role of consolidating patterns (imagery), providing consistency to all this background of aesthetic experiences. About this, two things must be underlined: first, memory is not in one place: memories are not stored exclusively in

tions without any reason other than to evoke pleasure. It is often the intention of the artist to make us perceive, think, and feel in new and different ways. This view of the artist and beholder is the essence of the I-SEK model. Given this framework, art can be construed as thinking with feeling". (Shimamura, 2013, p. 191).

10 "The I-SEK framework offers a schema for thinking about multiple approaches. When we look at art we must consider how it affects our sensations, knowledge, and emotion. On those rare and exhilarating moments when we have that "wow" experience, I would contend that all I-SKE components are driven to the maximum". (Shimamura, 2013, p. 260).

a (determined) part of the brain. Different types are stored in different interconnected brain regions. For example, for memories that are about events (episodic), as well as facts and general information (semantics) - there are three important areas of the brain: the hippocampus, the neocortex and the amygdala. Implicit memories, like motor memories, depend on the basal ganglia and cerebellum. Short-term working memory is highly dependent on the prefrontal cortex.[11] Second, memory and emotion are closely connected and Shimamura expanded the importance and meaning of memory in aesthetic experiences (namely in the appreciation of works of art) but also in the construction of our own identity and life:

> We are defined by our personal memories. When we experience a new culture, friendship, love, birth, or someone's death, we change and learn from the experience. Episodic memories shape the way we see, think, and feel. Without these personal memories we lose our self-identity. Yet the paradox of episodic is that as personal as they are, we all share common experiences. Moreover, we are all guided by essential human needs. In art, like our episodic memories, these universal experiences are remembered as we are transported to another time and place. Art offers a slice of life and tells a story about the human condition that we link to our own experiences – to our own self-identity. Without our personal memories, art simply becomes a document (Shimamura, 2013, p. 151).

Let us now consider the important role that bioart and neuroart could provide for this discussion. It should be noted that we write the role that they could play or provide, but that in fact they do not do. If we look at an exhibition of neuroart or bioart, we can say that our aesthetical experience is almost the same as if we were looking at groceries in a market store, that is, we feel almost absolutely nothing. Between what it could give and what is given there are a major difference, but mostly, a lost opportunity. It seems that this sort of art, which have almost the same age as neuroaesthetics, fail to provide not only the essence of its own definition but also his potential to developed a solid structure in the art field, that is, the truth meaning and interpretation of neuro correlates of brain areas with aesthetical experiences and judgments.

From a quick analyses at bioart and neuroart, and even admitting that they provide strong questions to think about (mainly ethical ones), they fail from the neuroaesthetical point of view. Take for instance the works of Eduard Kac, George Gessert or Oron Catts we see that they deliver ethical or moral problems more than artistic or aesthetical ones. But the point that we

11 "More than this, at a neural level, autobiographical memory employs the medial prefrontal cortex and the posterior cingulate cortex, both of which are activated (the anterior medial prefrontal cortex extensively so) in powerful aesthetic responses; in addition, many of the brain areas sensitive to emotions in aesthetic response, especially the hippocampus and the medial prefrontal cortex, perform functions essential to memory as well. Indeed, given the way in which imagery and reward rely on prior experience, I think it is impossible to dissociate aesthetic experience from memory circuitry". (Starr, 2013, p. 146).

want to highlight is that they could be the main source to think about neuroaesthetics experiences because, on one hand, they have the access, they have privileged material and on the other hand, they are dealing with topics (more or less directly) about life, and therefore, they could be reshaping the way we see, perceive and feel art or beauty (among other aesthetics categories). To conclude this issue, bioart and neuroart are contemporary ways of viewing different aspects of life, whether they are abstract or neurological configurations or representations; from the neuroaesthetical point of view, they miss the mark of a broader understanding of the boundaries of mind and brain, and therefore, of the existence of a prolific aesthetical role inside our heads that we can call mind.

As we already said, memory and feelings are very important to understand the wholly process. Note that the way we could understand the processes of viewing beauty through visual perceptions, the way things happen in brain, with the role of pre-frontal cortex and the limbic system – that is, the way we link experiences with emotions and judgments – and the way we keep memories of it, can also be a model to do a turn in the mind-body problem. In fact, if we consider the aesthetic brain as the source of aesthetical experiences, we are not only regarding art experiences but all of our daily life. Assuming this, means that aesthetical experiences take place in several sets and therefore, it can be assumed that it might be the case that we no longer need the dualistic vocabulary for representing our mental life; there is no need of a soul (the cartesian *res extensa*) if there is already in a substance called body, all the necessaries systems to appreciate and judge what we feel when being in the world (and we are always in the world-with-others). If we recall the studies of António Damasio it is showed that even with a lack of some brain parts, individuals maintain their consciousness and mind intact. One of the reasons seems to be the plasticity of the brain and the fact that brain can reshape itself, can reshape its functions according to his own (subject body) needs. This also means that brain can reconfigure other areas to develop specific functions, and therefore, to reconfigure the necessary ways to analyse, feel and judge the world in his beauty or ugliness as an aesthetical brain normally does.

To conclude: neuroaesthetics opens doors to understand the brain's behaviour in the face of aesthetic experiences. Even admitting the potential of neuroscientific studies, they cannot provide all the answers.[12] The explanation that goes from the brain functioning to the segregation of hormones says little about the phenomenon of subjectivity. According to Thomas Nagel the feeling of what it is like to be is what characterizes the subjective expe-

12 Like Chatterjee says: "We encounter limits of what neuroscience can contribute to aesthetics when we consider meaning in art. Neuroscience has something to say about the way we recognize representational paintings. We know something about how we recognize objects or places or faces. In so far as art depicts objects or places or faces, we know something about how the brain responds to them. But this knowledge is about our general understanding of these categories of objects and not about the particular response to a Cezanne still life, or a Rembrandt portrait, or a Turner landscape. (…) Neuroaesthetics studies show us that our brains do not have a dedicated aesthetic or art module in the brain". (Chatterjee, 2013, p. 183).

rience and there is no single explanation for it in any neuroscience manual. Thus, the definition of aesthetic brain is only possible due to the existence of this extraordinary part that occurs in the brain - the mysterious part that we like to call subjectivity - and that allows the understanding of the complexity of the human being. Answering the question posed in the title of this essay, remembering: Is there an aesthetic brain? the answer must be clear: there can only be an aesthetic brain if there is something aesthetic about it. This part that allows us to quantify its functioning as beautiful, is this incredible thing that we call *qualia* and that ultimately composes the aesthetic part of our lives. The aesthetic brain may be, after all, what we call the embodied mind. Like Shimamura said,

> Duchamp was correct when he stated that art should be "at the service of the mind". (…) From that point on, the brain acts to accentuate, fill in, segregate, and organize patterns of light into recognizable forms within a spatial environment. Thus, all art, and in fact everything you see, is at the service of the mind (Shimamura, 2013, p. 256).

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