
8 Evolutionary approaches to art and aesthetics
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Evolution provides the key to understanding why living organisms are the way they are, and natural selection constitutes the fundamental principle for explanation in biology (Ayala, 1970). Darwin's (1859) theory of evolution by means of natural selection revolutionized biology because it provided a unified explanation for centuries-old observations of the living world. For all our peculiarities and uniqueness, human beings are the result of evolution, just like bacteria and fungi, and our lineage has been shaped by the very same mechanisms of natural selection. A meaningful understanding of human beings - of our anatomy, physiology and behavior – is not possible unless we consider ourselves in the light of evolution (Dobzhansky, 1973). Why do we have color vision? Why do things taste the way they do? Why do we feel pain? Why do we feel attachment toward our kin? Why does it feel nice to be accepted and popular? The answers to such questions reside, in part at least, in our evolutionary history, in the fact that our species evolved from primitive hominins that evolved from primitive primates that evolved from primitive mammals, and so on.

Darwin (1991) believed that natural selection was not only responsible for the evolution of physical traits, but for mental traits as well. Our capacity for perceiving, for attending, for remembering and recognizing, for making decisions and for feeling emotions, together with all other mental capacities, should be understood as products of a long evolutionary history. Contemporary American psychologists received Darwin’s proposal with enthusiasm. Prominent voices argued that the mind could not be comprehended without reference to the world it evolved in, and that the main purpose of mental processes was to organize adaptive behavior. Herbert Spencer (1870, 1873), for instance, showed how cognition and memory were the products of evolution. In his view, they originated from simple forms of association, which came to be heritable with repetition. As they accumulated over time, these heritable associations became instincts, which in turn evolved into higher forms of cognition. James (1890, 1892) was a firm proponent of this “psychology of adaptation and survival-value” (Boring, 1950, p. 507). He wrote that “our inner faculties are adapted in advance to the features of the world in which we dwell, adapted, I mean, so as to secure our safety and prosperity in its midst” (James, 1892, p. 3). His thorough and influential Principles (James, 1890) remains, still today, the epitome of psychology in the light of evolution.
It might seem surprising to learn, thus, that art and aesthetics, apparently so distinctively human, were not systematically studied in the same light. At the time, in fact, very few psychologists approached art and aesthetics from an evolutionary perspective, and the whole topic has remained largely out of the mainstream of experimental psychology. There are two main reasons for this. First, the prevailing view during the nineteenth century considered that art and aesthetics had no purpose beyond themselves. The notions of art for art's sake and of detached aesthetic contemplation were the antithesis of the kind of mental processes whose purpose was adaptive and preservative action. The few that realized the adaptive value of aesthetic responses tended to restrict its scope to mate choice or habitat selection. The second reason is that, although the importance of aesthetics was acknowledged by evolutionary-minded American psychologists, most—including James (1890) himself—did not seriously deal with the topic. Psychological aesthetics was born in Europe (Fechner, 1876), where evolutionary thought had not impregnated psychology to a lesser extent. There, it thrived into a consolidated research program, mostly in Germany and the United Kingdom, where it remained largely out of reach from evolutionary thinking. Psychological aesthetics became a topic of interest in the United States only at the turn of the century, where it was soon absorbed into behaviorism as the study of pleasant and unpleasant responses to external stimuli. Aesthetic experiences were no longer conceived as mental processes; they became behavioral reactions to the environment. Only in the wake of the cognitive revolution did experimental aesthetics reemerge as a proper domain of experimental psychology (Berlyne, 1971). Berlyne's new experimental aesthetics was set on biological foundations, though with little reference to evolution. It was not until the burgeoning of evolutionary psychology in the early 1990s (Barkow et al., 1992) that a community of researchers interested in the evolution of art and aesthetics emerged.

This chapter revises attempts to understand the evolution of art and aesthetics. How and when did the capacities for art and aesthetics appear? This is a legitimate evolutionary question. It is not, however, an easy one. Although plausible hypotheses abound, not much has been actually proven since the earliest proposals based on Darwin’s (1859; 1871) principles of natural and sexual selection. At least three reasons explain such meager progress. First, whereas the locomotion and habitat of our ancestors, for instance, can be studied from their fossil remains and the fossils of plants and other animals found at the same archaeological sites, there is relatively little material evidence for the evolution of art and aesthetics. Even the evidence of pigment processing, engraving or painting is evidence only of the results of cognition and behavior. We can only infer the cognitive and affective processes that led to such manifestations, as well as their personal and social meanings and roles. Second, the fact that our closest primate relatives produce nothing like art, and appear to lack aesthetic appreciation, reveals a discontinuity that is difficult to reconcile with the slow and gradual process of natural selection. Such a divide poses difficult challenges for potential comparative studies. Third, the notions of art and aesthetics lack clear-cut definitions. It has even been argued that attempting to define art is a futile endeavor (e.g., Weitz, 1956) because the concept “art” is an open concept: new exemplars of artworks, styles and art forms have emerged throughout history, and will foreseeably continue to do so, constantly forcing new definitions that can accommodate them. Can we really learn anything about the evolution of a human capacity we have trouble defining? Would there be any hope of understanding the evolution of human locomotion or diet if researchers did not agree on the crucial features that define them?

Such difficulties not only hamper our understanding of the evolution of art and aesthetics. They also encumber research on the evolution of other mental traits, like language or morality, to the point that in the opening paragraphs of an essay on the evolution of cognition, Lewontin (1990, p. 229) wrote, with unvarnished skepticism: “If...it were our purpose in this chapter to say what is actually known about the evolution of human cognition, we could stop at the end of this sentence.” Lewontin’s (1990) chapter aimed to question the usefulness of hypotheses about the evolution of mental traits in the absence of direct evidence to test them, and to caution against mistaking plausible scenarios for demonstrated truth about the evolution of cognition in general.

Lewontin (1990), nevertheless, went on to write a whole chapter after that sentence, hinting that there might be some hope after all, if we proceed cautiously. And there are at least three reasons to proceed. First, the capacity for art and aesthetics has traditionally been considered one of the features that identify the human species, distinguishing it from its closest living and extinct relatives (Dobzhansky, 1962). The appreciation of aesthetics and art seems to be “unique to the human species in its essentials and a common part of our shared biological endowment,” a “true species property” in the terms Chomsky (1988) used to refer to language. To understand the nature of the appreciation of aesthetics and art is, thus, to understand a part of what makes our species unique. Second, not only are art and aesthetics related to the creation and admiration of some of the most extraordinary manifestations of human culture, such as music or architecture. They are also part of many of our ordinary activities, such as choosing what clothes to wear, which car to buy, how to decorate our homes and who to approach or avoid in the street depending on the context (Leder et al., 2010). Finally, our understanding of the capacities to make and appreciate art and aesthetics will be incomplete unless we know about their evolution ( Tinbergen, 1963).

### Approaches to the evolution of art and aesthetics

The reconstruction of the evolutionary history of biological traits—including the capacities for art and aesthetics—tends to begin with questions “which ask what is or might have been the selective advantage that is responsible for the presence of a particular feature” (Mayr, 1983, p. 325). Huron (2001), for instance, asked “What advantage is conferred on those individuals who exhibit musical behaviors over those who do not?” (2001, p. 43). Most hypotheses about
the evolution of art or aesthetics are grounded on the assumption that they are adaptations. An adaptation is usually defined as a trait that endows an organism with a specific selective advantage. However, fortuitous benefits are also adaptive, but they should probably not be regarded as adaptations (Williams, 1966). Thus, researchers agree that the term should be restricted to traits that provide selective benefits and that emerged through natural selection owing precisely to those benefits (Lauder et al., 1993). What benefits might have art and aesthetics provided humans? Different possibilities, examined below, have been set forth. Most were initially proposed during the late nineteenth or early twentieth centuries, and have been repeated in slightly different forms at later times. The majority of these adaptive hypotheses postulate individual selective advantages, though some researchers have argued that art and aesthetics also confer group-level advantages (Brown, 2000).

Some authors, however, believe that art and aesthetics do not qualify as adaptations, that they should be regarded as exaptations, or “features that now enhance fitness but were not built by natural selection for their current role” (Gould and Vrba, 1982, p. 4). Thus, exaptations include traits that did not originate owing to the direct effects of natural selection but that have subsequently been put to new advantageous uses, and traits molded by natural selection to perform specific functions—that is to say, adaptations—that were later coopted to perform different functions and provided new benefits.

Table 8.1 summarizes some of the most popular hypotheses about the evolution of art and aesthetics. It classifies them according to the main postulated evolutionary mechanism (adaptation or exaptation) and according to the level of selection in the case of adaptive scenarios (individual or group). Some of these proposals, such as habitat selection and mate choice, were intended mainly to explain the origin of humans’ capacity for aesthetic appreciation. Others, such as group selection theories, aimed to account for the evolution of our capacity to produce and appreciate art. Because some authors believe there is an intimate connection between art and aesthetic qualities, especially beauty, they have postulated that art and aesthetic appreciation were driven by a common selective advantage, such as mate choice.

### Habitat selection

Clay (1908) was among the first to propose that the adaptive value of aesthetic appreciation derived from our ancestors’ perceptual and affective responses to environments. Specifically, the main selective advantage conferred by aesthetic responses—be it beauty—was the possibility of distinguishing favorable from unfavorable environments.

Evolutionary psychologists updated and expanded this line of reasoning later in the twentieth century. The basic assumption grounding their hypotheses is that habitat selection was especially important to our Pleistocene ancestors because they lived in hunter-gatherer groups that roved across, and frequently resettled in, savannah-like environments. Natural selection molded aesthetic experience through the adaptive advantages conferred by emotional responses when making decisions and solving problems related with such a way of life (Orians, 2001): “Our aesthetic reactions to landscapes may have derived, in part, from an evolved psychology that functioned to help hunter-gatherers make better decisions about where to move, where to settle, and what activities to follow in various localities” (Orians and Heerwagen, 1992, p. 557). Natural selection would have endowed humans with a series of specific adaptations to quickly and unconsciously assess the suitability of certain landscape features, animals, fruits or natural indications that certain behaviors need to be modified (Kaplan, 1987, 1992).

In sum, our aesthetic appreciation originated in emotional responses shaped for generations because of the advantages they conferred in determining which elements in the environment required attention and the appropriate responses to them. From this perspective, humans’ preference for natural scenery, environments and landscapes is not just a special case of aesthetics; it is the foundation of some of the more traditional aesthetic domains (Kaplan, 1987, p. 25).

### Mate choice

The association between aesthetic appreciation and mate choice has a long tradition in philosophical thinking. Joseph Addison (1712), for instance, believed animals’ particular sensitivity to the beautiful qualities of their own kind served the purpose of attracting them toward potential mates of the same species. Thomas Reid (1785) conjectured that the varied ways in which animals instinctively respond to beauty has a fundamental biological function: “There seem likewise to be varieties in the sense of beauty in the individuals of the same species, by which they are directed in the choice of a mate, and in the love and care of their offspring” (p. 744).
Darwin (1998), however, was the first to elaborate a proper theoretical framework capable of explaining the role of aesthetic appreciation in mate choice: the theory of sexual selection. This theory originated from the observation that certain individual organisms have better access to reproduction than others of the same species and sex. One of its main accomplishments was to explain the existence of sexually dimorphic traits, especially those that have evolved to be so conspicuous and exaggerated that they seem to counter the logic of natural selection. He identified two major categories of sexual selection (Jones and Ratterman, 2009): intra-sexual and intersexual. Intra-sexual selection refers to the competition among members of the same sex to access potential mates. It can take the form of staying reproductively active longer than rivals, developing strategies to find mates faster, eliminating the competition through display or combat, sperm competition, suppression of competitors’ gonadal function or elaborating alternative mating strategies, such as female mimicry or inconspicuous mating behavior, among others. Intersexual selection, conversely, occurs when the preferences of one sex restrict access to mating. Examples include: limiting the chance of fertile mating with specific individuals, female selection of sperm from different males in her reproductive tract or selection among zygotes, embryos or offspring. Intra-sexual selection leads to traits related with aggression and intimidation, such as large size, horns, sharp teeth and claws; intersexual selection leads to advertisement and enhancement of secondary sexual traits (Paul, 2002).

The capacity to derive pleasure from sounds, colors and forms was, in Darwin’s (1871) view, an important element of intersexual selection. In fact, he believed that the appreciation of beauty was common to many animal species whose evolution has been driven by sexual selection. He noted, as Reid (1785) had, that the appreciation of beauty in other species was confined to opposite-sex conspecifics. Even though our species is peculiar in the open-endedness of the category of objects we appreciate aesthetically, Darwin (1871) believed that human ornaments, body decoration, art and music originally performed a similar role in many animal courtship songs and signaling calls. Aesthetics and art, thus, are the result of sexual selection.

Building on the foundation Darwin (1871) laid down, Allen (1880) conjectured that the earliest humans possessed only an elementary sensibility for the beauty of form, symmetry and color. The fully conscious manifestation of this capacity would occur solely in relation to physical features of opposite-sex conspecifics. The expression of this sensibility in relation to objects, such as flowers, fruits and feathers, would have been very limited. As human beings continued to evolve, this primitive appreciation of beauty broadened to include the sensibility for natural and cultural elements (Allen, 1880). The emergence of a flexible intelligence in humans decisively influenced this process of continuing evolution. Whereas the human production and appreciation of symmetry, for instance, are flexible, learned and consciously appreciated and valued for themselves, in other animals they emerge from stereotyped innate behavior patterns.

Miller (2000, 2001) updated Darwin’s (1871) and Allen’s (1880) views on the role of mate choice in the evolution of art and aesthetics and placed them within the framework of modern evolutionary psychology. He argues that our aesthetic preferences evolved favoring works of art that could only have been created by high-fitness artists. Evolution shaped our aesthetic preference as a domain-specific adaptive mechanism to distinguish difficult from easy, rare from common, skillful from careless and costly from cheap. Thus, we are inclined to consider people who are able to produce high-quality work as attractive due to our evolved preferences for what is difficult, rare, skillful and costly. Such qualities serve as indicators of health, energy, creativity, access to rare materials, good learning abilities, intelligence and coordination (Miller, 2001).

**Acquisition of knowledge**

A different line of reasoning suggests that art’s main advantage is that it stimulates knowledge acquisition and improves perceptual and cognitive problem solving. Allott (1994), for instance, suggested that artists are driven to create by a biological impulse to explore the world and the motivation to reproduce it in some lasting manner. He is not alone in suggesting that the selective advantage of art is related to knowledge acquisition. Some of the pioneers of neuroaesthetics have argued that art’s main function is to acquire knowledge about the world. In this sense, art constitutes a sort of continuation of the brain’s main function (Zeki, 2004). Given that art is the product of the human brain, its creation and appreciation are necessarily constrained by its properties. Zeki (2001) believes that art cannot be understood without reference to two main “laws” of the brain. The first of these is the **law of constancy**: Just as one of the main functions of the visual brain is to gather information about the constant and essential qualities of the objects around us despite their continually changing appearance due to local conditions, great works of art constitute refined renderings of fundamental and constant features. The second law, the **law of abstraction**, is based on the fact that efficient organizing of knowledge requires moving beyond the particular, creating representations that are applicable to many instances. This also allows overcoming working memory limitations and the need for recalling all the details of encountered instances. Abstracting and conveying general ideas and concepts are important features of art. The ambiguity of great art affords spectators the possibility of many different interpretations and meanings (Zeki, 2002).

Like Zeki, Ramachandran and Hirstein (1999) argue that art is based on the neural mechanisms that allow us to understand the world and create our internal representations of it. They, however, believe that the work of artists not only reflects the essence of things, ideas or feelings. Rather, artists distort them by magnifying their distinctive features. As a result, artworks engage the same neural mechanisms involved in processing the real entity, though in a more powerful way. Artists, in Ramachandran and Hirstein’s (1999) view, use nine strategies to exploit the neural mechanisms that enable us to make sense of the world. Importantly, in
the context of art, these mechanisms lead to pleasant feelings. First, they hypothesize that artists' enhancement of certain shapes produces an increase of activity in the brain regions that process form, a phenomenon akin to the peak shift effect. Second, artists' work draws on the mechanisms of perceptual grouping and binding of features. Third, by isolating a single area, they also emphasize a given feature, focusing attention to a particular source of information and directing the viewer to the artists' enhancements. Fourth, artists also manipulate contrast, which engages neurons in specific brain regions that are sensitive to color or motion contrasts. Fifth, artists might challenge spectators with perceptual problems they can solve, which leads to satisfaction. The sixth and seventh resources grounded in information processing mechanisms used by artists are symmetry and order. Eighth, to avoid unlikely coincidences and one-of-a-kind images, artists tend to portray content from a generic point of view. Ninth, artists will often make use of visual metaphors, produced as a result of abstraction and the formation of concepts (Ramachandran and Hirstein, 1999).

Imagination, pretense and fiction

Some have argued that art's adaptive role throughout human evolution was intrinsically linked to play. Grosse (1914) believed that art and play emerged from a common tendency to engage in mental or physical activities lacking any specific purpose, often involving diverse forms of imitation. He thought this tendency had been part of human nature since the origin of humanity, and cultural evolutionary processes shaped and molded it into its different manifestations, past and present. Groos (1919) agreed with Grosse (1914) that art's main evolutionary foundation is play, and noted the common features binding art and play: Enjoyment of regularity, rhythm, imitation, illusion and attraction toward intensity and difficulty.

Influenced by the tight relation Schiller (1895) wove between play, art and beauty, Groos (1919) regarded art as a form of adult play. And just as play is fundamental for children’s healthy development, he viewed art as biologically and socially decisive for adults' development. Art - he thought, following Schiller (1895) - is an essential means for the improvement of human capacities. Art allows cultivating and exercising perceptual, cognitive and affective processes that would otherwise wither with the monotonous routine of everyday human life. There are two main aspects that distinguish art from play, however. First, in art, imitation is not an end in itself, but a means to create an effect on spectators. The production of art is inseparable from the fact that it is destined to be appreciated. Second, and probably more importantly, art provides a moral elevation and insight into life that play does not (Groos, 1919).

Almost a century later, Carroll (2007) suggested that this second property of art is its main adaptive value. He postulated that literature, as well as other art forms, foster the elaboration of imaginary experiences. Although these images can serve as practical guides for action, this is not their main function. Their fundamental purpose is to allow people to make sense of the world around them, and of their reactions to it. It lets them assess and organize their own principles and motivations, and to value important aspects of their lives, giving personal and social meaning to their existence (Carroll, 2006).

Tooby and Cosmides (2001) elaborated the notion that the playful use of illusion is at the root of art within the framework of evolutionary psychology. They argued that natural selection endowed our species with specialized cognitive systems for art, and that fiction provides the key to understanding its adaptive value. The main selective advantage of this capacity for fiction is that it stimulates and helps organize the development of the ability to reason about conjectural situations. Furthermore, fiction allows practicing certain skills and responses to situations that could be dangerous, infrequent or uninformative in real life. Through fiction we can safely explore situations and events, improving the skills and knowledge required to deal with real-world situations.

Influence over others

Boyd (2005) shares with the proposals in the previous section the conviction that the fundamental evolutionary building block of art is the ability to imagine alternative realities, to think beyond the immediate present, testing and examining ideas. He believes, however, that this is only one of the two cognitive building blocks of art. The second one is the fundamental human drive to seek and direct the attention of others, which developed out of primates' social attention. He argues that art emerged as these two capacities became intertwined throughout human evolution. Natural selection made it pleasurable to engage in unbounded exploration of imagined scenarios, and increased the importance of social attention, endowing us with a great ability to share and guide others' attention. At some point, “the ability to share and shape the attention of others by appeals to common cognitive preferences led to the development of art: to behaviors that focus not on the immediate needs of the here and now but on directing attention and engaging emotion for its own sake, even toward distant realities and new possibilities” (Boyd, 2005, p. 10). Art would confer two adaptive advantages: At an individual level, it would foster commanding and following others' attention; at a social level, it would increase a group's coordination and cohesion, improving its chances of outcompeting others.

Taking this view a step further, Aiken (1998) argued that art's main adaptive value resides in the control of behavior. Although art can use cultural associations and techniques to move us, she believes that it also makes use of core automatic emotional response to certain elementary perceptual configurations. In her view, humans are predisposed to react in reliable and consistent ways to specific combinations of lines, colors, shades, angles, sounds and so on, which are often used in artworks around the world. Artworks function, thus, almost as complexes of fixed action pattern releasers. Such complexes can elicit a broad spectrum of behaviors and emotional responses, though to make her case she focuses mostly on defensive responses to threatening cues in art, such as sharp edges, or pointy angles.
In Aiken's (1998) view, art initially emerged from these automatic emotional responses. The original function of our emotional responses to such kinds of stimuli configurations was to guide our behavior in a complex environment, avoiding dangers and finding resources and safety. At some point, artists realized that they could exploit these reactions, related to environmental dangers and human desire, to control others' fears and pleasures. At this point, art became a means to acquire and perpetuate power. Leading figures in the community would have realized the value of this instrument to produce common emotional reactions in their groups, increasing their unity by focusing on the same goals or problems. Furthermore, they would have recognized that art, as a means of harnessing power, had the advantage of avoiding the use of force.

**Relief of tension and anxiety**

Humans are no different from other animals in their inclination to seek pleasure and avoid pain. Hirn (1900) argued that such a basic natural tendency was the key to understanding art production and appreciation. Specifically, he believed that the external expression of feelings had the effect of heightening pleasure or relieving pain. He also believed that art was primarily a means for expressing and conveying emotions. Such premises led him to conclude that, at an individual level, art was an intrinsically pleasurable experience. However, in Hirn's (1900) view, art is fundamentally social. The expression of emotions, through art or otherwise, elicits similar emotions in other people. In turn, others' sympathetic emotional responses feed back to the original individual, heightening the initial emotion he or she expressed. Artists, thus, are able to go beyond the automatic increase of pleasure and reduction of pain through emotional expression, common to all people. They can heighten pleasure and relieve pain by eliciting similar emotions in others. Although Hirn (1900) believed that every aspect of artistic creation is aimed toward emotional expression and contagion, he noted that the primitive pleasure-seeking/pain-avoiding impulse provided only the raw artistic drive. Artists devised the complex and varied artistic forms and mediums to express their feelings throughout evolution, probably based on elaborate gesture and vocal expressions of emotion.

Hirn’s (1900) line of reasoning was picked up by contemporary researchers interested in the evolution of music and art in general. Fukui’s (2001) hypothesis about the evolution of music, for instance, is grounded on the idea that, at some point during the evolution of our lineage, new tensions arose because of competition for resources and mates. The adoption of a new lifestyle, including monogamy, biparental families and group living would have led to an excess of testosterone, fueling aggression and sexual conflict. Based on the finding that music alters testosterone levels in men and women, Fukui (2001) believes that music appeared as a means to control this hormone's levels, suppressing the problematic aggressive and sexual behaviors it promoted.

Dissanayake (2007) also considers that one of art's essential functions is to relieve tension and anxiety. However, there is a crucial issue that distinguishes her views from those reviewed up to this point. She believes that, together with its relieving effects, art fosters a sense of coping with uncertainty by leading individuals to feel that they belong to a larger community. Thus, Dissanayake's (1992, 2000) evolutionary scenario combines selective advantages for the individual, but also for the group, a topic to which we now turn.

**Enhancement of group cohesion and cooperation**

Grosse (1914) was among the first to realize that during human evolution art had an important role in developing and strengthening social bonds within groups. This view contrasts with many of the previous hypotheses, based mostly on competition for resources or mates. Grosse (1914) contended that art was eminently a group activity during the early stages of human evolution. The individual relevance of art became apparent only recently, after the gradual specialization of certain people in artistic activities, allowing them to achieve highly valued creations. Dissanayake (1992) also emphasized that human arts did not emerge as autonomous activities; they were originally intertwined with rituals and ceremonies. Art’s main evolutionary contribution was to reinforce social cooperation and group cohesion. The way she views the nature of art is fundamental to the articulation of her evolutionary proposal:

> [I view] art itself as being not an entity or a quality but a way of doing or treating something; that is, a behavior of art, or "artification." When "artifying," I suggest, one intentionally makes ordinary reality extraordinary through certain operations: formalization, elaboration, repetition, exaggeration, and (sometimes) manipulation of expectation, or surprise. (Dissanayake, 2007, p. 9; emphasis in original)

By making our ancestors feel they belonged to a social group, the shared experiences of making special or "artifying" through temporal and rhythmic coordination of behavior provided, in Dissanayake’s view, a way to mitigate apprehension and nervousness, encouraging a sense of coping with uncertainty, as noted in the preceding section. Dissanayake (2000) proposes that the origin of such “artification” behaviors and their soothing consequences back to early evolutionary stages of the genus Homo. This genus’ commitment to strict bipedalism required the narrowing of the pelvis in large-brain-sized erectus-grade hominins, about 1.8 million years ago. Natural selection favored a shorter gestation period and the appearance of maternal strategies to provide the additional care for extremely immature offspring. Those ancestral adults communicated with infants using simplified or stereotyped, repetitive, exaggerated and elaborated visual, vocal and kinaesthetic signals, which must have caught infants’ attention and generated states of anticipation and expectation. Such behaviors served as a pool from which later hominins could draw when they began to engage in artistic and ritual activities (Dissanayake, 2000). In fact, these are the attributes that constitute the essential components of ritualization and artification observed in the art of all human societies.
Art as an exaptation

Darwin (1871) tried hard to understand the mystery of how natural selection had produced the human ability for, and interest in, music, given the absence of decisive advantages it afforded. In his solution to this mystery, Pinker (1997) excluded all adaptive function from music. He famously likened music to cheesecake, conceiving it as a non-adaptive pleasure-seeking mechanism. In his view, most features of other art forms also lack adaptive value. Music, and maybe art in general, did not directly promote survival, it just exploited some of the pleasure mechanisms that appeared as a way to reinforce some sort of adaptive behavior.

Pinker (1997) is not alone. De Smedt and De Cruz (2010) revised various lines of evidence relevant to the origin and evolution of art, and concluded that the production and appreciation of most instances of art emerged as by-products of common perceptual and motivational cognitive processes that evolved because they solved problems that were originally unrelated to art, including the perception and discrimination of salient features of the visual world and speech. Davies also believes that art is closer to being an exaptation than an adaptation:

"When I review the theories and the evidence, I am doubtful that the arts, either together or singly, are selected to serve an adaptive function. If I had to bet, I would say that the adaptations that give rise to art behaviors are intelligence, imagination, humor, sociality, emotionality, inventiveness, curiosity. Though art is mediated by culture, it gives direct and immediate expression to these traits and dispositions, so I would identify it as a by-product rather than as a technology. Art gives vivid and powerful expression to these qualities, which are central to our human nature and indicate our humanity." (Davies, 2012, p. 185)

In view of the fruitless discussions about the adaptive advantages conferred by music, or lack of them, McDermott (2009; McDermott and Hauser, 2005) advocated an experimental approach to determine the adaptive status of several musical processing components. Their basic assumption is that any perceptual or cognitive processes involved in music that are shared with other closely related primates cannot be considered to be part of an adaptation for music. Rather, they should be viewed as pre-existing cognitive traits that have been recruited by music at a later evolutionary stage, that is to say, as exaptations. Musical adaptations should be exclusively human, as well as exclusive to the domain of music. For instance, it has been argued that the capacity to process pitch contours, and recognize versions that have been shifted up or down in overall pitch, are a uniquely human trait and specific to music. However, the fact that people can also recognize brightness and loudness contours, even when the relations are replicated in a different range, led McDermott (2009) to argue that contour processing relies on general mechanisms of the auditory system, and that other animals' difficulties with recognizing transposed melodies might be related with limitations in their abilities to cope with relations among stimuli. Thus, "There is, as yet, no compelling evidence that any of these represent traits that are specific to music, consistent with the notion that music is a side effect of traits that evolved for other functions" (McDermott, 2009, p. 168).

Combinations

Although the different explanations for the origin of art and aesthetics have been offered as alternatives, these need not be mutually exclusive. In fact, some researchers have offered elaborated hypotheses that include different combinations of those. Dutton's (2009) account of the origins of art synthesizes a number of the scenarios noted above. Although art is practiced and appreciated in many different ways across cultures, Dutton (2009) believed that it exhibits a cluster of common features. Some of these are characteristics of the works themselves, and others refer to the way we experience them. Not all artworks, art forms or cultural art practices need to exhibit all of these features, but they will certainly show most of them. His cluster is composed of twelve items:

1. Artworks are valued as sources of pleasure, aesthetic pleasure.
2. Producing artworks requires skill and virtuosity.
3. Artworks are produced according to recognizable styles, and following specified rules and norms.
4. Artworks are treasured for their creativity and their novelty.
5. All art is accompanied by a system of criticism, which includes terminology that structures judgment and appreciation of the works.
6. To different degrees, art is about representation: it represents or imitates real or imaginary experiences or objects.
7. Artworks are conceived as separate entities from ordinary life, people create special places, moments or manners in which to engage with art.
8. Artworks are endowed with expressive individuality, reflecting the personality or identity of the maker.
9. The experience of art is fundamentally an emotional one.
10. Artworks are created to be perceptually and cognitively stimulating, to pose an intellectual challenge.
Art is performed, understood and valued within specific traditions and institutions. Artworks foster imaginary experiences in the artist and the audience: “All art, in this way, happens in a make-believe world.” (Dutton, 2009, p. 58)

Because these features are common to art in all human cultures, Dutton (2009) believed that they stem from a biological drive, an innate predisposition, which he called the art instinct. Thus, he aimed to explain the evolutionary origin of the human universal capacity to create and value artworks, understood as the kind of objects and experiences that exhibit most of the features listed above. He framed his evolutionary argument within the parameters established by evolutionary psychology, in a narrow sense (Tooby and Cosmides, 1992). For instance, he believed that the crucial aspects of our human makeup appeared during the Pleistocene, owing mainly to our ancestors’ adaptation to environmental features and challenges. He also committed to a strong version of mental modularity, which assumes that the human mind is constituted by a certain number of specific mechanisms adapted to solve specific environmental and social problems.

Dutton’s (2009) position is clearly adaptionist: art practices appeared and evolved because they increased our ancestors’ well-being and chances of survival and reproduction. He articulated his account based on three main adaptive pillars: storytelling, social cohesion and mate choice. The event that set the evolution of art into motion was the appearance of the capacity to create and understand invented stories and fictions. Fashioning hypothetical scenarios, future possibilities or alternatives to past events allowed our ancestors to plan and rehearse their responses to physical or social situations that in real life would be menacing or compromising. The capacity to imagine rich stories would benefit individuals by increasing their competence when actually encountering those situations. It would also benefit the community because storytelling allows communicating advice and enhances empathy toward others, strengthening the group’s bonds. Those who were better at storytelling would have had better chances of survival and transmitting this capacity to their offspring. Also, groups with good storytellers would have had better chances of survival than groups with fewer or worse storytellers (Dutton, 2009). In addition, individuals who were more proficient at creating engaging stories or objects would have been more successful than others in attracting mates for reproduction, who presumably appreciated such features as indicators of the creator’s fitness, much in the line of Miller’s (2000, 2001) argument. At some point during human evolution, the capacity to imagine and embellish stories to capture others’ attention would have generalized to other forms of creation, such as sculpture or dance.

A new framework for the evolution of art and aesthetics

The options reviewed above certainly do not exhaust the range of possibilities. Many more explanations for the origin of aesthetics, art and the particular arts have been presented. Because art and aesthetics perform so many functions in our cultures, any of them could have been their fundamental adaptive advantage. Among this large number of alternatives, some might seem very appealing. Some are logically sound, and well argued. However, in the absence of suitable evidence to test, or at least constrain these hypotheses, any of them could be right. They could also all be wrong. Unfortunately, however, we have no way of knowing, because these hypotheses are seldom accompanied by an appropriate description of the kind of facts that could falsify them. They thus run the risk of becoming little more than “Just-So” stories (Fitch, 2006; McDermott, 2009). Many of the facts required to determine whether art or aesthetics are adaptations or exaptations, or ascertaining the selective advantage they conferred, are simply out of our reach at the moment. Furthermore, we have to consider the possibility that they might never be within our grasp (Fitch, 2006).

Hence, we might as well accept that there is a good chance we will never really know how art and aesthetics evolved, and turn to more productive fields of inquiry. On the other hand, we might devise new approaches that attempt to overcome this obstacle. Fitch (2006), for instance, suggested that the kind of scenarios reviewed above can have a useful heuristic role: They can be used to motivate hypotheses that could be experimentally tested with humans or other animals, in line with the work of Fink, Grammer and Matts (2006) and Schaefer and colleagues (2006) on human attractiveness. In this section, we present a general framework that can serve to guide such kinds of hypotheses and delimit an appropriate theoretical space. This framework, first, defines the kinds of features of art and aesthetics that are amenable to evolutionary explanation, or the sense in which we should conceive art and aesthetics within an evolutionary cognitive neuroscience of art and aesthetics. Second, it assembles the relevant evidence from neuroscience, comparative neuroanatomy and archaeology.

Defining the object of study

Any evolutionary approach to art and aesthetics should make clear the sense in which the terms “art” and “aesthetics” are used. In doing so, at least three crucial facts should be taken into account: (1) Art, as a distinct and autonomous domain of human experience is a recent Western notion. (2) The kind of activities that we recognize as art nowadays do not constitute a natural kind, and have not always been considered to be art forms. (3) Art and aesthetics are practiced and experienced in countless different ways around the world. Unfortunately, the implications of these points are not always fully appreciated.

Art, as a separate domain from craft and other human activities, is a very recent cultural phenomenon. It was only since the eighteenth century that artworks became autonomous objects free from all functional purpose, which could be fully appreciated without reference to context, and which were intended solely for aesthetic and intellectual contemplation. Artworks had previously been an integral part of a community’s events or locations, serving diverse purposes and promoting
social values, beliefs and interaction. However, since the eighteenth century, they were increasingly accumulated in museums or private collections, where they were turned into purposeless objects for contemplation, and their condition as artworks was underscored and exalted (Carroll, 2008; O’Doherty, 1986). Whereas art became inextricably identified with the production of beauty, and regarded as the product of inspiration and genius (Tatarkiewicz, 1971), crafts were relegated to a secondary position, and were thought of as merely requiring skill, following conventions and destined for use or entertainment (Shiner, 2001). This breach was accompanied by a distinction between the gratifications that people were expected to obtain from art and craft. Art, the fine art, was supposed to be enjoyed with a refined and elevated sort of contemplative pleasure, an aesthetic pleasure. Crafts, on the other hand, could produce ordinary functional pleasure derived from the useful or amusing (Shiner, 2001). Thus, the separation of art from other spheres of human experience was paralleled by the tearing of aesthetic interests away from all-purpose and common pleasure (Carroll, 2008).

Our second point was that, although most of the hypotheses reviewed in the sections above attempt to explain the origin and evolution of the class of activities that we regard as artistic nowadays, such as painting, music, sculpture, architecture and so on, the category of arts is not a natural category, it is a cultural construction. The kind of activities we refer to as art in the twenty-first century were not recognized as constituting a common set until recently. Toward the end of the seventeenth century and beginning of the eighteenth, the classification of the arts was widely discussed within European cultured circles. Even Kant (1892) dealt with this issue, dividing the fine arts into speaking arts (poetry and eloquence), plastic arts (painting, sculpture, architecture and gardening) and arts of the beautiful play of sentiments (music and the art of color). But Bateau’s *Les beaux-arts réduits à un même principe* (1746) turned out to be the most influential classification, and it is regarded as the decisive step toward the modern system of arts (Kristeller, 1952; Shiner, 2001). Bateau separated the fine arts from the mechanical arts because he believed that fine arts sought to imitate nature, though choosing only that which was beautiful, and that their purpose was pleasure. The fine arts included music, poetry, painting, sculpture and dance. Eloquence and architecture were placed in a separate group that combined pleasure and usefulness (Kristeller, 1952). Such a system could obviously only have appeared at a place and time when imitation and purposelessness were regarded as the essence of art, and it turned out to be very appealing.

Although the notion of a common essence to all arts that justifies their inclusion in a common category has endured the passage of time, the modern system of the arts is more a reflection of the spirit of a past time than of the nature of art. The category “art” is a conventional division of objects or of human activities or capacities. There is nothing in the nature of painting that makes it more an art than gardening or eloquence. It is precisely because we have lost sight of the idea that there is no essential quality binding our cherished arts together that we have been searching for a single explanation for the evolutionary origin of the human capacity to produce and enjoy art. We have been trying to determine the fundamental selective advantage that art conferred our ancestors. Stating, for instance, that “The purpose of art, surely, is not merely to depict or represent reality – for that can be accomplished very easily with a camera – but to enhance, transcend, or even to distort reality” (Ramachandran and Hirstein, 1999, p. 16) is a gross overgeneralization: “Even a fleeting visit to one of the great museums might serve to convince the authors that few of the exhibits conform to the laws of art they postulate” (Gombrich, 2000, p. 17). Contrary to what Ramachandran and Hirstein (1999) state, the purpose of art is manifold. Art performs and has performed many functions, some of which might have been beneficial for individuals, some might have been beneficial for groups of people and some might have had no immediate benefits. Moreover, these benefits might have changed dramatically throughout history.

Our third point is extremely relevant, because most of the evolutionary work we have reviewed has taken Western art and aesthetics as a point of departure. They have mostly tried to explain art as we understand it, as we have learnt it and as we appreciate it. Western art and aesthetics, however, are not the best representatives of art and aesthetics as they are practiced and understood around the world. They are most familiar and comprehensible to Western researchers, but they are the result of just one of the many particular traditions in the world, the European one. It is fruitless to attempt to explain the biological evolution of art understood as an autonomous domain of human experience related with the purposeless contemplation of the fine arts for their own sake. These qualities of Western art are already adequately explained by art history. If we wish to understand the biological bases of art and aesthetic experience, a particular form of experience afforded by our human nature, then we need to be able to account for varieties of such activities across many human cultures. Anderson’s (1989) study of art around the world can help us home in on the special features exhibited by art in different cultures: (1) it conveys culturally significant meaning; (2) it shows a characteristic style; (3) it is produced using a sensuous, affective medium; (4) it involves the recognition of special skill. He has, accordingly, defined art as “culturally significant meaning, skillfully encoded in an affecting, sensuous medium” (Anderson, 2004, p. 277).

In sum, from an evolutionary perspective, it only makes sense to explain the origin and evolution of art/craft, or popular art, or art with lowercase “a.” By this we mean a sort of activity that can be deeply embedded within ritual and ceremony, that can serve many individual and social purposes (many of which have nothing to do with beauty), that is practiced in innumerable manners and that elicits many different responses. From this perspective, the study of the evolution of art should aim to ascertain how natural selection endowed *Homo sapiens* with the capacity to create and appreciate affective and sensuous media skillfully used to convey important cultural meaning.

The notion of aesthetics also requires careful consideration. Like in the case of art, non-Western aesthetics generally permeates a broader range of activities and objects than Western aesthetics, and, unlike the European tradition, it is related to
the communication of spiritual, ethical and philosophical meaning (Anderson, 1989). For instance, writing about Huichol aesthetics, Shelton remarked that “Aesthetics as a discourse does not exist, but aesthetics as an ethical codification of the use, significance, and purpose behind sacred and ritual arts pervades metaphysics and ontology” (Shelton, 1992, p. 235). Beauty, for the Huichol, is a measure to the extent which something incarnates the character of the deity it is meant to represent. Thus, Huichol aesthetics and ethics are inextricably bound together. In this sense, the notion of aesthetics cannot “be regarded as pertaining to the study of the visual perception of the beauty of a material object” (Van Damme, 1996, p. 56). We require an evolutionary framework to account not only for visual and auditory aesthetic experiences, but also for olfactory, gustatory, tactile and kinaesthetic experiences, as well as multiple and dynamic combinations of them. Moreover, we need to account for aesthetic experiences that are unrelated to beauty, such as those that arise from human engagement with the ugly, the comic, religious symbolism, identity markers and so on (Van Damme, 1996).

The recognition of the inadequacy of the traditional notion of aesthetic experience has led some philosophers to search for better ways of conceiving it. Carroll, for instance, proposed a content-oriented notion: “An experience is an aesthetic one if it involves informed attention to the formal, expressive or otherwise aesthetic properties of the artwork in ways that are consistent with the norms and strategies of detection prescribed for that type of work by its conventions, genre, and tradition” (Carroll, 2008, p. 159). Shusterman (1997; Shusterman and Tomlin, 2008) and Bergeron and Lopes (2012) presented a similar view, though they unpacked it into three main features: An aesthetic experience has an evaluative dimension, in the sense that it involves the valuation of an object; it has a phenomenological or affective dimension, in that it is subjectively felt and savoried and it draws our attention; and, finally, it has a semantic dimension, in that an aesthetic experience is a meaningful experience, it is not mere sensation. Thus, in our evolutionary framework, the question about the origin and evolution of aesthetics is answered by determining the conditions under which, and by virtue of what evolutionary processes, did human experiences become evaluable, affectively absorbing and individually and socially meaningful.

Assembling the evidence: neuroscience

There are two lines of research that have advanced our understanding of the neural mechanisms underlying the creation and appreciation of art and aesthetics: The study of the effects of neurological disorders and neuroimaging. The first of these has shown that artists are vulnerable to the same visual, motor, auditory and cognitive neuropsychological deficits that affect other people, despite their proficient perceptual and motor skills. The difference, in Chatterjee’s (2004) words, is that artists manifest these deficits in strikingly eloquent ways. Most artists suffering from neurological disorders continue to be artistically motivated, productive and expressive after the onset of their condition (Zaidel, 2005). There usually is, however, a noticeable change in the work of most artists who have suffered a stroke.

Neurological conditions can thus have diverse effects on artistic production. But what about their influence on appreciation, the other side of the artistic coin? What can similar cases tell us about the biological underpinnings of aesthetic enjoyment? Overall, they argue against the existence of specialized brain mechanisms underlying the experience of art (Zaidel, 2005). Several studies suggest that the perception, recognition and emotional impact of artworks can be affected. Most patients, however, are still able to recognize and experience art in a meaningful and consistent way, even in the face of extensive brain damage or disabling neurodegenerative diseases (Halpern et al., 2008; Halpern and O’Connor, 2013).

Neuroimaging techniques have allowed researchers to address similar and new issues in healthy subjects in controlled situations, and to correlate appreciation and enjoyment of music, painting, architecture or sculpture, among other forms of art, with the activity of several brain structures. A number of recent neuroimaging studies have revealed that aesthetic appreciation of different artistic manifestations involves at least three different kinds of measurable brain activity (Nadal and Pearce, 2011): (1) an engagement of the reward circuit, including cortical and subcortical regions, as well as some of the regulators of this circuit; (2) an enhancement of cortical sensory processing; (3) high-level top-down processing and activation of cortical areas involved in evaluative judgment. It is clear from neuroimaging studies that these brain regions, described in three functional clusters, interact in complex ways to produce our experiences of art and aesthetics. Processing is performed in parallel along highly interrelated brain networks, relying heavily on information feedback, making it impossible to describe any meaningful sequence of events. One cannot even say that an art experience begins with perception, given the strong biasing influences that context, expectations and prior knowledge have even on very early perceptual processes (Cupchik et al., 2009; Kirk et al., 2009; Leder et al., 2004).

Neurological and neuroimaging evidence, thus, leads to a series of conclusions that should be taken into account by evolutionary explanations of art and aesthetics. First, there is no localized seat for art or aesthetics in the brain. Such experiences are the result of complex feedforward and feedback interactions among the nodes of a broadly distributed network of cortical and subcortical brain regions. This distributed and unspecific quality of the neural underpinnings of art and aesthetics might explain why the production and enjoyment of art are generally resilient to neurological disorders. In spite of the different effects that these disorders seem to have on the experience of art, patients continue to engage with art in personally meaningful ways, even though perceptual, memorable or affective qualities might escape them. Crucially, none of the brain regions identified in neuroimaging studies is specialized in responding to art alone, or specifically suited to aesthetic experiences. Not even in the sense that one could think of Broca and Wernicke’s regions as specialized for language processing. All of the
relevant brain regions are involved in other domains of human experience, from perceiving small details in the world or making trivial decisions to abstract reasoning or establishing social relationships.

Assembling the evidence: comparative neuroanatomy

Let us assume, as neuroimaging and neurological evidence suggests, that the network of brain regions described above, divided into three functional components, constitutes the neural underpinnings of aesthetic experience. It seems reasonable to suppose that the evolution of art and aesthetics was made possible because evolution molded and integrated the elements of this network. To what extent have this network’s components changed throughout human evolution? Has the whole network changed, or did evolution target specific components? Comparative neuroanatomy can, to a point, inform about this process. Although our knowledge of the evolution of the brain regions involved in aesthetic and artistic appreciation is very incomplete, a number of conclusions can be drawn from the review of this evidence (see Table 8.2 for a summary). First, some features of these regions are largely conserved, suggesting that they have undergone little change throughout human evolution. Second, some features are derived, meaning that they appeared at some point during human evolution, after our lineage split from that of chimpanzees.

Trivial as these two points might seem, theories on the evolution of art and aesthetics have not fully accommodated their implications. Human evolution did not begin from scratch. The brain and cognitive system of the common ancestor of humans and chimpanzees provided the starting point. Based on living non-human primate cognition, it can be assumed that this hominoid had highly developed physical and social cognition (Tommasello and Call, 1997; Zentall and Wasserman, 2012) that relied on the complex primate brain organization (Dehaene et al., 2005; Hofman and Falk, 2012). Thus, a considerable portion of the neural architecture that were later recruited for the appreciation of art and aesthetics were already in place between 6 and 8 million years ago, when hominins first appeared (Cela-Conde and Ayala, 2007), and long before the first archaeological indicators of artistic and aesthetic activities. Natural selection did not build art and aesthetics de novo. It took certain aspects of pre-existent primate brain regions and networks involved in several perceptual, affective and cognitive processes, and modified others, to assemble the neural mechanisms to support art and aesthetics. This sort of tinkering is common in evolution (Jacob, 1977). Thus, we can narrow down the general question, “How did art and aesthetics evolve?” to “How and why did natural selection modify certain aspects of the underlying neural circuitry (e.g., reducing neuron density in prefrontal regions or increasing the complexity of processing within the ventral striatum) and integrate these innovations with primitive features (e.g., the basic architecture of the prefrontal cortex or the connectivity of the frontal poles)?” In light of the comparative evidence, it is also fair to wonder to what extent were these broadly distributed changes, which no doubt had far-reaching effects on cognition and brain function, the result of natural selection strictly for art or aesthetics. It is plausible that the evolution of at least some of the brain regions we considered above was driven by domain-general advantages that had effects in diverse spheres of human life (Justus and Hutsler, 2005).

Assembling the evidence: archaeology

Palaeoanthropologists commonly consider early artistic and aesthetic activities, such as the decorative use of pigment or engraving, to be part of a suite of indicators of modern symbolic human behavior, together with evidence for transcendent thinking, such as burying the deceased with tools, decorations and ornaments. Human symbolic cognition, however, appeared together with other
indicators of modern human cognition (McBrearty and Brooks, 2000), including those related to ecology (e.g., broad diet), technology (e.g., microblades, hafting, use of bone and antler to craft tools) and economy and social organization (e.g., exchange networks across long distances, reoccupation of habitation sites, specialized hunting of large and dangerous animals). Several explanations for the origin of human modern behavior have been put forward, but they lie between two extreme perspectives: the revolution and the gradualist hypotheses. The revolution hypothesis sees evidence in the archaeological record for a recent and rapid appearance of modern human behavior in Europe between 50,000 and 40,000 years ago. The richness of the archaeological remains unearthed at European Upper Palaeolithic sites is regarded as proof of a substantial change in human cognition (Mellars, 1991) and its neural substrates (Klein, 1995). This contrasts with Middle Palaeolithic sites, which indicate lower effectiveness of resource exploitation, and yield a simpler and less varied lithic technology, as well as virtually no evidence for symbolic behavior.

This view, popular during the twentieth century, has recently been questioned by authors favoring the gradualist perspective, which argues that the set of behaviors regarded as indicators of human cognitive modernity did not appear at a single time and place. The use of ochre, engraving, bone working, complex subsistence strategies and other similar activities appeared much earlier than posited by the revolution hypothesis (McBrearty and Brooks, 2000). In fact, there is now ample evidence supporting the notion of a gradual and prolonged emergence of the cognitive underpinnings of art, including early use of pigments, engraving traditions, the elaboration of personal ornaments, the production of music and early evidence from Asia and Australia. Thus, the archaeological record tells the story of a slow and gradual accumulation of behaviors related to art and aesthetics. The capacities to create and appreciate art emerged together with new and complex forms of social, technological and environmental cognition that characterize our species. Although some of these aesthetic or artistic behaviors have their roots in the behavior of earlier hominids, nothing like the pervasiveness of ornaments, pigment use, engraving and musical instruments is associated with any other prior or contemporary hominin species. Since the earliest artistic or aesthetic manifestations, humans have expressed this capacity in many different ways, creating traditions that appeared, disappeared and reappeared. These patterns of artistic flourishing and withering, including the Upper Palaeolithic creative explosion in Europe, seem to be the result of geographic, climatic and demographic factors (Mellars, 2009), rather than biological adaptations.

Sketching a framework for the evolutionary cognitive neuroscience of art and aesthetics

We have argued that it makes little sense for evolutionary approaches to art and aesthetics to focus on the practice and appreciation of High Art in the European tradition. Trying to understand how evolution gave us Impressionism, Picasso or Warhol's Brillo Boxes is like trying to understand how it gave us French or Swahili. Obviously French and Swahili speakers and listeners are able to engage in conversation due to brain systems that evolved for millions of years. But such systems evolved because of the adaptive advantages conferred by the capacity for language. French and Swahili are the result of particular cultural and historical processes that are the subject of historical linguistics. Just as the field of language evolution attempts to understand how the capacity for language evolved, our framework aims to accommodate hypotheses about the evolution of the capacities for art and aesthetics and of their neural underpinnings. Based on the common features of art in different small-scale societies (Anderson, 1989), we have tentatively defined the capacity for art as the capacity to create and appreciate the skillful use of affective and sensuous media to convey important cultural meaning. Variations in media, required skills and the meaning conveyed have allowed the flourishing of art's wonderful and distinct cultural and historical manifestations, styles, schools and movements. Attempting to capture the enormous variety of aesthetics as experienced around the world, we have defined an aesthetic experience as one that is evaluable, affectively absorbing and individually and socially meaningful.

In this framework, thus, we aim to ascertain the evolutionary processes that led to the appearance of the capacity to create and appreciate the skillful use of affective and sensuous media to convey important cultural meaning, and the conditions under which, and by virtue of what evolutionary processes, human experiences became evaluable, affectively absorbing and individually and socially meaningful. The domains of art and aesthetics overlap somewhat, in the sense that artworks can be created and appreciated for their aesthetic qualities. On the other hand, we can enjoy the aesthetics of non-artistic objects or events and we can enjoy art for non-aesthetic reasons. Unfortunately, at this moment it is difficult to say whether art and aesthetics evolved as independent capacities, or whether they have common evolutionary roots. Furthermore, it is virtually impossible to distinguish the archaeological and neuroscientific evidence for the evolution of art from evidence for the evolution of aesthetics. Most neuroimaging studies of the aesthetic experience have used artworks as materials, and most archaeological finds lack a sufficiently rich context to be able to make the distinction.

The second aspect of our framework refers to neuroscientific and archaeological facts that should be acknowledged by hypotheses about the evolution of art and aesthetics. First, there is no specialized brain region or mental process that makes us capable of engaging with art and aesthetics. Our experiences of art and aesthetics rely on a complex network of brain regions, none of which is specific to this domain of human experience. Our appreciation of art and aesthetics is the result of neural interactions throughout a network of at least three functionally distinct sets of brain regions, related to affective and emotional processing, evaluative judgment and attention-driven enhanced perceptual processing.

Second, we share many of the features of these brain regions with our primate relatives, suggesting we inherited them from distant ancestors. Other features of
these brain regions have been subjected to significant modifications throughout the hominin lineage. The challenge for the evolutionary cognitive neuroscience of art and aesthetics is to explain why and how natural selection preserved some of the features of the brain regions that constitute the network underlying the appreciation of art and aesthetics and favored changes to others. Because such brain regions are involved in many other domains, it is likely that some of the changes were not driven specifically due to the advantages conferred in the domains of art or aesthetics.

Third, the archaeological evidence indicates that different artistic and aesthetic activities appeared gradually at different moments and places of our species’ evolution. The creative explosion evident in the European Upper Palaeolithic record is the result of an accumulation of behaviors and traditions that had emerged much earlier, some maybe even before the appearance of our own species. Engraving, coloring and beading traditions appeared and disappeared owing to the impact of environmental and demographic factors.

Evidently, there are many gaps—major voids, one could say—in the general framework we have just sketched. In fact, it merely highlights the kinds of questions and evidence that hold the greatest promise for increasing our understanding of the evolution of art and aesthetics. Answering these questions, and finding new kinds of evidence, will require further research that can fill in many details and even major aspects of the framework. For instance, we need to explore the potential of experimental approaches, especially the comparative method, to unlock the answers to some of those questions. The only way to accomplish this is through truly interdisciplinary work. The picture of the evolution of art and aesthetics will not come into focus unless psychologists, neuroscientists, evolutionary anthropologists, archaeologists, anthropologists, art historians, art theorists and philosophers overcome traditional disciplinary boundaries and work together to move the field beyond its mostly conjectural and provisional state. However, if we agree with James when he wrote that “the best mark of health that a science can show is this unfinished-seeming front” (James, 1890, vii), there is good reason for optimism.

References


Each year approximately 5 million individuals visit The Metropolitan Museum of Art in New York City. They gaze upon works of artistic genius from all over the world and from four millennia. At the same time, about 500 people visit the Waikouaiti Coast Heritage Centre in the South Island of New Zealand. They gaze upon firemen’s helmets, Māori artifacts and the architectural drawings for the Lunatic Asylum at Seacliff. These two institutions are antipodean in terms of location, size, collection and attendance. One might even reasonably question whether most of the objects in Waikouaiti are art. And yet these institutions have a kinship: they are important to their communities; they collect and preserve items of significance; and the people who walk out of them are different from when they entered. In this chapter, we review the research on why people go to art museums, what they do while they are there and how their direct interactions with original art impact their lives.

We experience art in many aspects of our lives – the paintings on our walls, the sculptures in public spaces, the photographs on billboards, the freestyle poetry read in bars, and in the movies, music, books and plays we enjoy. But it is in the concert hall or theater or museum that art takes center stage. For the visual arts, it is on museum walls and in gallery spaces that artworks are experienced in a formal way. As seemingly conventional a context that a museum is for experiencing visual art, it has been less conventional a locale for investigating the psychology of art and aesthetics. This has been the case since the early works of Gustav Theodor Fechner (1876), who is usually credited with establishing the empirical study of art and aesthetics. Thus, for over a century, the white walls of the laboratory have dominated the white walls of the museum as the environment for learning about why the artifacts that we call art have such significance in our lives and why the aesthetic experiences of art are some of the most memorable and personally meaningful of human experiences (Carr, 2003; Pelowski and Akiba, 2011; Smith and Smith, 2001; Smith and Wolf, 1996).

Psychological research in museums may seem sparse indeed. It is, however, important to note that what is usually considered as falling under the rubric of museum research or museum studies often bears a striking resemblance to psychological research. This is especially the case for those studies that have been conducted during the past two decades. One of the aims of the present chapter is to examine the results of these studies (e.g., Falk, 2009; Pitman and Hirzy, 2010)