

Human Characteristics

Human Characteristics:
Evolutionary Perspectives
on Human Mind and Kind

Edited by

Henrik Høgh-Olesen, Jan Tønnesvang
and Preben Bertelsen

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P U B L I S H I N G

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This book first published 2009

Cambridge Scholars Publishing

12 Back Chapman Street, Newcastle upon Tyne, NE6 2XX, UK

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

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ISBN (10): 1-4438-0213-1, ISBN (13): 978-1-4438-0213-0

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INTRODUCTION

HUMAN CHARACTERISTICS - SETTING THE STAGE

HENRIK HØGH-OLESEN

Every once in a while, we as scientists have to reconsider the perennial questions concerning human nature: What are the special human behaviours, social practices, and psychological structures that make us particularly human? Or, as the French crooner Charles Aznavour puts it, on one of my mother-in-law's old records: "*Tell me if you can, what makes man a man?*"

The answers given to this question may differ considerably, and each century or decennium may have its favourites. But one thing seems inevitable. Whenever a new distinction is launched, it stirs up fuss and provokes many people, both inside and outside the scientific community, to take a stand. Thus, when the Swedish botanist Carl von Linné, in the 10th edition of his "*Systema Naturae*" in 1758, placed humans and apes in the same zoological category of "*Primates*", an outcry of indignation was heard all over Europe. Man was "imago Dei": The only living creature made in the image of God. And little did it help that the word "primate" literally indicated that we were among the first, foremost and highest in rank of all God's creatures (which was Linné's way of sugaring a bitter pill). The Rubicon between man and beast had been crossed, and – primate or not – from now on man was just another mammal with a natural history.

When, a hundred years later, Darwin consolidated this view in "*On the Origin of Species*" (1859) and "*The Descent of Man*" (1874), the reception was just as hostile, and the rave goes on as the latest roars from the supporters of intelligent design indicate.

So obviously, these matters most certainly matter to us. And indeed, this perpetual quest for origin, meaning, and ontological status – this existential need to know who we are – may in itself be one of the human particulars that we have set out to discover. Man, "the existential man-hunter", so to speak, constantly tries to track down his own footprints in order to catch up psychologically with himself and his origins.

It is also significant that the closer we get to our own time, the more answers are suggested and the quicker they change. Today, relevant data and theoretical deliberations from a broad range of sciences are piling up, and so an overview is needed. To facilitate this breadth of view, a large inter-disciplinary conference entitled ‘Human Mind – Human Kind’ with participants from more than 20 nations was held at the University of Aarhus, Denmark in August 2007. More than 100 experts within the field of evolution and cognition presented their latest research. Forty-five papers were later submitted for publication, and after a review process, twenty of these found their way to this book, securing a volume of both quality and thematic coherence.

The contributions fall into three well defined but interconnected sections.

Section 1: *Evolution and Cognition – comparative and developmental perspectives* begins with Stange’s interesting work on art creation and appreciation in humans and animals. Aesthetic preferences may be functional to others than humans, but does non-human animals show any signs of aesthetic sensibility or artistic creativity? The evidence is scanty and it is difficult to know for certain ; however, Stange discusses what data we have, and ends his chapter with an actual sketching of an experimental procedure, that might help us answer some of these fascinating questions.

In chapter 2, Nadal, Capó, Peters & Cela-Conde continue this discussion in a review, that fuses results from empirical aesthetics, neuroimaging and comparative neuroscience, and substantiate the idea that aesthetic preference – rather than a content-specific modular mechanism – seems to be the result of several cognitive and affective processes (a “mosaic evolution”), some of which we have inherited from our primate ancestors.

The phenomenon of art itself is indicative of a complex inner world; but do other animals also have complex mental worlds, and how are we going to address this question empirically?

One way to approach the question is by investigating animals’ abilities to travel mentally in time, and to recollect and plan for future states. Oswath has conducted a series of experiments on chimpanzees and orangutans that would seem to suggest, that humans are not alone “in the mental world of possible futures”, as he so eloquently puts it in chapter 3.

Kingo & Krøjgaard (chapter 4), further develop the focus on complex symbolic and mental capacities by directing the attention towards language and tool use, two domains in which humans seem to be far superior, when comparatively viewed. There may be many reasons for this superiority, but one easily overlooked explanation offered here, is the

human ability to extract and understand the functional characteristics of physical objects, and it is argued that this skill serves as a basic prerequisite for advanced language and tool use.

Krøjgaard (chapter 5) expands this line of thinking in a thorough article on object individuation in humans and apes. Basic aspects of object individuation may also be prominent in some of our primate relatives, but again humans excel and display a far more elaborate understanding of cultural artefacts than any of these. Additional skills, far beyond simple object tracking here and now, may account for this surplus, and the attention is directed towards the human ability to abstract spatio-temporal threads of specific objects. Finally, Nørager (chapter 6) closes the theme on tools, objects and cognitive capacities in an article that shows how our knowledge of primate cognition and tool use can be applied in making modern computerised technology more intuitive and user-friendly.

The applied field of psychotherapy also seems to gain important insights from animal comparisons. Descartes' *Meditations*, and the thought processes produced in modern depth psychology, may be prime examples of a type of reflexive thinking only found in humans, but in chapter 7, the psychiatrist Brickmann turns our attention towards a continuum of succorance, running from arched back nursing in rats, and grooming in non-human primates, to supportive elements of psychotherapy in humans, hiding underneath all the "mentalizing".

Closing the section – and serving as a bridge to the social perspectives in section 2 - Smedt, de Cruz & Braeckman conduct an examination of human social cognition from an archaeological and comparative perspective, which suggests that the human brain is not simply an enlarged chimpanzee brain. Instead natural selection seems to have favoured a different social cognition in both species.

In Section 2: *Human Sociality, Morality & Religiosity*, scholars from within psychology, philosophy, ethics and the scientific study of religion, look at the interconnected vessels of sociality, morality and religiosity from an evolutionary perspective.

The section opens with a longitudinal study by Takahashi, Inoue, Yamakawa & Shibata on the development of close social relationships among young Japanese children, that introduce light and shade into the classic attachment theory by showing, that children as young as 3 years old, construct their own frameworks of social relationships consisting of *multiple* significant others, including non-kin, and this makes evolutionary sense.

To many (see Høgh-Olesen chapter 20), third-party sanctioning and norm enforcement is the moral Rubicon between humans and apes. In

chapter 10, Ingram, Piazza, & Bering explore the possibility that human gossiping, and the phenomenon of absent third-party punishment, has generated the evolution of a set of unique cognitive structures (which enable people to model and manipulate their reputation in the minds of others), capable of handling this adaptive challenge. The model presented is supported by an observational study on tattling in two preschool samples, and an experimental study of giving, under threat of gossip, in a dictator game.

The theme on human morality is further developed in chapter 11, where de Jelle discusses empathy (affective and cognitive) as the trigger of altruistic motivation, and in chapter 12 and 13, where the philosophers Toft and Nissen take a closer look at some of the foundational problems related to an evolutionary approach on human altruism and morality. Toft by addressing the problem of altruism towards distant strangers in need, a phenomenon that according to him cannot be sufficiently accounted for by evolutionary theory ranging from reciprocal altruism to gene-culture co-evolution, and Nissen by investigating what conclusions to draw in philosophical ethics from the fact, that morality is an adaptation. An investigation that leads Nissen towards a notion of objective morality, that is strong enough to support moral realism.

Human sociality is complex. As humans we engage in large scale, high-risk cooperation with non-kin and strangers. We glue these complex social organisations together by strange symbolic embellishments and religious beliefs, cults and rituals, unparalleled in the rest of the animal world, and sometimes we even sacrifice our own life to defend or revenge an actual or symbolic threat to these ideological and collaborative mega-units (being a Dane, the “cartoon-crises” is still fresh in memory).

These phenomena are puzzling indeed. Liberoth (chapter 14) explores how far evolutionary theory will get us in understanding the evolution of martyrdom and religious self-sacrifice, while Levi (chapter 15) examines the nature and functions of religious cognition and behaviour and argues, that ritual behaviour and norms are among the forces that render human traditions evolutionary stable.

Petersen & Kennair (chapter 16) conclude the section with a bridge-building article that shows how evolutionary psychology and political and social science may cross-fertilize each other and join hands in the understanding of such complex social phenomena as cooperation, coalition formation, norm-sanctioning and public opinion.

The domain summarized under the heading of Section 3: *Human Sexuality and Mating Strategies*, has been a growing field in many years,

in journals like “*Human Nature*” and “*Evolution and Human Behavior*”, and three such studies have found their way into this volume.

Until now mating studies have largely ignored the fact, that mating decisions may be heavily influenced by parents and other kin, and that parents and offspring may have conflicting opinions, regarding what constitutes an ideal mate. Park, Dubbs & Buunk throw light on this subject in a new study presented in chapter 17, while Hald & Høgh-Olesen study the different mating strategies applied by women and men, by letting eight confederates approach strangers of the opposite gender on a university campus, asking one of the following three questions: 1) “Would you go on a date with me?”, 2) “Would you come to my place tonight?”, 3) “Would you go to bed with me tonight?”. The gender-specific answers to these questions can be found in chapter 18.

Finally, Klavina, Buunk & Park, chapter 19, investigate the relationship between jealousy towards rivals from different ethnic groups and the perceived characteristics and stereotypes of these groups. An important aspect of intergroup conflict is competition for mates, especially among men, and because different outgroups pose different levels of threat, the group membership of rivals may be a characteristic that evokes jealousy. Data supporting this prediction is presented.

A book entitled *Human Characteristics* is more or less under an obligation to synthesize perspectives into a more inclusive answer to what exactly makes us human, and at least to outline the species-specific behaviours, social practices and psychological processes that appear to be uniquely human. The present author takes on this commitment in chapter 20, summing up and supplementing the perspectives presented so far. Four central fields of activity related to: 1) complex symbolic behaviours, 2) tool making and tool use, 3) culture and social transmission, 4) sociality and morality, are surveyed and comparatively analysed for similarities and differences. Supplementary data, from a broad range of sciences, are brought in, introducing light and shade into the picture.

The atmosphere at the conference was open-minded and characterized by inter-disciplinary curiosity, and so are the following articles. They naturally apply their own evolutionary and/or comparative approach without engaging in aggressive theoretical demarcations.

In my own field of science, psychology, we traditionally speak of the major paradigmatic “*forces*” that have dominated the field. Behaviourism, psychoanalysis, and humanistic psychology constitute the three first forces, and now, after some 30 years interregnum, a fourth unifying force, which introduces an evolutionary and cognitive angle to the study of man, has emerged strong and vital.

Naturally, there are differences between socio-biology, human behavioural ecology, gene-culture co evolution, evolutionary psychology, etc., but equally there were differences between Watsonian, Pavlovian, and Skinnerian behaviourism, and between humanistic and existential psychology. Therefore, let us not indulge in the narcissism of the little difference, as Freud put it. The different 'regiments' may wave different colours, but it is still the same force united in a common evolutionary approach.

SECTION I:

**EVOLUTION AND COGNITION –
COMPARATIVE AND DEVELOPMENTAL
PERSPECTIVES**

CHAPTER ONE

ART AND APPRECIATION: UNIQUELY HUMAN?

KEN STANGE

Abstract: Close observation of other species has resulted in the realization that most of the characteristics once thought to be unique to *Homo sapiens* are also found in other species, albeit in a less developed state. This paper addresses recent claims that even artistic creativity may not be unique to human beings. While rejecting the often cited and dubious evidence of animal art admired by humans, it offers an alternative approach which involves clearly operationally defining art, creativity, and aesthetic sensibility in terms of the unique characteristics associated with each. On the basis of these definitions, some evidence is offered to support the idea of an aesthetic sensibility in other species, and one feasible empirical investigation is proposed

What Makes *Homo sapiens* Unique? The Usual Suspects

Science has a justified reputation for attacking our self-esteem as a species. The first major attack was the Copernican Revolution which moved us and our home from the centre of the universe—and now cosmologists have relegated us to the far suburbs in but one insignificant galaxy among millions scattered over distances we can't even comprehend. Then a blow was struck even closer to the bone by what Daniel Dennett (1995) calls Darwin's "dangerous idea" of natural selection. Once we accept this humbling cornerstone of biology, we are tempted to reach out for something, anything, we can claim as uniquely ours—at least in the small corner of the universe to which we have access. Can we at least claim our species is qualitatively different from all the other life forms of which we have knowledge? Descartes famously considered all non-human creatures as mere automatons, and many are afraid that recent neuroscience discoveries are implying that we too are

automatons. Is there any justification remaining for thinking *Homo sapiens* differ *qualitatively* from other species?

The specific candidates traditionally offered up as evidence of our special status have been systematically eliminated—or at least many feel they have. The four major specific candidates are language, tool-use, cognitive skills at problem solving, and transgenerational transmission of culture. Of course one can choose to operationally define each of these so stringently that only *Homo sapiens* makes the cut, but to do so seems a mere *ex post facto* attempt at saving face.

For example, the degree to which the great apes can understand syntax, or whether they do so at all, is often acrimoniously debated, with researchers such as Francine Patterson, working with the gorilla Koko (Patterson & Linden, 1988), and Sue Savage-Rumbaugh, working with the bonobo Kanzi (Savage-Rumbaugh, Shanker, & Taylor, 2001), claiming to have evidence of sophisticated language abilities including syntactical usage in their protégés, while highly respected linguistic experts such as Stephen Pinker and Noam Chomsky view such claims as exaggerated projections of the researchers' expectations and involvement with their animals. "Possessing a language is the quintessentially human trait: all normal humans speak, no nonhuman animal does." (Pinker, 1995, p. 135).

Nevertheless, it is fair to say that if one doesn't set the bar too high, most researchers have to concede something that could be called 'language ability' in other species. Furthermore, regarding the other three former candidates for human uniqueness, there is plenty of evidence of some degree of cognitive skill at problem solving in many species (Wasserman, and Zentall, 2006), indisputable evidence of animal use of tools, even in birds (Bluff, Weir, Rutz, Wimpenny, and Kacelnik, 2007), and general acceptance of transgenerational transmission of acquired social or adaptive skills in non-human primates (Laland, and Hoppitt, 2003).

However, in more general terms, humankind does seem to be distinct from other species in having science, religion, and art. However science, in the modern sense, was not a characteristic of our species until relatively recent times. And science, in the broad sense of making observations and generalizing from them certainly does exist in primitive form in other species. The strict behaviourist's attempts to explain away apparent empirical reasoning by other creatures has been replaced by widespread acknowledgement of observational learning in animals (Bandura, 1977). Religion can be viewed as a combination of superstitious behaviour and ritualized behaviour, both of which have certainly been observed in other species (Dawkins, 2006). If one accepts this loose definition of science

and this interpretation of religion, only art remains as the last bastion of ‘hope’ for any claim to the qualitative uniqueness of our species.

Some feel that this bastion is being battered by evidence that chimps and elephants and a few other species can, when given the necessary tools, create admirable paintings that are indistinguishable even by art critics from the work of contemporary artists. Whenever a painting by an elephant or a chimp sells for a substantial sum, it makes the news. For example, a painting by Kamala, an elephant at the Calgary Zoo in Canada, recently sold for \$1,175. This news is greeted with glee both by those who wish to denigrate contemporary artists and by those who wish to elevate our estimation of animals to a higher plane. However, neither of these groups could be called unbiased evaluators of the significance of such news.

Yet it is a serious philosophical and empirical question whether or not other species demonstrate what could justifiably be called an aesthetic sense, and it is worthwhile to question whether or not aesthetically pleasing paintings created by other species are really valid evidence of such an aesthetic sense—and if they aren’t, what really would constitute such evidence. These are the questions addressed in this paper.

To Claim Art as Uniquely Human Requires Defining Art

It is at first surprising that both philosophers of aesthetics and those engaged in doing research in empirical aesthetics rarely address the question of exactly what art is. The primary reason for this is that art, even more than science and religion, is notoriously resistant to definition. This problem stems from the incredible diversity of art forms which seem to have so very little in common. What does found art, such as Marcel Duchamp’s urinal have in common with a Rembrandt painting or a Bach fugue or a Bergman film or the unrecorded 1913 *Rites of Spring* ballet performance that caused Stravinsky to flee the concert hall or the Köln Cathedral or the ritual masks of the Dani tribe of Papua New Guinea or the sonnets of Shakespeare or the draping of the Pont Neuf in Paris by Christo?

There is a simple solution to this problem: focus not on the thing called art by someone, not on the object or performance, but rather on the response to it (Stange, in prep). All of the above examples induce in some people what could be called an “aesthetic response”, which is precisely what inspires someone to call something ‘art’. There is far less confusing diversity in the “aesthetic response” than in what induces it: some of us are or could be ‘moved’ or ‘touched’ by all of the above examples, but our

experience in each case is surprising similar. This shifting of emphasis from cause to effect may seem like begging the question, not very different from saying intelligence is what IQ tests measure just to avoid confronting what intelligence really is or what people mean when they use the word. However, defining art as what produces an aesthetic response is different. Like being in love, anyone who has had the experience knows what it is. And, from a more scientific perspective, one can cite specific unique characteristics associated with the experience.

There are three empirical criteria that seem to consistently distinguish the aesthetic experience:

(1) It involves an intense emotional response to simulations or imitations of 'real-life' events or things. Furthermore, some of these events or things are ones we would find aversive if indeed they were real.

(2) It results in a pleasurable cognitive response to relationships just for their own sake, independent of any apparent utility.

(3) It produces pleasure from pure perception. The perceptual experience seems to be an end in itself.

The seemingly reasonable objection to this definition of art is that one has such aesthetic responses to things we don't call art; e.g. a stunning landscape or the face of a beautiful woman. This objection misses the point that this is simply a working or operational definition of art. All such definitions are admittedly arbitrary, but nonetheless are considered good and useful if they match up with our general conception of what is being defined. We don't normally label as art what has been created by chance or by nature. So by eliminating such unintentional causes of the aesthetic response, one arrives at a reasonable working definition for art: art is what produces an aesthetic response and is *not* a product of random or natural events. A painting of a landscape that effects an aesthetic response in someone *is* usually called art. A landscape that effects an aesthetic response in someone *is not* usually labelled art. I realize that even this working definition can occasionally be problematic, but it is far less so than any based on the cause of the experience rather than the experience itself.

However, the first step to answering any question about artistic creativity in another species is to search for evidence of an aesthetic response to *anything*, art or nature. Before one can even consider the possibility of non-human artistic creation, one has to establish evidence of aesthetic appreciation. So now here is a closer look at the three criteria just mentioned.

First to be considered is the paradoxical emotional response we have to what we know are mere simulations or imitations of something, our strong

emotional response to what are clearly not “real-life” events. We seek out such experiences even when they would be aversive if real. It makes sense to cry at the death of a loved one. However, we also cry at the death of Romeo and Juliet. Our adrenaline levels surge if we encounter a bear while walking through the woods, but our sympathetic nervous system also is activated by seeing a character in a film suddenly encounter a big, bad bruin. Again there may be a reasonable evolutionary explanation for this. It may be vestigial and residual and no longer particularly adaptive, something like our easily triggered fear of snakes even if most of our species now live where there are no venomous snakes. Or it may serve some function such as training our sense of empathy or rehearsing for dealing with real life events. Nevertheless, it is unique to the aesthetic experience.

Then there is the cognitive response. Much of aesthetic appreciation is largely rational. There is a pleasure inherent in seeing new relationships. A pun or any joke involves surprising us with an unconsidered relationship. A Shakespearean play is all about the complex inter-relationship of fictional individuals. A Bach fugue is about the intertwining of highly abstract contrapuntal and polyphonic sound sequences. Some art is called ‘cerebral’ because the pleasure one gets from it is relatively free of emotion. For example, the murder mysteries of Agatha Christie don’t particularly excite our emotions, for we rarely mourn for the victim, but we derive pleasure from trying to untangle the motivational and situational relationships that led to the crime and finding the overall pattern that points to the perpetrator. There is no question that seeing relationships has tremendous survival value, so of the three markers of an aesthetic response this one has the most obvious evolutionary value.

Finally, one of the most striking things about the aesthetic experience is the pleasure we derive from the pure perception of an object or event. It is entirely understandable that a well “plated” meal should stimulate our pleasure centres. It makes sense to salivate at the sight of an appetizing meal. The pleasure we derive from perceiving an appetizing dish motivates us to consume the food, which has obvious survival value. It is no accident that some of the so-called “pleasure centres” in the brain such as the hypothalamus are also those that regulate homeostasis and drive us to eat when hungry and drink when thirsty, as electrical stimulation of this structure has repeatedly demonstrated (Bozarth, 1994). However it does not make sense that we derive profound pleasure from a beautiful still life painting of food when we are well aware that the canvas is inedible—and we do so even when we’re not hungry. When one considers the great pleasure derived from something like an abstract piece of music, the

mystery is even more overwhelming. Evolutionary psychologists and those researching empirical aesthetics are working hard to explain this phenomenon, but that is not what is at issue here. Suffice it to say that this is an important criterion that distinguishes the aesthetic experience.

To summarize, the aesthetic response is distinguished by emotional, cognitive, and perceptual experiences we find pleasurable and seek out, even though they have no apparent immediate relevance or practical value. And so the critical questions are whether other species also seek out such experiences and whether we can find evidence of this by applying these criteria.

Two Relevant Paradoxes

Before proceeding to the thematic question of whether art is unique to humankind, and how one could possibly answer that question, two apparent paradoxes have to be considered because both are extremely relevant. The first has to do with the famous Turing Test for artificial intelligence, and the second is what I call the “Creative/Critical Paradox”. Both directly relate to any possible test of the uniqueness of art to our species.

The so-called Turing Test is the classic empirical test for artificial intelligence proposed in 1950 by the brilliant mathematician Alan Turing, one of the fathers of computer science. The protocol for the test is as follows. A human ‘judge’ sits at a computer keyboard terminal and communicates by typing messages to two sources located in closed rooms hidden from his view. In one room is a human being who reads and responds to the messages sent from the judge. In the other room there is a computer, allegedly possessing artificial intelligence, which also receives and responds to the messages and questions sent by the judge. If, after extensive questioning and interaction with both the computer and the human, the judge is not able to tell which room contains the human correspondent and which the computer, on a better than chance basis, the computer is said to have passed the test—and can be credited with intelligence equivalent to that of a human being.

The classic refutation of the validity of this test is Searle’s “Chinese Room” thought experiment. Searle (1980) suggests that if you imagine yourself a monolingual English speaker “locked in a room, and given a large batch of Chinese writing” plus “a second batch of Chinese script” and “a set of rules” in English “for correlating the second batch with the first batch”, and then a judge who is fluent in Chinese sends you messages, you will be able to ‘reply’ in a way that convinces the Chinese judge that

you really know Chinese. You will have passed a Turing Test for Chinese linguistic intelligence without having that attribute.

I find Searle's argument persuasive. I even hold the unorthodox view that Alan Turing wasn't entirely serious and that he actually presented his so-called "test" more as a tongue-in-cheek critique of excessive trust in operational definitions than as a sincerely intended test by which artificial intelligence could be demonstrated. But whatever Turing's motives, his test paradigm and Searle's criticism are just as relevant to the alleged demonstration of artificial creativity as they are to artificial intelligence.

If an independent judge cannot distinguish artworks created by a computer from those created by a human artist, the computer would pass the Turing Test for artificial creativity. Now replace the computer with, for example, an elephant. Imagine you have this elephant in a (big) room painting pictures, while in another room you have an abstract expressionist artist also painting. If, after a substantial number of paintings have been created by both artists, the works are presented to a judge, and that judge cannot consistently distinguish the paintings of the human from those of the elephant, is it not reasonable to say the elephant has passed a variation of the Turing Test modified to determine animal creativity? And, despite the elephant passing the test, isn't the conclusion of animal creativity dubious?

The second apparent paradox is what I call the "Creative/Critical Paradox". It is common to view being critical as easy and being 'creative' as difficult. "Everyone is a critic!" is a common lament, especially by creative people. It is easy to find fault with ideas, but difficult to find new ideas, or so goes the folk wisdom. While there is an element of truth to this common perception of the nature of creativity, it can be misleading.

Creativity has two components: the production of something new and the evaluation of what has been produced. The fact is that production actually is the relatively easy part, while evaluation is the hard part. All good writers know writing is mostly revision. Ideas are a dime a dozen. Good ideas are rare. What distinguishes creativity is the ability to distinguish the wheat from the chaff. I have written software—which I call *Ghostwriter*—that randomly creates a virtually infinite number of syntactically correct sentences. Every once in a great while, like with the proverbial many monkeys at many typewriters with much time on their hands, a sentence sometimes appears that is stunningly beautiful, even profoundly insightful. Whatever creativity I have as a writer resides in my ability to detect these rare gems. The computer program can take care of the production part of creativity, but only a human can take care of the evaluative part.

The creation of art is primarily a matter of evaluating, filtering and then revising. It may be that we often do this evaluation mentally, before physically creating something, before writing a sentence or putting a brush stroke down on canvas. Nevertheless, it is *judgment* that is the critical and distinguishing component of creativity, of the creation of significant art and science.

Creativity, like all behaviour, can be schematized as consisting of input, processing, and output. The log-jam in AI development hasn't been at the processing or output parts; i.e., at the productive part of this circuit. It has been at the input part because input involves evaluation. Computers can do logical analysis and output the results. Computers can create images and sound sequences and present them. However, computers *cannot evaluate* their output because they cannot, when their output is sent back as input, *recognize* and *appreciate*—or at least so it seems so far.

If things that produce an aesthetic response result from random events (e.g., the reflections in an oil spill after a rainfall), from evolutionary natural selection (e.g., the male peacock's glorious tail), and from insentient computer algorithms (e.g., a sentence 'written' by my *Ghostwriter* program), should these things be considered creative and assumed to have an aesthetic sense? This is a rhetorical question, for obviously we do not credit happenstance, nature and algorithms with that attribute we call creativity or aesthetic sense.

Aesthetic evaluation depends on appreciation. So these two apparent paradoxes suggest that understanding the nature of appreciation is the key to understanding creativity.

So How To Detect An Aesthetic Response? By Art Appreciation?

To reiterate and summarize, the first place to look for any substantive evidence of an aesthetic sense in other species is not in what they may 'create' (and certainly not the creations judged by human—anthropocentric—standards), for there really is no way to determine if the work is intentional and driven by any aesthetic motives. Nor is it reasonable to focus on creative production as any kind of evidence, for an aesthetically pleasing thing can be created even by random events: What matters is the critical and evaluative aspect of creativity. Thus the logical thing to look for is some evidence of aesthetic *appreciation*, some evidence of an aesthetic response.

The following are the three aforementioned empirical criteria associated with an aesthetic response: 1) an emotional response independent of 'real-

life' events; 2) a cognitive response to relationships independent of practical application; and 3) pleasure in perception independent of utility. Human beings clearly search out experiences that induce these responses. Can we possibly determine if other species exhibit these behaviours, behaviours we consistently associate with the aesthetic response?

Emotional responses independent of 'real-life' events? The difficulty in 'reading' animal emotions makes this very problematic, and the question of whether an animal can even distinguish reality from illusion is not easily answered. The closest thing to an empirical investigation of this is the research done with mirrors where there is some evidence great apes (and perhaps elephants and dolphins) recognized themselves as themselves in mirrors (de Waal, 2007). With species that don't show this ability, the observed reaction to simulations of real stimuli seems at first to be accepting the simulations as real stimuli, followed in some species by an indifference to the stimulus that seems to indicate a rejection of it as a mere illusion. An example is how one of my dogs responded to the appearance of canines in television shows. Initially, the sounds of barking and the images (which it should be noted dogs do not perceive as fluid movements because of a different flicker frequency threshold) caused my dog Nick to bark in social response and even look behind the television monitor. Eventually, however, he failed to respond with anything more than a glance at the tube when dogs appeared or barked in some show, even when the barks clearly were ones of distress or aggression.

Cognitive responses to relationships independent of practical application? Again this seems impossible to ascertain. How could we possibly determine if an animal is seeking out intellectual stimulation and challenge? So clearly this, too, seems outside the realm of empirical investigation.

Pleasure in perception independent of utility? Fortunately, this marker *does* seem to be measurable in other species, because it can be inferred if a creature repeatedly seeks out certain perceptual experiences that seem to have no obvious utility. Such behaviour would at least *suggest* a primitive aesthetic sense and *is* testable.

There are three behaviours that could be reasonably considered indicative of pleasure in perception independent of utility, and so perhaps of an aesthetic 'drive':

(1) The first of these is exploratory behaviour: the seeking out of novel experiences for their own sake.

(2) Secondly, there is the seeking of non-sexual and non-utilitarian sensual pleasures.

(3) Finally, the expression of clearly defined preferences for some stimuli over others, without any obvious immediate or evolutionary benefit, would be evidence of purely aesthetic motivation.

In searching for these behavioural markers in another species, I have chosen as my example *canis lupus familiaris*: the domestic dog. The reason for this choice is that our knowledge of the behaviour of dogs is far greater than that of any other species high enough on the evolutionary tree to possibly manifest the criteria behaviours. The domestic dog's intelligence has been estimated (Coren, 1994) to be that of a two-year old human child, and although the great apes exist on a more proximate branch of the evolutionary tree, and are usually assumed to be even closer to us in cognitive ability and behavioural traits, our knowledge of them is far less extensive than of the domestic dog with whom we have empathetically cohabited and observed for at least fourteen thousand years.

So do dogs show exploratory behaviour, the seeking out of experience for its own sake? Obviously they do, and of course exploratory behaviour is also widely observed in many other species. Its evolutionary function is obvious. When satiated laboratory rats are placed in a novel maze they don't just lie down and sleep. They spend their time exploring; and if reintroduced to the maze when hungry, they learn the location of the reward faster than rats that hadn't previously had the opportunity to explore the maze (Tolman, 1948).

Do dogs seek non-sexual and non-utilitarian sensual pleasures? Again, obviously they do. There is no survival benefit to being petted, but any dog owner knows their aptly named 'pet' seems to have a biological need for it; and unlike most drives to fulfil a need, the need seems insatiable. A piece of canine wisdom (from which we could learn) is that "when they stop petting you, move on!" Unless we stop stroking them, most dogs seem willing to sit and be petted forever. Grooming behaviour in the primates may seem similar and is usually assumed to serve the useful functions of social bonding and hygiene, but neither seems a particularly likely explanation for the doggie drive to be petted. It is true that some research has indicated cats rub each other's faces as part of social bonding and that humans mimicking this behaviour with their hands produce "affiliative responses" in their feline pets. (Schmied et al., 2008) But dogs do not rub each other's backs, and dog trainers and owners know that the canines especially prefer being petted in places where they would not normally be stimulated—and certainly not by others of their species. The most parsimonious explanation of why dogs seek out petting is simply—it just feels good. (Of course, why something feels good which has no

utilitarian or apparent evolutionary explanation is a central question in both aesthetics and general evolutionary theory, not to mention neuroscience.)

Nevertheless, it certainly seems that canines do show clearly defined preferences for some stimuli over others without any—at least *obvious*—utilitarian or evolutionary benefit. As every dog owner knows, dogs definitely do have preferences. They have preferred parts of their bodies to be rubbed, preferred places to rest, preferred foods, preferred scents, preferred toys, preferred human companions, etc. Many of their preferences seem to make no sense to us and seem entirely arbitrary and idiosyncratic. (Why my dog Maggie much prefers her fuzzy lion toy to the fuzzy bear toy is a mystery to me.) The meaning and function of preferences is a complex topic of great interest in the field of empirical aesthetics.

One of the ongoing projects of evolutionary psychologists is trying to explain wide-spread human preferences that are now actually maladaptive. For example, a preference for—and thus over-indulgence in—sweet and salty foods is accepted as a major contributor to a variety of medical problems in developed countries. We only have five taste receptors on our tongues and two of these are specialized for inorganic salts and for sugars. Salt is essential to the mammalian diet and once was scarce, so it isn't difficult to understand why we evolved special receptors to detect foods that contain it—and why consumption of it is so pleasing. Similarly, a preference for sweet foods makes perfect sense for two reasons: sugars are one of the most concentrated sources of quick energy and few poisonous plants taste sweet. When salt and high caloric foods were scarce, there was no need for an off switch for our drives to consume them.

When we move deeper into the area of aesthetic preferences the source of these preferences is less obvious, but nevertheless is sometimes discernable or inferable. One example of this is the widespread preference, both in pictures and in the design of parks, for landscapes that resemble the East African savannah which have places to hide safely, yet offer vistas of the surrounding area (Orians and Heerwagen, 1992). The typical urban park is designed as a variety of open and wooded spaces. Also both parks and popular landscape paintings usually contain bodies of water.

Thus it may be that many of our aesthetic preferences for some stimuli over others once had some practical function that has faded away over time and now seems mysterious and inexplicable. Why we prefer the smell of roses over the smell of marigolds may never be explained. Why our dogs couldn't care less about the smell of roses or marigolds, but definitely love the smell of dead and rotting fish, even to the extent of

rolling on them to scent themselves, also may never be explained. The suggestion that they do this to disguise their own scent so they can sneak up on prey seems dubious. “Don’t worry, pal, about that big, hairy mammal that seems to be stalking us: my nose tells me it is just a big fish out of water.” I am being facetious, of course, and certainly if the prey were only relying on olfactory warnings, there may be some substance to explaining this behaviour as olfactory masking—although the usual prey species of wolves are mammals, usually more likely to be alerted by their visual systems’ movement detectors than olfactory cues. (One must be careful about facile explanations that simply fit with one’s adopted theoretical framework, e.g., evolutionary biology, and miss more parsimonious explanations. Could not dogs just *like* the smell of rotting fish?)

The virtually indisputable point is that dogs (and of course many animals) show strong preferences for certain—at least *apparently*—non-utilitarian stimuli, which they repeatedly seek out, just as we do when we go to a manicured park or an art gallery. With other species it may be easier to suggest some plausible past or present utility to the preference, but that does not make it qualitatively different from our preferences. For all we know, there very well may be an evolutionary explanation for many humans’ love of baroque music.

A Modest Research Proposal

So let us say an elephant is given brushes and paints and creates a painting. How could one determine if the work is the result of some aesthetic sense or merely a random event? Certainly not by having human beings judge it, for that is incredibly and naively anthropocentric. Just as dogs have very, very different ideas of what smells good than we do, so presumably the elephant artist will have a very different idea of what looks good. They don’t even have the same visual perceptual apparatus as we do: their visual acuity is mediocre; they are dichromats, and what colour they do see is similar to what a human with red-green colour blindness would see.

One has to keep in mind that while we may find something so beautiful and aesthetically pleasing as to want to hang it on the wall, it may be considered repulsive by another species. Because of their aesthetic appeal I have downloaded and saved images of the many beautifully pigmented poisonous frogs that live in the tropics, but it’s reasonable to assume that—unlike me—would-be predators find these frogs very ‘ugly’ because their gaudy colouration is a warning against stopping for a nibble.

Relevant, too, is the lesson to be learned from studies of face recognition in chimps, where initially their ability was judged to be poor. However, the faces presented were human faces, and subsequent studies have shown that even young chimps have excellent face recognition *for their own species*, just not for human faces (Myowa-Yamakoshi, et al, 2005). (“All dem damn humans look alike!”) Even sheep have demonstrated finely tuned ability to recognize other individuals of their species, even in photographs (Kendrick et al, 2001).

So if, as I have argued, the one readily measurable indicator of aesthetic sense is aesthetic preference, the following (admittedly quirky) experiment could cast some light on the question of animal creativity and aesthetic sense.

Give a number of elephants (or chimps) paints and canvas, and have them create a number of paintings. Then have an accomplished human artist study these works, and then produce an equivalent number of paintings in the same ‘style’. Finally collect a set of paintings by artists working in various styles—of course matched in terms of size and other superficial parameters.

Set up some standard preference paradigm such as has been used in empirical aesthetics research since its inception. Just one of many possible methodologies, widely used for studies of preferential-looking in neonatal humans and animals, is eye and head-tracking of moving stimuli.

Have the animal artists ‘evaluate’ the works, as operationally defined by, for example, viewing time, to the four stimulus categories: 1) their own productions; 2) other conspecific works; 3) the human stylistic imitations of their works; and 4) a random sample of human art works. Achieving any statistical significance between these four conditions in such a study would be interesting, would be of value in understanding aesthetic preference in non-human species, and could offer some modest supporting evidence for the proposition that abstract, apparently non-utilitarian aesthetic preference isn’t uniquely human.

If, for example, a clear preference—or lack of interest in—was only shown for the subject’s own productions this would suggest that memory and familiarity were the determining variables. If, as another possibility, a significant preference for both the subject’s own work and other conspecific creations was demonstrated, this would seem to indicate some of degree of aesthetic ‘judgment’ based on that species’ perceptual preferences. Of course, neither of these possible outcomes would conclusively demonstrate that the animal is a ‘creative artist’! However, it would certainly offer some modest supporting evidence for the proposition that abstract, apparently non-utilitarian aesthetic preference isn’t uniquely

human. Even if the animal subjects showed a clear preference for the human works over their own creations, perhaps because of novelty, this would be suggestive of aesthetic discrimination.

Conclusion

There is no question that art is one of the greatest achievements of humankind and that no other species has accomplished anything approaching what we have wrought. No whale song approaches the complex beauty of a Bach fugue. No elephant's painting can be compared to the ceiling of the Sistine Chapel. Nevertheless, we exist along the continuum of evolution, and we should be cautious about assuming that huge differences in accomplishment mean that an evolutionary quantum leap has occurred. None of the great apes are ASL signing (or typing) complex periodic sentences, but there is evidence of primitive language ability. We are profoundly different from the other fauna on this planet, but we have repeatedly found that on a very basic level we have more in common with them than previously believed.

The question of whether there is any primitive aesthetic sense in other species, and thus some precursor of human artistic creativity, isn't a trivial one. The recent trend to promote and sell paintings by animals is not motivated by any sincere attempt to answer this question, nor does human evaluation of these works really contribute anything to our understanding. But it has had the positive effect of raising the question. The first meaningful step to a serious scientific investigation of this would be to determine the characteristics that are uniquely associated with an aesthetic sense and aesthetic appreciation, which is itself a worthwhile endeavour. The next logical second step would be to design ways of empirically testing for those characteristics.

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