

CHAPTER 4

The Arts are More than Aesthetics: Neuroaesthetics as Narrow Aesthetics

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Neuroaesthetics is a young enough field that there seems to be no established view of its proper subject matter. Morphologically, the term implies the scientific study of neural aspects of the perception of artworks such as paintings, or elements of artworks such as musical intervals. We are concerned, however, that practitioners of this new field may not be aware of the tremendous ambiguities inherent in the terms “aesthetics” and “art,” ones that limit a proper understanding of human art behavior. Connotations of these terms are particularly inappropriate and misleading when considering the experiences, practices, and functions of the arts in preindustrial, folk, aboriginal, or Pleistocene societies, and even in contemporary popular culture.

It is only during the last two centuries that the terms “Art” (with an implied capital A, connoting an independent realm of prestigious and revelatory works) and “aesthetics” (as a unique, and even reverential, mode of attention toward such works) have taken on their present elitist meanings and become unavoidably intertwined (Davies, 2006; Shiner, 2001). The word “aesthetic” (from the Greek *aesthesia*, having to do with the senses) was first used in 1735 by a German philosopher in a book on poetry (Baumgarten, 1735/1954), and since that time has been employed in two different, but not always distinct, ways. Enlightenment philosophers and their followers gradually developed the now elitist notion of “*the aesthetic*”—a special form of disinterested knowledge and appreciation—to describe the emotional response elicited by the perception of great works of art (Shiner, 2001).

While this meaning of aesthetic has strong historical connections with the arts and with artworks, a second usage has come to refer to any value system having to do with the appreciation of beauty, such as the beauty of nature. In recent decades, for example, some ethologists and evolutionary psychologists have adopted this second, broader notion of aesthetics in a new field, originally called “landscape

aesthetics" (Appleton, 1990; Orians, 2001; Russo, Renninger, & Atzwanger, 2003) or "Darwinian aesthetics" (Thornhill, 1998), but generally called "evolutionary aesthetics" (Voland & Grammer, 2003) today. Evolutionary aesthetics investigates sensory preferences in animals and humans that promote selective attention and positive emotional responses toward objects in the environment that lead to adaptive decision making and problem solving (Orians, 2001). Objects perceived in this manner are considered to be beautiful (Thornhill, 1998). Following Darwin (1871), who noted that animals (especially birds) seemed to appreciate beauty and who attributed the spectacular colors and patterns of male birds to female choice, some workers in evolutionary aesthetics have proposed that human art arose by sexual selection in a similar manner to the courtship displays performed by male birds to attract females for mating (e.g., Miller, 2000, 2001).

Although workers in evolutionary aesthetics do not overtly adhere to the elitist philosophical connotations of aesthetics, some nevertheless write as though their findings are applicable to an understanding of human responses to art and beauty (e.g., Thornhill, 1998). Judging by the work published thus far under the banner of neuroaesthetics, this field seems to be expressly concerned with art, not least the masterpieces of European visual art and even abstract paintings (e.g., Kawabata & Zeki, 2004; Solso, 1994; Vartanian & Goel, 2004; Zeki, 1999). We suspect that this interest in elite visual art arises from the implicit association of both art and aesthetics with the eighteenth century Eurocentric notions of these concepts.

In this chapter, we suggest that present-day neuroaesthetics is limited in three important respects by a narrow, culture-bound sense of aesthetics/art. First, its aesthetic data—based on sensory percepts and preferences—apply to a much wider range of objects than art objects. Neuroaesthetics, like evolutionary aesthetics and other scientific notions of aesthetics, is predicated on a class of emotions whose biological function is to generate an appraisal of the *properties of objects*. However, aesthetic emotions, seen here as general appraisals of like or dislike, are superordinate: they are critical in all living creatures for assessing a wide variety of objects important for biological survival, as in evolutionary aesthetics, where they include landscapes, food quality, the appearance and behaviors of conspecifics, and so forth. Strictly speaking, it is this broad area—not works of art alone—that defines the domain of neuroaesthetics; a better goal for the field would be to develop a general, superordinate theory of aesthetic responses that applies to all appraised objects rather than one linked to artworks (or landscapes or mates, for that matter). As presently conceived, neuroaesthetics has no way of distinguishing art from nonart. Characterizing the neural responses elicited by viewing a modern abstract painting begs the question that what is being assessed is a response to art. In the next section, we present a view of art as a behavior of "artification," a neologism that allows us to think of art as an activity, in other words as something that people do (to "artify").

Second, the arts themselves deal with a much broader realm of human experience than aesthetic responses or preferences for features. A focus on such responses and preferences, even in individual artworks, reduces the arts to the level of receiver psychology and social functionlessness, as presupposed in many philosophical approaches to the fine arts based on Enlightenment principles. Although

complex behaviors such as creating art (like choosing a mate or finding a suitable habitat) include an aesthetic dimension, they are in no way reducible to it, nor is it the most important thing about them. Introducing another neologism, we propose a new field, “neuroartsology,” as a comprehensive neuroscientific approach to the arts, which is conceived in the broader framework of art as an evolved behavior.

Third, because aesthetic experience, broadly speaking, concerns the emotional appraisals of objects (be they art objects or otherwise), we find it necessary to ground neuroscientific studies of aesthetic responses where they belong, in a larger theory of emotion. Until recently, biological theories of emotion have been strongly dominated by the “basic emotion” theory (BET), dating back to Darwin (1872). We believe that the BET provides an inadequate basis for the understanding of not only aesthetic responses but of many other emotions that accompany the production and perception of the arts. To take the starker example (and the one most central to this volume), while there is indeed a basic emotion for the negative-valenced appraisal of disgust, there is no basic emotion corresponding with its positive-valenced counterparts of liking, attraction, ecstasy, and so on. Hence, neuroaesthetics, no less than evolutionary aesthetics, is in need of a richer theory of emotion than the one provided by the BET. In a later section, we discuss the Clore/Ortony theory as one promising alternative, and attempt to relate it to neuroimaging work in the field of emotion.

In summary, neuroaesthetics should not be limited to the arts but should instead focus on all types of aesthetically appraised objects and phenomena; and a proper understanding of the arts does not benefit from a narrow neuroaesthetics of perceptual preferences, but instead requires a neuroartsology that seeks to explain the full array of cognitive, neural, and cultural phenomena involved in the universal behaviors of artification.

WHAT IS ART AND WHAT IS IT FOR?

Although aesthetics is a confused term, the concept of art is, if anything, even more conflicted and contested. And as with the term aesthetics, the modern use of art is derived from the eighteenth century philosophy of fine art and its focus on artworks that were largely created for a wealthy elite, mainly the church and the court. It is therefore burdened with Eurocentric conceptions regarding the practices and meanings of classical/fine art. However, a comprehensive scientific understanding of art must include its manifestations in all human cultures. A foray into the arts of non-Western cultures not only compels us to confront art practices that are removed from the “disinterested” aesthetic practices of Western fine art, but also forces us to consider the arts as behaviors that may have no necessary connection with beauty (Dissanayake, 2007).

When we look at the contexts for the production of the arts in premodern (traditional, aboriginal) societies around the world and throughout time, we find that they are notably practiced in ritual ceremonies (Alcorta & Sosis, 2005; Dissanayake, 1988, 2006). Indeed, ceremonies, whatever else they may be, are collections of arts (conceived of as artified behaviors). Despite wide cultural variability, ritual

ceremonies, as behavioral manifestations of cognitive belief systems about the way the world works (Alcorta & Sosis, 2005), have some common characteristics. They are *performed at times of perceived uncertainty*, when individuals and groups wish to influence the outcomes of circumstances that they perceive as vital to their livelihood and survival (Dissanayake 1992, in press; Rappaport, 1999; Turner, 1969). They are typically *multimodal*, combining singing, instrument playing, dancing, literary language, dramatic spectacle, and the decoration of bodies, surroundings, and paraphernalia. In addition, they are typically *participative*: even when an audience observes specialists performing, they join in by clapping, moving, shouting, singing, and so forth. As John Chernoff, a scholar of West African drumming, has observed: “the most fundamental aesthetic in Africa is that without participation, there is no meaning” (Chernoff, 1979, p. 23).

The arts in ceremonial contexts provide a multitude of critical social functions for cultures small and large, including historiographic functions related to a society’s ancestry and identity; discursive functions related to the justification and feasibility of planned endeavors; functions related to the marking of time (e.g., calendrical rituals [harvests], life-cycle rituals [weddings, funerals, births]); communication with deities; relief of anxiety and stress; social coordination, to name but a few. A major purpose of arts activities is to foster cooperation in support of collective endeavors, such as hunting, foraging, resisting enemies, building infrastructure, and the like. The arts are also the major means of maintaining social harmony and ameliorating conflicts within groups. The group benefits of the arts across cultures are strong and widespread. Reducing the arts’ adaptive function to individual sexual display, as sexual selectionists have proposed (Miller, 2000), makes the arts into a completely competitive enterprise, when there is an abundance of evidence to suggest that the arts do precisely the opposite, foster cooperation and obviate individual competitiveness. Hence, while we acknowledge the existence of sexual display in the context of arts-suffused rituals, we reject a reduction of the arts to sexual display. In fact, if a connection is indeed to be found here, it is more likely that sexual display is a secondary offshoot of the group-assembly aspect of ceremonial rituals rather than the reverse (Brown, 2000). Once the group comes together for the business of collective survival, there can be opportunities for sexual display within such a context.

We suggest that it is profitable to consider the arts not as objects (paintings, songs), qualities of objects (beauty, consonance), cues to sensory-cognitive preferences, or passive registrations of sensory/cognitive stimuli, but as behaviors of artification—things that people do. Over several decades, one of us [ED] has gradually refined such a concept (Dissanayake, 1988, 1992, 2000, in press). Artification (originally called “making special”) refers to the universally observed penchant of human individuals (and groups) to “make ordinary reality extraordinary” (Dissanayake, 1992, p. 49).

An understanding of artification and its manifestations in human ritual practices is made clearer by an application of the ethological concept of “ritualization,” as developed in the study of other animals (Tinbergen, 1952). Briefly, ritualized behaviors are communicative displays that take ordinary, unremarkable behaviors

drawn from everyday life (e.g., preening, nest building, pecking for food) and use them in an altered manner and novel context in order to communicate something entirely different from their original source. Ethologists have described the alterations that occur during ritualization in both animals and humans (Eibl-Eibesfeldt, 1989, pp. 439-440), and have shown that, compared with the precursor behavior, the ritualized version becomes (a) *simplified*: it is formalized, stereotyped, or patterned; (b) *repeated*, often with a “typical intensity” or regularity of pace that departs from desultory performance of ordinary actions; (c) *exaggerated*; and (d) *elaborated*, sometimes with (e) *manipulation of expectation*. These alterations or operations serve to attract attention to and sustain interest in the new message, which is often concerned with aggression or courtship.

The human behavior of artification, like ritualization, uses operations such as formalization, repetition, exaggeration, and elaboration performed on components of ordinary behaviors to make them notable and extraordinary. In the most elementary sense, ordinary body movements, when artified (or stylized) through formalization, repetition, elaboration, and exaggeration, become “dance,” ordinary language is made poetic or literary, and ordinary materials (bodies, artifacts, surroundings) are rendered extraordinary with paint, carving, and accoutrements of countless kinds. More broadly, a dance in a traditional culture becomes further enhanced as a narrative reenactment of historical (mythical) events. Artified behaviors, like ritualized behaviors, attract attention, sustain interest, and shape emotion. Indeed, while not themselves art, the preferences investigated by evolutionary aesthetics and neuroaesthetics are often themselves artified or used in artifications, as when appealing colors or shapes emphasize or enhance an important object, event, or message.

Lest artification be seen exclusively in terms of its ability to stimulate aesthetic responses, we point out that the result of such an activity has an important *cognitive* consequence, mainly to generate a new signification for something compared with its ordinary meaning or use. For example, ornamentation of objects like weapons or vessels is a way of giving them special power: the placement of a crucifix in a new church is a way of sanctifying and protecting it, and the utterance of special texts like prayers or incantations is a way of making contact with remote deities. Hence, the emphases that underlie the “alterations” of artification involve not only changes in context or performance properties such as repetition and exaggeration but include cognitive changes in the signification and function of an object or event. Arts behaviors are among the most important mechanisms that link ritual practices with cognitive belief systems (Alcorta & Sosis, 2005).

Interestingly, human infants are born with predispositions to respond to the operations of ritualization (or artification) on the vocalizations, facial expressions, and head/body movements of adult caretakers. In the universal dyadic behavior of “baby talk,” adults spontaneously (that is, without being taught) simplify, repeat, elaborate, and exaggerate their utterances, expressions, and kinetic movements, thereby attracting infant attention and sustaining their interest. Adults temporally coordinate these signals with infant responses, as evidenced by studies that show that, by eight weeks, infants expect contingent responses from their adult partners

(Murray & Trevarthen, 1985; Nadel, Carchon, Kervella, Marcelli, & Réserbet-Planterey, 1999).

Such coordinated, dyadic behavior is hypothesized by Dissanayake (2000; *in press*) to have originated as a behavioral adaptation that addressed the “obstetric dilemma” of two million years ago when the anatomical trend toward a narrowed pelvis in fully bipedal *Homo erectus* conflicted at childbirth with a concomitant anatomical trend toward enlarged brains and skulls. Among other adaptations (e.g., separable pubic symphysis in females at parturition, compressible infant skull, extensive postnatal brain growth), the gestation period was significantly reduced (Falk, 1998; Gould, 1977; Portmann, 1941), resulting in helpless infants dependent on their caretakers for years, rather than weeks or months as in other primates. A mother’s simplification, repetition, elaboration, and exaggeration of affiliative communicative behaviors (e.g., smiling, open eyes, eyebrow flash, head bob, head nod, soft undulant vocalization, touching, patting, kissing) served to reinforce affiliative neural networks in her own brain and, when performed on a shared temporal basis, also set up a means of neural coordination of behavior and of matching of affective change between the pair (Beebe, Lachmann, & Jaffe, 1997; Trevarthen, 1979). Mother-infant interaction would seem to operate like a ritualized behavior, where signals from one context (affiliative, prosocial behaviors, observable in human adults and other primates) are altered and come to mean something different or, in this case, foster an adaptive mutual emotional bond. Dissanayake (2000; *in press*) suggests that human sensitivity to and competence for the operations of artification originated phylogenetically in evolved interactions between ancestral mothers and their immature infants.

A THEORY OF EMOTION

We have argued that the concept of aesthetics, unencumbered by its Eurocentric conflation with art, applies to a wide array of objects (as in evolutionary aesthetics), and that a neural theory of the arts requires much more than a neuroaesthetic analysis of sensory preferences for art objects. An understanding of the proper connection between neuroaesthetics and the arts requires not only a functional analysis of the behaviors comprised in the arts but, equally importantly, a grounding of aesthetic responses in a theory of human emotion.

We understand emotions as being responses to events or objects in the environment, driven by appraisals of goodness or badness. They are strongly tied to goal-driven motivational states important for survival, as related to feeding, self-defense, mating, migration, and so forth. The concept of emotion requires three critical facets: valence, intensity, and focus. Valence refers to the fact that the vast majority of emotions fall binarily into the categories of positive and negative (Ortony & Turner, 1990). In other words, most emotional appraisals are experienced as either “good for me” or “bad for me.” In contrast to this discrete division, emotions vary in intensity along a graded scale from weak to strong. Frustration and gladness are low-intensity emotions compared with highly intense counterparts like rage and ecstasy. Synthetic schemas that unite valence and intensity include the “circumplex”

or “pleasure-arousal” model, in which valence (pleasure) and intensity (arousal) are seen as orthogonal dimensions on a two-dimensional plot (Reisenzein, 1994).

While significant, such schemes still lack a third critical ingredient in the psychology of emotion, namely focus. The most universally accepted scheme for focus is the Basic Emotion Theory (BET), first suggested by Darwin (1872) but elaborated in the twentieth century by Ekman and colleagues (Ekman, 1992, 1999). The BET scheme comprises some 5 to 8 discrete emotion types that are shown to have strong biological underpinnings, both by the unique facial expressions that accompany them and by their universal expression across cultures. The BET has been a major driving force for neuroimaging work on emotion and, not surprisingly, the major emotions analyzed in neuroimaging studies (mostly fear) are components of the BET scheme (Hennelotter & Schroeder, 2006). Of these basic emotions, only disgust can be categorized as an aesthetic emotion although there are clearly nonaesthetic meanings of disgust in addition to aesthetic ones.

To our way of thinking, the BET greatly underrepresents the number of human emotions as well as the richness of human emotional life. Psychologists who have cataloged human emotions find there to be literally hundreds of emotions, not merely a handful (see Clore, 1994). We are sympathetic to the criticisms of the BET put forth by Clore, Ortony, and others (e.g., Ortony & Turner, 1990), and find that their perspective on emotional focus provides a more promising way of understanding the complexities of human emotion than the BET.

In the Clore/Ortony scheme (Clore, 1994; Clore & Ortony, 2000), emotions are categorized with regard to three foci: outcomes, objects, or agency. To these, we add a fourth category, what we call the “social interaction” focus.

1) *Outcomes*. The first category deals with valenced reactions to the *consequences of outcomes*. These are the *motivational* emotions, spanning the range from happiness (being pleased with an outcome) to sadness (being displeased with an outcome). Joy is a positive outcome-emotion, one that has a higher intensity than happiness, while grief and sadness are analogous negative-valence emotions.

2) *Objects*. The second category deals with valenced reactions to the *aspects of objects and events*. Importantly for this volume, *it is this category that comprises the aesthetic emotions*, spanning the range from liking/attribution to disliking/disgust. This is also the category that is invoked when people discuss preferences and taste. Hence, feelings of aesthetic attraction, whether for a face, a food item, a melody, or a building, fall into this category, as do negative-valenced counterparts such as hate and disgust. Regarding neuroaesthetics, it is telling that the basic emotion theory does not contain a positive-valenced aesthetic term (e.g., attraction, liking, love), only the negative-valenced emotion of disgust.

3) *Agency*. The third category of emotion involves valenced reactions to the *actions of agents*, and includes the spectrum from approval to disapproval. This category comprises a large part of what people think of as *moral* emotions (judgments of the appropriateness of behavior), including assessments of praiseworthiness or shamefulfulness. Interestingly, the negative-valenced basic emotion of disgust sits in two focus categories. On the one hand, disgust can be an aesthetic assessment of the properties of an object (e.g., of feces, spoiled food), but on the other, it can be a

moral assessment of the actions of an agent (e.g., of a politician, boss, or store clerk). Hence, a scheme such as that proposed by Clore and Ortony permits an appreciation of the “multifocus” nature of emotion terms in a way that the BET simply cannot.

4) *Social interaction*. The fourth category of focus, which we offer here as a refinement of the Clore/Ortony scheme, involves valenced reactions to social interactions with other people. While similar to the moral emotions discussed under agency, these emotions go beyond simple appraisals of agency, and can probably be best encapsulated by the comfort/discomfort emotional spectrum. Do we feel that people are on our side or against us? Are they supporting our goals or thwarting them? When our ego feels threatened by someone whom we perceive as being better or more competent than ourselves, it is this fourth category that is experienced. On the positive side, this involves emotions like love, trust, and affiliation that are so central to the experience of the arts. These are rewarding emotions that are not aesthetic in nature but that definitely reinforce aesthetic assessments. We will talk more below about the interplay between attraction (an aesthetic emotion) and affiliation (a social-interaction emotion). On the negative side is a basic emotion which, like disgust, has complex multifocus connotations, namely fear. Fear is an “outcome” emotion related to predictions of negative consequences for future events (e.g., stage fright related to a class presentation), but fear is also a strong social-interaction emotion related to a perception of people’s intent to thwart our goals or hurt us (i.e., being afraid of someone).

Beyond these four general foci of emotion, there is an important interplay among emotions of a similar valence that tend to act in a mutually reinforcing manner. We propose that there is a union of emotions that vary in focus but are similar in valence. For example, people tend to evaluate as morally good those things that they think of as aesthetically beautiful, and as bad those things they assess as ugly. Hence, in mythology, the wicked witch is ugly and the good prince is handsome. In numerous premodern societies (e.g., Basongye, Dinka, Igbo, Javanese, Lega, Senufo, Temne, Wahgi, among many others), the good (refined, wholesome) and the beautiful are conceptually inseparable (Dissanayake, 1992; van Damme, 1996). Socially, we assess as morally good those people who support our goals and around whom we feel comfortable. We tend to find them attractive (if not immediately, at least over time). So, aesthetic and moral evaluations of a given object tend to be parallel (Brown & Volgsten, 2006). Situations where they fail to be so tend to cause feelings of cognitive dissonance; we are confused if the ugly witch is benevolent or the handsome prince is evil. In sum, we tend to make parallel appraisals of multiple aspects of objects or situations, and these appraisals tend to be mutually reinforcing along the lines of valence.

To summarize, an understanding of aesthetics must be rooted in a theory of human emotion, which includes the dimensions of valence, intensity, and focus. The “basic emotion” theory lacks sufficient theoretical sophistication for an accurate understanding of focus. We believe that the Clore/Ortony theory is a richer view of emotion. Of the four foci of emotion that we discussed, “aspects of objects” is the one most directly related to aesthetic emotions. However, our plea is to look beyond aesthetic emotions and recognize the complex network of emotions

involved in the arts, not least the interactions between aesthetic emotions and other socially important emotions.

ORBITOFRONTAL CORTEX AND THE APPRAISAL OF VALENCE

As just discussed, emotions are based on a valenced appraisal of an object or event, that is, an assessment of the goodness or badness of something in terms of individual goal attainment. The appraisal process is in many ways a comparison between “exteroceptive” perception—the perception of things occurring in the external world around us—and “interoceptive” perception—a reporting of the status of our internal environment as related to the functional state of our organs vis-à-vis physical and emotional needs. There are “visceral afferent” systems that report on the state of our homeostatic mechanisms, such as the need for food, warmth, or sleep. When we perform a goal-directed behavior, a comparison is made between our intended goal and the current visceral state. We make judgments of the outcomes based on whether they promote our goals (positive valence, rewarding) or oppose them (negative valence, aversive). Hence, when we perceive things around us in the context of goal-directed behavior, parallel sensory signals arrive from exteroceptors and interoceptors, and they must be compared. An “appraisal of valence” system makes an assessment of the compatibility between exteroceptive inputs and interoceptive inputs. Based on this comparison, an emotion of positive or negative valence, and of a given intensity, is registered.

In thinking about brain centers for the four foci of emotion previously mentioned, it is interesting to consider the paralimbic cortex of the orbitofrontal cortex (OFC, mainly human Brodmann area 11, but also including anteroventral portions of the cingulate cortex) as a promising candidate for a multifocus and multimodal brain area dealing with the appraisal of valence (Rolls, 2004). This is one of the few brain areas that shows consistent responsiveness to objects of both positive and negative valence. Interestingly, the orbitofrontal cortex is perhaps primarily a higher-level sensory cortex for smell and taste, serving as a secondary olfactory and gustatory cortex (Rolls, 2005). This, in and of itself, may indicate something significant about the origins of aesthetics in the appraisal of food sources (and perhaps conspecifics as well via odor and taste mechanisms).

Neuroimaging studies of aesthetic emotions, especially those of positive valence, have demonstrated activations in the orbitofrontal cortex in response to a wide diversity of rewarding stimuli, including music (Blood & Zatorre, 2001; Blood, Zatorre, Bermudez, & Evans, 1999; Brown, Martinez, & Parsons, 2004), paintings (Kawabata & Zeki, 2004), faces (Aharon, Etcoff, Ariely, Chabris, O'Connor, & Breiter, 2001; Nakamura et al., 1998; O'Doherty, Winston, Critchley, Perrett, Burt, & Dolan, 2003), odors (Anderson et al., 2003), tastes (Small, Gregory, Mak, Gitelman, Mesulam, & Parrish, 2003), and touches (Francis et al., 1999). Hence, there is ample evidence of multisensory processing within the context of a given emotional focus (namely, aesthetic appraisals of objects and events). Beyond such multisensory processing is crossmodal processing. For example, the conjunction of

olfaction and gustation within neurons of the OFC is thought to mediate the higher-order sensation of flavor (Rolls, 2005). Cross-modal associations are present even in very young infants and include visual, kinetic, and vocal associations (Schore, 1994).

Other brain areas that have been implicated in emotional processing show more valence specificity than the OFC. For example, positive emotions are associated with areas like the ventral striatum (nucleus accumbens), ventral tegmental area, periaqueductal gray, and their associated dopaminergic and opiate neurotransmitter systems (Burgdorf & Panksepp, 2006). Negative emotions are associated with areas like the amygdala and anterior/ventral insula. So, the orbitofrontal cortex is perhaps the best candidate for a superordinate emotion area that spans both valence and focus. It is also one of the cortical receiving areas for visceral afferents, which thus provides clues regarding the mechanism by which it can make an appraisal of valence. By mediating a comparison between exteroceptive information from all the sensory pathways (via their “what” or object-recognition pathways) and interoceptive information from the organ systems, the orbitofrontal cortex is in a good position to generate an assessment of “good for me” vs. “bad for me” and hence assign valence to the emotional appraisal of a stimulus. In addition, the OFC is a paralimbic area that is closely connected with mnemonic areas like the parahippocampal gyrus and hippocampus, thus modulating the memorability of stimuli. It also projects extensively to subcortical motivation-emotion integration centers, especially in the right hemisphere (Tucker, 1992). The importance of the OFC for the appreciation of art objects like symphonies and sculptures may derive evolutionarily from the function of this part of the cortex in making appraisals of the olfactory and gustatory properties of food sources and perhaps conspecifics as well. The OFC is also important for affiliative interactions, which is the topic of the next section.

AFFILIATION vs. ATTRACTION

Both musical anthropologists and popular music theorists agree that Western thinking about the arts is based on an *objectification* of artworks (see also cultural theorist Shiner, 2001). Art genres are seen to be composed of collections of discrete “artworks” (e.g., books, symphonies, ballets) having individual authorship (Stockfelt, 2006). Because aesthetic emotions are those that relate to the properties of objects, it is perhaps natural to reduce the arts to the appraisal of objects, namely, aesthetic responses. However, as described above, we believe that a theory of the arts based exclusively on the properties of objects is inadequate. Having described the four foci of emotions in our modification of the Clore/Ortony theory, we feel it important to emphasize that the efficacy of the arts in terms of human behavior is dependent upon the production and perception of *all types* of emotions and not just object-based aesthetic emotions. We suggest that one of the most significant (and understudied) emotions that drives the arts is social affiliation, an emotion of strong reward value. This is tied in with our view that one of the most important functions of the arts is to create and reinforce a sense of social unity so as to promote cooperation and cohesion within social groups. In fact, affiliative interactions are the very basis

for group formation, including family units and friendships. There is a strong developmental basis for this, as ritualized affiliative signals exchanged between mothers and infants in baby talk attune infants' cognitive and affective capacities in ways that provide a foundation for the skills at work in later production and perception of the arts (Miall & Dissanayake, 2003). While affiliation sits in our category of social-interaction emotions, it is highly tied in with moral emotions about the appropriateness of social actions and with motivational emotions about their goals and consequences. And as per our discussion of emotion above, all of these different emotion types should be mutually reinforcing. Hence, object-based aesthetic emotions are part of a suite of responses that includes the rewarding emotions of affiliation, anticipation, and moral righteousness.

There is a small amount of neuroimaging literature devoted to affiliation, including maternal love and romantic love. It is telling that the experience of affiliative emotions activates the orbitofrontal cortex as well as other reward centers of the brain such as the periaqueductal gray (Bartels & Zeki, 2004; Carter et al., 1999; Miller & Rodgers, 2001; Nitschke, Nelson, Rusch, Fox, Oakes, & Davidson, 2004). This latter area contains a high concentration of receptors for vasopressin and oxytocin—both of which are implicated in the experience of affiliation in animals (Nelson & Panksepp, 1998; Young & Wang, 2004; see also papers in Pedersen, Caldwell, Jirikowski, & Insel, 1992)—and projects to the orbitofrontal cortex. This finding is consistent with our claim above that the orbitofrontal cortex transcends the focus of emotion, and that interactions between emotions of more than one focus may come together in this brain area, thus providing a biological explanation for why the wicked witch should be ugly or the good prince should be handsome. We can speculate that the functional properties of the orbitofrontal cortex provide important insight into the human affinity toward multimodal processing so central to ritualized behaviors, extending from mother-infant interaction all the way to the artifications of groupwide ceremonies. Additionally, the contribution of oxytocin to stress reduction supports an argument that some social participation in the arts, in addition to other functions, may relieve individual anxiety (Dissanayake, 2007; Üvnas-Moberg, 1999).

The bottom line for us is that the arts provide a marriage of the four emotional foci of outcome, object, agency, and social interaction. It is misleading and reductionist to relegate the arts to a narrow domain of aesthetics only. It does not do justice to either the arts or the richness of the emotions that accompany them. Activities like music making and dance in small-scale cultures are consummate ways of eliciting the organismic properties of a group and ultimately solidifying the sense of common cause that is so important for group actions, not least costly ones like hunting or warfare. Aesthetic approaches to the arts focus on objects rather than behaviors and therefore neglect most of the functional consequences of the arts.

NEUROARTSOLOGY, NOT NEUROAESTHETICS

Although we appreciate the pitfalls in proposing neologisms, we believe that a deep understanding of the evolution and neuroscience of the arts will only come about from a “neuroartsology” and not a neuroaesthetics. To the extent that aesthetic

responses are a critical facet of the experience of the arts, neuroaesthetics will no doubt provide important enlightenment for the neural study of the arts. And yet, neuroartsology will cover much more ground than that offered by neuroaesthetics. As mentioned, the arts take advantage of all aspects of cognitive life and capitalize on all four categories of human emotions described in this chapter, not only aesthetic emotions. In addition, neuroartsology places a strong emphasis on the behavioral functions of producing and perceiving art. It does not reduce the products of artificialization to the aesthetic responses of perceivers, responses that are little different from responses to any other salient stimulus. Perhaps most importantly, neuroartsology encompasses a host of cognitive and behavioral mechanisms of the arts that have no direct aesthetic functions or consequences. Features of the arts such as pitch-combination rules in music, rhythmic entrainment in dance or music, role-playing in drama or dance, or image creation through drawing or painting need not have any direct aesthetic function and may instead be serving social roles related to motivating people to take up arms, communicating with deities, educating people about their ancestral lineages, or assuaging anxiety and generating catharsis after a misfortune. Aesthetic emotions are unquestionably an integral part of the arts, but they are neither necessary nor sufficient to characterize them. Thus, a narrow focus on aesthetic responses is ultimately a distraction from the larger picture of what the arts are about. Finally, to the extent that the arts are perceived as rewarding, this is not so only because artworks are appealing objects. There is a wide variety of rewarding emotions that occur when people create and experience art apart from simply object-based emotions, including the pleasure of social communion and the moral zeal of common cause.

REFERENCES

- Aharon, I., Etcoff, N., Ariely, D., Chabris, C. F., O'Connor, E., & Breiter, H. C. (2001). Beautiful faces have variable reward value: fMRI and behavioral evidence. *Neuron*, 32, 537-551.
- Alcorta, C. S., & Sosis, R. (2005). Ritual, emotion, and sacred symbols: The evolution of religion as an adaptive complex. *Human Nature*, 16, 323-359.
- Anderson, A. K., Christoff, K., Stappen, I., Panitz, D., Ghahremani, D. G., Glover, G., et al. (2003). Dissociated neural representation of intensity and valence in human olfaction. *Nature Neuroscience*, 6, 196-202.
- Appleton, J. (1990). *The symbolism of habitat*. Seattle: University of Washington Press.
- Bartels, A., & Zeki, S. (2004). The neural correlates of maternal and romantic love. *Neuroimage*, 21, 1155-1166.
- Baumgarten, A. (1735/1954). *Reflections on poetry*. Berkeley: University of California Press.
- Beebe, B., Lachmann, F. L., & Jaffe, J. (1997). Mother-infant interaction structures and presymbolic self and object representations. *Psychoanalytic Dialogues*, 7, 133-182.
- Blood, A. J., & Zatorre, R. J. (2001). Intensely pleasurable responses to music correlate with activity in brain regions implicated in reward and emotion. *Proceedings of the National Academy of Sciences*, 98, 11818-11823.
- Blood, A. J., Zatorre, R. J., Bermudez, P., & Evans, A. C. (1999). Emotional responses to pleasant and unpleasant music correlate with activity in paralimbic brain regions. *Nature Neuroscience*, 2, 382-387.

- Brown, S. (2000). Evolutionary models of music: From sexual selection to group selection. In F. Tonneau & N. S. Thompson (Eds.), *Perspectives in ethology. 13: Behavior, evolution and culture* (pp. 231-281). New York: Plenum.
- Brown, S., Martinez, M. J., & Parsons, L. M. (2004). Passive music listening spontaneously engages limbic and paralimbic systems. *NeuroReport*, 15, 2033-2037.
- Brown, S., & Volgsten, U. (2006). Is Mozart's music good? In S. Brown & U. Volgsten (Eds.), *Music and manipulation: On the social uses and social control of music* (pp. 365-369). New York: Berghahn.
- Burgdorf, J., & Panksepp, J. (2006). The neurobiology of positive emotions. *Neuroscience and Biobehavioral Reviews*, 30, 173-187.
- Carter, C. S., Lederhandler, I. I., & Kirkpatrick, B. (Eds.). (1999). *The integrative neurobiology of affiliation*. Cambridge, MA: MIT Press.
- Chernoff, J. M. (1979). *African rhythm and African sensibility*. Chicago: University of Chicago Press.
- Clore, G. L. (1994). Why emotions require cognition. In P. Ekman & R. J. Davidson (Eds.), *The nature of emotion: Fundamental questions* (pp. 181-191). New York: Oxford University Press.
- Clore, G. L., & Ortony, A. (2000). Cognition in emotion: Always, sometimes, or never? In L. Nadel, R. Lane, & G. L. Ahern (Eds.), *The cognitive neuroscience of emotion* (pp. 24-61). New York: Oxford University Press.
- Darwin, C. (1871). *The descent of man and selection in relation to sex*. London: J. Murray.
- Darwin, C. (1872). *The expression of emotion in man and animals*. London: J. Murray.
- Davies, S. (2006). *The philosophy of art*. Malden, MA: Blackwell.
- Dissanayake, E. (1988). *What is art for?* Seattle: University of Washington Press.
- Dissanayake, E. (1992). *Homo aestheticus: Where art comes from and why*. Seattle: University of Washington Press.
- Dissanayake, E. (2000). *Art and intimacy: How the arts began*. Seattle: University of Washington Press.
- Dissanayake, E. (2006). Ritual and ritualization: Musical means of conveying and shaping emotion in humans and other animals. In S. Brown & U. Volgsten (Eds.), *Music and manipulation: On the social uses and social control of music* (pp. 31-57). Oxford: Berghahn.
- Dissanayake, E. (2007). What art is and what art does: An overview of contemporary evolutionary hypotheses. In C. Martindale, P. Locher, & V. Petrov (Eds.), *Evolutionary and neurocognitive approaches to aesthetics, creativity, and the arts* (pp. 1-14). Amityville, NY: Baywood.
- Dissanayake, E. (in press). If music is the food of love, what about survival and reproductive success? *Musicae Scientiae*.
- Eibl-Eibesfeldt, I. (1989). *Human ethology*. Hawthorne, NY: Aldine de Gruyter.
- Ekman, P. (1992). Are there basic emotions? *Psychological Review*, 99, 550-553.
- Ekman, P. (1999). Basic emotions. In T. Dalgleish & M. Power (Eds.), *Handbook of cognition and emotion* (pp. 45-60). Sussex, UK: John Wiley and Sons.
- Falk, D. (1998). Hominin brain evolution: Looks can be deceiving. *Science*, 280, 1714.
- Francis, S., Rolls, E. T., Bowtell, R., McGlone, F., O'Doherty, J., Browning, A., et al. (1999). The representation of pleasant touch in the brain and its relationship with taste and olfactory areas. *NeuroReport*, 10, 453-459.
- Gould, S. J. (1977). *Ontogeny and phylogeny*. Cambridge, MA: Harvard University Press.
- Hennelotter, A., & Schroeder, U. (2006). Partially dissociable neural substrates for recognizing basic emotions: A critical review. *Progress in Brain Research*, 156, 443-456.

- Kawabata, H., & Zeki, S. (2004). Neural correlates of beauty. *Journal of Neurophysiology*, 91, 1699-1705.
- Miall, D. S., & Dissanayake, E. (2003). The poetics of babyltalk. *Human Nature*, 14, 337-364.
- Miller, G. (2000). *The mating mind: How sexual choice shaped the evolution of human nature*. New York: Doubleday.
- Miller, G. (2001). Aesthetic fitness: How sexual selection shaped artistic virtuosity as a fitness indicator and aesthetic preferences as mate choice criteria. *Bulletin of Psychology and the Arts*, 2, 20-25.
- Miller, W. B., & Rodgers, J. L. (2001). *The ontogeny of human bonding systems: Evolutionary origins, neural bases, and psychological mechanisms*. Dordrecht: Kluwer.
- Murray, L., & Trevarthen, C. (1985). Emotional regulation of interaction between two month-olds and their mothers. In T. Field & N. Fox (Eds.), *Social perception in infants* (pp. 177-197). Norwood, NJ: Ablex.
- Nadel, J., Carchon, I., Kervella, C., Marcelli, D., & Réserbet-Plantey, D. (1999). Expectancies for social contingency in 2-month-olds. *Developmental Science*, 2, 164-173.
- Nakamura, K., Nagumo, S., Ito, K., Sugiura, M., Kato, T., Nakamura, A., et al. (1998). Neuroanatomical correlates of the assessment of facial attractiveness. *NeuroReport*, 9, 753-757.
- Nelson, E., & Panksepp, J. (1998). Brain substrates of infant-mother attachment: Contributions of opioids, oxytocin, and norepinephrine, *Neuroscience and Biobehavioral Reviews*, 22, 437-452.
- Nitschke, J. B., Nelson, E. E., Rusch, B. D., Fox, A. S., Oakes, T. R. & Davidson, R. J. (2004). Orbitofrontal cortex tracks positive mood in mothers viewing pictures of their newborn infant. *NeuroImage*, 21, 583-592.
- O'Doherty, J., Winston, J., Critchley, H., Perrett, D., Burt, D. M. & Dolan, R. J. (2003). Beauty in a smile: The role of medial orbitofrontal cortex in facial attractiveness. *Neuropsychologia*, 41, 147-155.
- Orlans, G. H. (2001). An evolutionary perspective on aesthetics. *Bulletin of Psychology and the Arts*, 2(1), 25-29.
- Ortony, A., & Turner, T. (1990). What's basic about basic emotions? *Psychological Review*, 97, 315-331.
- Pedersen, C. A., Caldwell, J. D., Jirikowski, G. F., & Insel, T. R. (Eds.). (1992). Oxytocin in maternal, sexual and social behaviors. *Annals of the New York Academy of Sciences*, 652.
- Portmann, A. (1941). Die Tragzeit der Primaten und die Dauer der Schwangerschaft beim Menschen: Ein Problem der vergleichende Biologie. *Revue Suisse de Zoologie*, 48, 511-518.
- Rappaport, R. A. (1999). *Ritual and religion in the making of humanity*. London: Cambridge University Press.
- Reisenzein, R. (1994). Pleasure-arousal theory and the intensity of emotions. *Journal of Personality and Social Psychology*, 67, 525-539.
- Rolls, E. T. (2004). Convergence of sensory systems in the orbitofrontal cortex in primates and brain design for emotion. *The Anatomical Record*, 281A, 1212-1225.
- Rolls, E. T. (2005). Taste, olfactory, and food texture processing in the brain, and the control of food intake. *Physiology and Behavior*, 85, 45-56.
- Ruso, B., Renninger, L., & Atzwanger, K. (2003). Human habitat preferences: A generative territory for evolutionary aesthetics research. In E. Voland & K. Grammer (Eds.), *Evolutionary aesthetics* (pp. 279-294). Berlin: Springer-Verlag.
- Schore, A. N. (1994). *Affect regulation and the origin of the self: The neurobiology of emotional development*. Hillsdale, NJ: Erlbaum.

- Shiner, L. (2001). *The invention of art: A cultural history*. Chicago: University of Chicago Press.
- Small, D. M., Gregory, M. D., Mak, E. Y., Gitelman, D., Mesulam, M. M., & Parrish, T. (2003). Dissociation of neural representation of intensity and affective valuation in human gustation. *Neuron*, 39, 701-711.
- Solso, R. L. (1994). *Cognition and the visual arts*. Cambridge, MA: MIT Press.
- Stockfelt, O. (2006). Music and reuse: Theoretical and historical considerations. In S. Brown & U. Volgsten (Eds.), *Music and manipulation: On the social uses and social control of music* (pp. 315-335). New York: Berghahn.
- Thornhill, R. (1998). Darwinian aesthetics. In C. Crawford & D. L. Krebs (Eds.), *Handbook of evolutionary psychology: Ideas, issues, applications* (pp. 543-572). Mahwah, NJ: Erlbaum.
- Tinbergen, N. (1952). Derived activities: Their causation, biological significance, origin, and emancipation during evolution. *Quarterly Review of Biology*, 27, 1-32.
- Trevarthen, C. (1979). Communication and cooperation in early infancy: A description of primary intersubjectivity. In M. Bullowa (Ed.), *Before speech: The beginning of human communication* (pp. 321-347). Cambridge, MA: Cambridge University Press.
- Tucker, D. M. (1992). Developing emotions and cortical networks. In M. R. Gunnar & C. A. Nelson (Eds.), *Development, behavior, neuroscience* (pp. 75-128). Hillsdale, NJ: Erlbaum.
- Turner, V. (1969). *The ritual process: Structure and anti-structure*. London: Routledge and Kegan Paul.
- Üvnas-Moberg, K. (1999). Physiological and endocrine effects of social contact. In C. S. Carter, I. I. Lederhendler, & B. Kirkpatrick (Eds.), *The integrative neurobiology of affiliation* (pp. 245-261). Cambridge, MA: MIT Press.
- van Damme, W. (1996). *Beauty in context: Towards an anthropological approach to aesthetics*. Leiden: E. J. Brill.
- Vartanian, O., & Goel, V. (2004). Neuroanatomical correlates of aesthetic preference for paintings. *NeuroReport*, 15, 893-897.
- Voland, E., & Grammer, K. (Eds.). (2003). *Evolutionary aesthetics*. Berlin: Springer-Verlag.
- Young, L. J., & Wang, Z. (2004). The neurobiology of pair bonding. *Nature Neuroscience*, 7, 1048-1054.
- Zeki, S. (1999). *Inner vision: An exploration of art and the brain*. Oxford: Oxford University Press.