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# Evolutionary Aesthetics

## An Introduction to Key Concepts and Current Issues

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### 1. *Introduction*

Humans are an aesthetic species. We react with aesthetic pleasure to a rather diverse array of phenomena. On the one hand, we enjoy things like tasty food, picturesque landscapes, beautiful faces and well-built bodies, cute puppies, or the elegant movements of cats. We can be deeply moved by the right musical tune. We spend hours of our lives listening to well formulated fictitious tales and looking at figures and pictures of people, places, and things that might never have existed. On the other hand, we are disgusted by a similarly large number of things, with distaste perhaps exerting an even stronger influence on our decisions. Finally, we might even occasionally experience pleasure when intentionally exposing ourselves to (small doses of) our own disgust. The question of why this is so is the question underlying all theories of aesthetics. Evolutionary aesthetics (EA, for short) in particular tries to explain our aesthetic preferences against the background of our evolutionary past. In the following, we will try to give a philosophically reflected introductory overview of the current theoretical developments in this field of aesthetics. Our aim is not completeness. Rather, we will try to depict some of the central assumptions and explanatory tools frequently used in evolutionary accounts of human aesthetical preferences and then address a number of currently debated, open research questions.

EA has long passed the developmental stage of merely picking out particular aspects of our aesthetic experience and making up "just-so stories" about their evolutionary history. Therefore, we chose not to begin our overview by presenting a few successful partial theories within EA. Instead, we begin by reviewing the conceptual framework used by all these theories in section 2. With a clearer idea of what the goals, tools, and

limits of EA are, we will then, in section 3, briefly outline and discuss some answers which EA can contribute to the understanding of human aesthetical preferences. In section 4 we present a number of future directions in which, we hope, research in EA will proceed next. Section 5 concludes this paper.

## 2. *What is a complete evolutionary explanation?*

According to Tinbergen (1963), a complete evolutionary explanation of an adaptive trait, e.g., a cognitive system that produces aesthetical preferences comprises four main parts. These are (1) an understanding of the ontogenetic development, i.e., the changes the trait undergoes and the regulations of these changes from conception through the various stages of life until the death of an individual, and (2) the phylogenetic development of the trait, i.e. its evolutionary history. Furthermore, a thorough understanding requires the knowledge of (3) its proximate mechanisms, e.g., the neural circuitry and the emotions controlling mental representations and behavior, and (4) its ultimate function, i.e., the reason(s) why the trait was promoted or at least conserved by natural selection. These four different questions require quite different research methodologies. While proximate mechanisms (3) can mostly be tested in the laboratory, the study of ontogenetic developments additionally requires longer observations and comparisons of age groups. Alternatively, the phylogenetic history (2) of a trait is usually studied using a comparative approach in which the capabilities of different but related species regarding that specific trait are investigated. Finally, the ultimate function of a trait (4) can then be assessed by trying to integrate the results obtained in the study of the three other aspects and linking them to their observed, or at least their expected, fitness consequences.

It is mostly this fourth aspect of Tinbergen's questions that frequently sparks lively discussions between "Evolutionary Aesthetes" and the proponents of alternative, more philosophical aesthetics. This is mostly because in traditional philosophical aesthetics, the pleasure of beauty was thought of as disinterested, an idea coined by Kant in his *Critique of Judgment* (1790), and therefore as functionless. As soon as utility comes into play, Kant uses the notion of "mediated" pleasure while the beautiful, according to him, causes "immediate" pleasure in the subject. Because of this distinction, utility, or function, and beauty have to be kept strictly separate from a traditional point of view. By explicitly investigating the function of beauty, however, EA seems to be undermining this distinction.

This apparent discrepancy, though, can be resolved quite easily, we think, by respecting the systematic place of both perspectives in Tinbergen's programmatic scheme: The traditional view on aesthetic experience, which conceives of the beautiful as "immediately pleasurable", focuses on the proximate phenomenology of aesthetics, while the function of what is beautiful which EA tries to understand, can only be described on the ultimate level. In other words, it is perfectly safe to assume that the pleasure caused by enjoying beauty is absolutely "immediate" and functionless from the individual's point of view. This does not imply, however, that aesthetic judgment has no function as a biological trait. It is easy to confuse these levels of description, the proximate and the ultimate, but it is a category mistake nevertheless.

This being said, we can now take on the question of why it is that natural selection, which quite consistently favors traits which bring about genetic advantages in the struggle for life, has promoted the evolution of a cognitive system which arranges the phenomena of our world using aesthetic judgments.

## 3. *What is the sense of beauty good for?*

One of the most prominent mistakes which one should not make when trying to explain human aesthetic experience with recourse to evolutionary theory is attempting to subsume all phenomena in the field of aesthetics under one principle. Humans are able to experience a broad array of things in terms of "beauty" and "ugliness", including tastes, smells, haptics, other humans, non-human animals, places and landscapes, artifacts, stories and plays, sounds, and music. Some of the human preferences in these different aesthetical domains, particularly regarding taste and smell, quite obviously evolved in order to guide us to directly fitness enhancing choices, such as seeking nutritious food, avoiding inedible or spoiled nourishments, avoiding harm from potentially dangerous animals, and settling in appropriate areas. While it is a very interesting task to investigate these preferences and their interplay with the (cultural) conditions of modern life, we have limited the scope of this article paradigmatically to one of the currently best researched subfields of EA, namely human physical attractiveness, and to evolutionary theories of human artistic endeavor, because these are presumably of the greatest interest to the readers of *Aisthesis*[1].

[1] Further information on the other branches of EA can be found, e.g., in Heinrich (2013) for food choice, Orians and Heerwagen (1992) or Falk and Balling (2010) for habitat choice, Pijanowski et

*3.1 The aesthetics of the human form*

Whenever we see other human beings, we instantly and subconsciously judge their attractiveness. This automatic evaluation of attractiveness uses all the information available about other persons: their body shape and size, their face, their movement, their odor, their voice, and their skin texture – see, e.g., Grammer at al. (2003), Gangestad and Scheyd (2005), and Rhodes (2006) for comprehensive reviews. A myriad of studies have investigated the mechanisms of attractiveness evaluation in humans, but also in non-human animals, in the laboratory and in the field. The most astonishing results for humans include the following: (i) attractive persons are not only more popular with the other sex, but they are also more successful in their professional careers, i.e., they achieve better grades in school and receive higher salaries in their later vocations (see, e.g., Grammer et al. [2003]; Möbius and Rosenblat [2006]); (ii) attractiveness is judged by standards which are quite invariant across individuals, i.e., also across gender (but see Rhodes [2006]), and across cultures (Langois et al. [2000]). Interestingly, though, and also quite invariant across cultures, while attractiveness judgments are very similar, physical attractiveness seems to play a more important role in actual mate choice for men than for women (Grammer et al. [2003]; this finding also seems to extend to gay men, Swami and Tovée [2008]). Notwithstanding the remarkable stability of the central tendencies of attractiveness judgments, we do observe ethnohistorical variance. This raises the question if these observed differences are caused merely by local contingencies, i.e., minor instances of random noise with respect to the long-term stability of aesthetic judgment, or if these differences are expressions of adapted aesthetic mechanisms which react differentially to the environment. We will get back to this point in section 4.2. The most important factors consistently found to be influencing our attractiveness judgments are briefly described in the following.

(1) *Symmetry:* The closer faces and bodies are to the ideal of axial symmetry the more attractive they seem to appear; see, e.g., Rhodes (2006) for a more detailed discussion also concerning the problem of methodological biases and artifacts. The most prominent hypothesis for explaining this finding is that individual asymmetries in facial and bodily characteristics result from failures to resist stress during ontogeny caused, e.g., by inbreeding, poor nutrition or pathogen stress. Symmetry, thus, might indicate

al. (2011) for sound, Davies (2012) for non-human animals, and Milinski (2003) for smell; also see the other works compiled in Voland and Grammer (2003).

"good genes", i.e., a genetic endowment which is able to cope well with the current environment.

(2) *Averageness:* Particularly for faces, averageness has been found to predict attractiveness. While this feature also is susceptible to methodological bias and thus needs very careful controls (see Rhodes [2006]), it has quite reliably been found that more average faces are judged more appealing than faces which deviate from the most frequently observed forms. Again, this characteristic has been linked to "good genes", with more average faces perhaps indicating "functional optimality" – very average noses, e.g., allow optimal breathing function (see Rhodes [2006]).

(3) *Body shape:* Although some standards of bodily attractiveness vary between cultures, and also across time within the same culture, some trends have been observed. Men in many cultures tend to judge women as more attractive who have a waist-to-hip-ratio (WHR) below the population average, although the exact value of the preferred WHR does vary with time and culture (Gangestad and Scheyd [2005]). It is a task for future research, though, to understand these mechanisms of preference shift better and to investigate their interaction with cultural norms of beauty (see 4.2). Male bodies, on the other hand, are rated more attractive by women the more average their WHRs, the taller, and the more V-shaped they are. Interestingly, though, western men seem to systematically overestimate the importance of muscularity compared with female preferences. The same holds for the importance of female slenderness, which also seems to be overestimated by women compared with male preferences (Frederick et al. [2005]).

(4) *Additional natural factors:* Apart from the static, visual cues just described, a number of additional characteristics have been found to influence attractiveness judgments. Probably best studied is the influence of *body odors* known to the general public from the famous t-shirt studies (e.g., Wedekind et al. [1995]). Using olfactory cues, humans seem to be able to assess the compatibility of their potential partners' immune systems, a very important factor in the evolutionary arms race between hosts and parasites which all animals are subjected to. Furthermore, it has repeatedly been suggested that *movement* plays a role in partner choice. Just from watching plain movement data, i.e., the recordings of a number of light points fixed to the joints of moving persons which are invisible otherwise, humans probably can deduce information on gender, age, health, hormonal status and more (Grammer et al. [2003]). Another factor which attracted more research interest in the last couple of years is *skin quality*,

which also carries an amount of information about the individual (see, e.g., Fink et al. [2006]).

While most of the factors identified as adding to an individual's appeal seem to be linked with increased health, fertility, and developmental stability directly (see Rhodes [2006]), it is not guaranteed that this is why humans perceive all of them as attractive. For averageness and symmetry there is a competing, much more general, hypothesis which might also explain our respective preferences, although only by recourse to proximate mechanisms. This hypothesis of the "informational appeal" of symmetry is based on the observation that in sets of things of various kinds, humans reliably prefer the items closest to the average and the most symmetrical ones (see Rhodes [2006]). Symmetrical objects in general are easier to recognize (see Enquist and Arak [1994]), and averageness might meet the requirements of categorization mechanisms relying on class prototypes (see, e.g., Winkielman et al. [2006]). Currently, it remains an open research question, to what extent our appreciation of symmetry and averageness in human bodies and faces is actually rooted in the fitness benefits they might have caused under ancestral conditions. It might, instead, also be the case that we are dealing with a functionless by-product here. We will return to this issue (see 4.2). At any rate, it is very likely the case, that there are more reasons behind our attraction to symmetry and averageness than just their function as signal of health in mate choice.

Nonetheless, the findings addressed here and the other results on sexual attractiveness are exemplary for how a subfield of EA is converging on a complete evolutionary explanation of one domain of human aesthetic experience (see 2). In a very simplified account, we can summarize that the class of aesthetic judgments which we have just reviewed directly influences our mate choice decisions in the direction of better fit and thus fitness benefits. It is, therefore, not too surprising that it stood the test of natural selection. The cognitive mechanisms producing these judgments cause the phenomena which are referred to as instances of "natural beauty" in the experience of the individual. Understanding the ultimate causes behind artistic activities, however, seems more complicated.

### *3.2 The aesthetics of "making special"*

One cross-culturally observable phenomenon which likely also has some influence on attractiveness judgment is body modification, presumably with the use of ochre and other minerals for body painting representing the oldest of these practices (Knight [2010]). The methods employed by humans to augment their appearance reach from

make-up to tattoos, piercings and other artificial ornaments of all conceivable kinds, and even include perilous surgical interventions.

What is manifested here is referred to as "making special" by Dissanayake (e.g., 1995). *Making special* begins when humans take something out of its everyday context and invest time and effort in refining and stylizing it; and it does not appear erroneous that many historical early forms of "making special" such as body modifications are consistent with what studies on sexual attractiveness find to be considered beautiful. Some observed modifications, though, seem to contradict "natural beauty standards", such as tattoos, the practice of scarification or the use of lip plates in some African regions.

In order to understand that such phenomena can also inherently bear a "promise of fitness", one has to bring to mind that biological evolutionary events produce two different classes of traits, namely "useful traits" on the one hand, i.e., those that very directly contribute to self-preservation and reproduction, and on the other hand, signals, such as the peacock's train, which while not allowing any direct utility to be recognized, yet probably do reveal information about "hidden utility". The evolutionary functional logic of the adaptive signal system was initially recognized and described where it is most noticeable, namely in the area of sexual mate choice – but is in no way limited to this domain (see Voland [2003], Zahavi and Zahavi [1997]). In species with sexual reproduction, natural selection can lead to quite remarkable differences in morphology and behavior of the sexes, i.e., sexual dimorphisms. In many species, including humans, this is rooted in the fact that males and females differ in their potential reproductive effort. Females usually invest more resources, like time and energy, in the upbringing of their offspring than males, who, in the extreme case, only stop by for copulation and then leave again. This leads to diverging preferences regarding mate choice between the sexes, with males being less discriminatory than females with regard to mate quality. Thus, in many species male reproduction is limited by female choice. This can result in busy mating markets in which males need to advertise their qualities in order to be chosen to reproduce. In some species they do this by providing females with gifts which are actually useful, like e.g. food or nests, or by displaying features which are actually useful for themselves, like agility, strength or hunting skills. In other species, however, female choice evolved to focus on particular "handicaps" of males (Zahavi [1975]), i.e., features which are disadvantageous, or "costly", to the males but function as honest signals of their quality as mates. Handicaps are called "honest" signals, when forging them would result in costs equal to or greater

than the cost of regularly producing them. The standard example of such an honest costly signal, or handicap, is the peacock's train, which, while impressive to look at when displayed during courtship, hinders males in fleeing from predators and offers much room for parasites. Moreover, males must find larger quantities of high-quality food and metabolize it in order to be able to synthesize the colors of the feathers. Male handicaps, nevertheless, carry important information for females: they show that a particular male is (genetically) able to afford the costs of maintaining them, because only healthy, possibly parasite-free males are able to maximally display their epigamic show features (tail feathers, color signals, courtship rituals).This is why these advertising features in their strength reveal relevant conditions of the individually varying males such as the quality of their immune system. Hence, "handicaps" become the crucial hinge between the local ecology and sexual selection.

As already indicated above, we are dealing with biological traits with two basically different types: "costly signals" ("handicaps") and "useful traits" (see Zahavi und Zahavi [1997]). The difference is grave: whereas the selection of utility promotes economic efficiency, the selection of a handicap maximizes communicative reliability. Efficiency is maximized if a maximum of utility is achieved with a minimum of investment. On the other hand, selection for reliability leads to what at first glance appears to be an uneconomic waste of scarce resources, namely to presumably functionless redundancy and extravagance of the signals – and this is only due to the fact that signals have to be expensive in order to be convincing. For useful traits, their production costs are disadvantageous, but inevitable. In contrast, the additional costs are what count with regard to signals.

With these explanatory concepts provided by evolutionary theory in hand, it has been proposed that some kinds of body modifications be understood in terms of costly signals (see Singh and Bronstad [1997], Voland [2003]). While frequently linked with sexual selection, though, handicaps can also evolve in other contexts, e.g., in establishing prestige hierarchies or selecting cooperation partners (see Nelissen and Meijers [2011], Plourde [2008], Smith and Bliege Bird [2005], Soler [2012], Sosis et al. [2007]). Wherever one's own quality needs to be advertised in order to gain fitness relevant benefits, individuals who develop honest costly signals might be favored by natural selection (Voland [2003]).

The "promise of fitness" is incorporated also in artistic beauty namely, as already mentioned, especially visible in the area of sexuality, as the example of body modifications shows. The question arises of whether motivations to subject things

outside of one's own body to a creative *making special* process might derive, from an evolutionary standpoint, from the functional logic of reliable communication by means of the "handicap principle". Much art is produced by males in their twenties and early thirties (Miller [1999]). This has led many to assume, that art production might serve as an honest signal of cognitive and skillful ability in sexual selection (see, e.g., Miller [2001]). Evidence with regard to this claim is rather mixed, though. Nettle and Clegg (2006), e.g., found in a non-representative British sample that, while professional art producers indeed had more sexual partners, there was no interaction between sex and creative activity, suggesting the same pattern for male and female art producers. Additionally, the number of children and time spent in a steady relationship also did not differ between the creative and the uncreative subjects. Their study did not investigate if creative activity is more frequent in either one of the sexes, though. Nettle and Clegg's results do show, however, that there seems to be an interaction of artistic productivity with mating success even today. Further study is definitely needed in this area.

In addition to this empirical issue, there is also a theoretical problem that needs to be solved, namely the question of what the selective benefits for signalers and signal recipients are, for being willing to engage in a communicative exchange outside the narrower sense of the sexual domain via *making special*? How was the "handicap principle" able to emerge from its original function, namely of sexual courtship, and penetrate the area of symbolic communication? These are questions which Zahavi's perspective of aesthetics attempts to answer. If they are to have an explanatory value of their own, i.e. if what we view as being beautiful is to be understood as the result of the evolution of signals and our preferences for what is beautiful as the result of the evolution of utility, three conditions have to apply:

(i) Beauty must be expensive as an honest signal;

(ii) As an honest signal of the quality of the signaler, beauty must vie for the attention of certain recipients;

(iii) It must be useful for these recipients to be able to evaluate the signaler via beauty.

Elsewhere these three hypotheses are explained in more detail and measured against empirical findings, whereby the conclusion manifests itself that in the aesthetic practice of humans very frequently *making special* actually merges into *making expensive* (Voland [2003]). Even the earliest known evidence of artistic activity, dating back more than one million years, namely skillfully crafted stone axes which were refined to a degree exceeding what was necessary for the practical use of the axe as a

tool (Mithen [2003]) argue in favor of the early transfer of the handicap principle from what is natural beauty to what is artistic beauty. The producers of the beautifully crafted stones axes give evidence of their special suitability for tasks of this kind to all who want to know. However, the theory of costly signals does not capture all of the aspects of aesthetic practice.

Besides phenomena for which the handicap principle seems to offer a valid explanatory matrix, in aesthetics phenomena are also observed, the communicative significance of which tends to lie in the regulation of emotional sensitivities. Music, dance and ritual performance definitely belong to this category. Certainly there also are events of competitive artistic performance, e.g., in classical music, where you can become world-famous by playing the "Flight of the Bumblebee" error-free in 66.56 seconds. Here one is quickly prone to link the exhibition of extraordinary talent by reproducing musicians with the "costly-signaling" theory. It is easy to see, however, that there is a bit more to productive artistic activity of this kind. What we enjoy, eventually, is the music itself, although we need someone to reproduce it, error-free (!), for us to hear it. What is brought to light here is an effect of art which influences and regulates emotional constitutions. The demand for such effects may initially seem to be a personal matter in which personal moods are reflected and processed in the consumption of art. However, these effects do not remain limited to the individual because emotional regulation can also lead to an emotional synchronization of many, which results in reinforced group cohesion. *Making special* thus becomes an integral element of social rituals, the function of which is to bind societies and to align them to common values or tasks and to emotionally synchronize their members; in particular if challenges requiring extraordinary efforts on the part of the members arise (like, e.g., war, solidarity, collective processing of mourning, initiation, etc.), art, especially music, displays its emotional and manipulative potential. In a pre-historic world, which has comprised more than 99% of the socio-ecological milieu of humans and which is described by Alexander (1987) as a world in which autonomous small groups are in constant competition for ecological benefits, group cohesion was a crucial survival factor. This aspect of the production of music cannot have been without evolutionary significance. Whoever was not receptive to the emotionally invasive power of rituals was hardly likely to be one of our ancestors.

In this way, the arts become agents of social cooperation, coordination and cohesion (Menninghaus [2011]) and thus generate an explanatory contrast to those evolutionary models of art which view the competition-driven self-projection of personal fitness

indicators as their evolutionary engine. With the current status of the research, it is still unclear for the most part how these two complexes of functions, namely honest communication via fitness indicators and the genesis of emotional communion, correlate evolutionarily. Menninghaus (2011) makes some interesting suggestions here, by introducing concepts into the discussion which essentially utilize the arguments of expansions and overlapping of biologically evolved modular brain functions. In this way, it is possible to find the evolutionary and anthropological roots of the elaborate art events of modern times without at the same time having to deny the increase in complexity compared to pre-historic art practices. In doing so he draws, to a certain degree, a parallel to Mithen's (1996) ideas on the evolution of religiosity. These intellectual advances are interesting and quite promising and demonstrate that evolutionary aesthetics is a very dynamic field. However, they also require increased empirical research by evolutionary anthropologists and psychologists, the results of which are urgently required to improve the formation of theory within EA.

## 4. *Open research questions*

Evolutionary aesthetics formulates very specific questions for the academic disciplines involved. Successful proceeding in all these disciplines is indispensable for the whole enterprise, in order to make progress both theoretically and also empirically: Evolutionary theorists see themselves faced with the challenge of explaining the evolutionary status of aesthetic preferences and motivations. Are we only dealing with biologically functional adaptations in aesthetic life contexts or (also) with functionless by-products of a cognitive apparatus which has evolved for reasons other than aesthetic judgments? Behavioral ecologists (and also empiricists from other academic disciplines) face the task of capturing the variability of the aesthetic judgment and tracing it back to its conditional cause. Ultimately, the question is what portion of aesthetic diversity (if any) can be depicted by evolutionary theory and through what mechanisms observable variety can be generated and maintained. Once again, philosophers have to deal with a problem already touched upon in ancient Greece, namely of how beauty and goodness could be linked. Recent empirical results, especially from the imaging processes of neurosciences, provide new material for this situation, which is still unclear. In the following, we wish to outline and specify the three research questions cited in more detail.

*4.1. Adaptation or functionless by-product?*

Many theorists have tried to explain the enjoyment of art in terms of an adaptive value, i.e., a fitness enhancing function, which it might have. Alternatively, it was assumed that our aesthetic preferences are useless by-products of otherwise functional adaptations, e.g., the mode of operation of our neural circuitry for object recognition and classification (see 3.1). In this view, aesthetic pleasure can be compared to drinking alcohol: our taste for alcohol is unlikely to have been shaped by evolution. Rather, ethanol molecules seem to destructively interfere with our neural architecture in a way that, as a by-product, releases opiates, making us feel happy (see, e.g., Mitchell et al. [2012]). Once this effect had been discovered by chance, however, humans learned how to control it and culturally developed a rich variety of alcohol related traditions and huge industries serving our need for alcoholic drinks. This does not mean, however, that we need an adaptive account of alcohol production and consumption.

More comprehensive accounts of the "by-product or adaptation" debate for the arts can, e.g., be found in Voland (2003), Davies (2012), and Dutton (2009). An interesting intermediary position, though, was proposed by Tooby and Cosmides (2001) and, e.g., Eibl (2012), who also do not attribute a directly fitness enhancing function to the enjoyment of beautiful, i.e., aesthetically preferred, tunes or things. However, they propose that the built-in inclination of our cognitive apparatus to seek out and explore the novel and the extraordinary, our curiosity, and our other epistemic mechanisms not only have a "working mode" in which they function adaptively by providing us with useful information about our natural environment. Additionally, they say, these mechanisms also have an "organizational mode", i.e., a mode in which our epistemic modules are trained and calibrated by playful occupation with innocuous but nevertheless cognitively challenging things. In their view, the enjoyment of art can thus be understood as some form of "mental play"; while not being immediately useful, it does however train and foster otherwise functional capacities.

*4.2. The behavioral ecology of aesthetics: What causes the observed variability of aesthetic judgments?*

Biological evolution does not happen through the gradual change of a type but through the gradual conversion of populations. Typological thinking is, therefore, not suitable for evolutionary theories (Mayr [1998]), which is why a search for *the* aesthetic judgment formed by natural history would not be an enterprise justified by evolutionary theory. Populations show variability in their biological traits, and one of the key scientific

objectives of an evolutionary behavioral theory consists not only of comprehending the central evolutionary tendency of a trait but also the adaptive backgrounds for observed variability in the trait. Behavioral ecology research registers some functional fields in which adaptive variance also occur in aesthetic preferences. They can become visible *intraindividually*, *interindividually* or *intraculturally*, whereby – as is frequently the case – sexual aesthetics has more often found the attention of researchers than other aesthetic phenomena.

Strikingly, and very indicative of the evolutionary background of mate choice mechanisms, e.g., one factor has been found to reliably cause *intraindividual variation* in attractiveness and judgments of attractiveness over time: the female menstrual cycle. During a short timeframe close to ovulation, e.g., women seem to appeal most to men (Miller and Maner [2010]) and also change their partner choice preferences to some extent. Depending on whether women are in the non-fecund or fecund phase of their cycle, they evaluate sexual attributes differently. In comparison to the non-fecund days, body and facial symmetry (Thornhill et al. [2003]), "masculine" faces and body shapes (Johnston et al. [2001], Little et al. [2007]), testosterone markers (Roney and Simmons [2008]), social dominance and presentation ("macho behavior"; see Gangestad et al. [2004], Havlicek et al. [2005]), a deep voice (Puts [2005]), height (Pawlowski and Jasienska [2005]), creative self-projection (Haselton and Miller [2006]), MHC difference (Wedekind [2007]) and finally, male flirting offers (Rosen und López [2009]) are assessed as being more attractive on fecund days.

*Interindividual variability* with regard to the question of which traits are perceived as sexy to what degree and which are in demand while choosing a mate, are lastingly based on one's own market value as a sexual partner. Women of above-average attractiveness need to make fewer compromises with regard to mate selection than women who are less attractive, by waiving the sexual attractiveness of their partners in favor of familial virtues – or vice versa. Women of above-average beauty in the market for mates can afford to raise their personal standards with regard to both aspects, and therefore, their aesthetic cognitions are more critical concerning masculine sex appeal (Buss and Shackelford [2008]).

*Intercultural variability* regarding the question of which traits are perceived as sexually attractive to what degree and become in demand during mate selection, are lastingly derived in accordance with the good-gene model from the magnitude of pathogenic stress experience to which the population is exposed. Actually, Gangestad and Buss (1993) were able to find evidence for such a link in a comparison of 29

countries. Accordingly, the significance of physical attractiveness in mate selection preferences is dependent on local pathogenic prevalence.

The same argument is formulated even more sharply by an investigation conducted by DeBruine et al. (2010). The authors have ascertained female preferences for masculine faces in thirty countries and correlated them with the medical developmental status of these countries, as indicated in the statistics of the World Health Organization (WHO). The outcome is a finding according to which the sexual preference for masculinity increases to the degree that the average health status of the population decreases. The authors see the result of a trade-off problem here: Under living conditions with an increased disease burden it is more advantageous for women to select masculine men as the fathers of their children, even if these men function less reliably as caregivers owing to their success in the sexual competition. On average, they are carriers of the "better genes", i.e., locally adapted genotypes.

These brief comments might suffice to illustrate that evolutionary theory offers a perspective which deals with an improved understanding of variability in aesthetic judgments and not – as frequently assumed – in the search for a normative standard for beauty fixed by natural history. Psychological adaptations are information-processing mechanisms for solving biological life and reproduction problems which naturally also process personal data and therefore can generate variable output with the same input. For reasons of biological individuality, there are simply disparate life problems with different decision-making processes and therefore also different tastes, even though the Darwinian algorithm of the aesthetic judgment must be thought of as a biologically evolved species-specific universal.

*4.3 Links between the beautiful and the good*

Ever since Plato's *Republic,* one subject of philosophical discussion has been whether the aesthetically preferred and the morally good interact somehow. Even Kant himself links aesthetics and morals in his famous passage on the two main causes of veneration and awe regarding the constitution of our world: «Der bestirnte Himmel über mir, und das moralische Gesetz in mir» («The bestarred sky above me, and the moral law within me», translated by the authors; see Kant [1788]). In current philosophical aesthetics, ethicism, e.g., is a position which claims that the aesthetic value of a work of art is, in part, determined by its moral value (see, e.g., Halwani [2009], for a critical discussion).

Current empirical moral psychology and neuroscience, with their rigorous methodologies, actually are on the trail of this link. It has been found, e.g., that subjects'

moral judgments become stricter when they are exposed to stimuli eliciting disgust, irrespective of whether the moral transgression under evaluation itself involved triggers of disgust, e.g., eating your dog, or not, or not returning a lost wallet (Schnall et al. [2008]). Furthermore, it was experimentally found that witnessing unfairness in an economic game triggers exactly the same physical facial motor activity that an awful taste does (Chapman et al. [2009]). Finally, neuro-imaging studies have shown that there is an overlap in the brain regions that process moral and aesthetical judgments (Zaidel and Nadal [2011]). While some philosophers doubt that the moral evaluations investigated in these studies are representative of what philosophers mean when they speak of moral judgment (see, e.g., Sneddon [2009]), we think that, especially from an evolutionary perspective on moral psychology, these findings are seminal. If it turned out e.g., that the human ability to make moral judgments is evolutionarily derived from aesthetic judgment, which succession is suggested by the fact that the gustatory sense is very common in the animal kingdom while moral judgment seems to be rather "recent" evolutionarily, this would really deepen our understanding of human morality. As Hume already suspected in his *Enquiry Concerning the Principles of Moral* (1751), we think that moral judgment eventually involves feelings and sentiments which so far have successfully eluded the attempts of rational philosophical enquiry to fully explain them. If, however, new findings in moral psychology could really establish that, e.g., our intuitive "taste for fairness" was formed by natural selection just like our tastes for sugar and fat, this could really root the existing attempts for formulating a (descriptive) theory of Evolutionary Ethics in the empirical sciences.

## 5. *Conclusion*

Let us briefly summarize: In our view, it is a rather straightforward task for theorists using the framework of EA to explain human aesthetical preferences in the domain of natural beauty. Although more research is needed here to fulfill the requirements of complete evolutionary explanations (see 2.2), we think that the EA approach is well suited to understand these phenomena in their entirety. Things are more complicated, however, when we turn to artifacts, including music and recital, since it is not quite clear whether human art production has an evolutionarily relevant function or if it is, like the production of alcoholic beverages, just a culturally evolved way of satisfying a coincidentally existing demand. As interesting and theoretically distinguished this question doubtlessly is, yet it cannot be exploited for the purpose of questioning the evolutionary approach as a whole. After all, even by-products are based on evolutionary

adaptations, so that the question of the evolutionary basis of art is not abrogated but only shifted by one level, if, at the end of the day, the by-product hypothesis for the production of art were to be proved to be the more powerful explanation. What are these adaptations then, the by-product of which is art? Are the by-products co-opted secondarily by evolutionary processes?

Completely independently of the solution to the adaptation/by-product issue, the evolutionary perspective of aesthetics is taking a position, accidentally and completely unintentionally, on the age-old philosophical debate on the origins of beauty. Is beauty inherent in the objects themselves or in the minds of the viewers? Is beauty a category of the objects or of the subjects recognizing beauty? In the almost two and a half thousand year-old philosophical debate, realistic positions which view beauty as objectively existing in reality are confronted with absolutely implacably idealistic positions, which – in their hardest versions – interpret aesthetic perception as a solely subjective achievement, not justifiable, not objectifiable, not even communicable. It should have become clear that neither of the two positions find unrestricted support from an evolutionary standpoint. Of course beauty is inherent in things to a certain degree. Signals are real, objective and perceptible facts and that which leads to their generating beauty is determinable, such as the number of "eyes" in the peacock's train. Just as self-evidently, aesthetic judgment is the result of a subjective evaluation process of the empirical state of facts. The same signal can be evaluated very differently, because it is only the brains that perceive and process the individual bits of information which generate meaning. They evaluate what has been perceived in accordance with personal criteria (how else?) but without losing themselves in an arbitrariness that is not rationally accessible. Aesthetic judgment is a subjective performance of an objective species-specific adaptation. «Beauty is in the eye of the beholder» is, therefore, only half the truth. Symons (1995) expressed this more pithily: «Beauty is in the adaptations of the abholder».

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