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Art in the Making: The evolutionary origins of visual art as a communication signal

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3. THE ART OF COURTSHIP: GEOFFREY MILLER'S MATE CHOICE MODEL

Courage, pugnacity, perseverance, strength and size of body, weapons of all kinds, musical organs, both vocal and instrumental, bright colours and ornamental appendages, have all been indirectly gained by the one sex or the other, through the exertion of choice, the influence of love and jealousy, and the appreciation of the beautiful in sound, colour or form; and that these powers of the mind manifestly depend on the development of the brain.

CHARLES DARWIN, 1871



In 1860, Charles Darwin wrote in a personal letter to botanist Asa Gray: “The sight of a feather in a peacock’s tail, whenever I gaze at it, it makes me sick!” (Hiraiwa-Hasegawa 2000:12). This now legendary quote reflects the problem that conspicuous animal traits posed for Darwin’s principle of natural selection, since these properties did not seem to contribute towards the survival of the individuals that possessed them, being even detrimental at times. Later, however, he arrived at the mechanism of sexual selection to explain those exaggerated traits that had defied him – such as the colourful plumage of the males of several bird species, and the huge antlers of many male ungulates –, as armaments or ornaments used in courtship displays (Anderson 1994:XV).

The origins-of-art model that will be reviewed in the present chapter maintains that a work of art, like the peacock’s tail, is a personal advertisement of one’s physical, mental, and social condition. In this model, art is thus a striking feature that does not increase survival chances, but is imposing to rivals and attractive to the opposite sex, and thus increases mating opportunities. It further suggests that, like those animal armaments and ornaments, art evolved as a strategy for mating competition, to entice sexual partners and outcompete opponents.

In recent years, the main representative of this hypothesis has been American evolutionary psychologist Geoffrey Miller, whose work will be examined in this chapter. Miller’s model is based on two complex theoretical frameworks: evolutionary psychology and sexual selection theory. The first section of this chapter will lay out a general background regarding some key concepts of sexual selection and mate choice theory. The next section will then describe the main line of argument of his model, placing special attention on its treatment of visual art. This will be followed by a discussion of Miller’s hypothesis in light of data from biology, anthropology and developmental psychology. Finally, the model will be compared with what is known about

mating preferences in relation to human evolution, and the visual art record in Pleistocene archaeology. To this aim, I will formulate some predictions derived from the model regarding the emergence of visual art, and see whether these are consistent with what is indicated by the archaeological record. This exercise will elucidate whether the model can offer a plausible scenario for the emergence of visual art.

3.1 Sexual selection and mate choice theory: The background

In *On the Origin of Species*, Darwin presented not only his renowned thesis on natural selection, but he also introduced the principle of sexual selection, which “depends not on a struggle for existence, but on a struggle between the males for possession of the females” ([1859]2006:56). He would further elaborate on the evolutionary effects of sexual behaviour in *The Descent of Man*, from 1871.⁵⁶ In broad lines, he argued that whereas success in natural selection depends on the survival of individuals in relation to the conditions of life, in sexual selection success is measured by the reproductive advantage of certain individuals over others of the same sex and sort in relation to the propagation of the species (Darwin [1879]2004:243; Taylor 1996:35). The environment and competition for resources are major factors of natural selection, but sexual selection is mainly driven by intra-species competition over mates and mating opportunities (Andersson 1994:8).

Sexual selection includes several mechanisms, one of which is mate choice or “the outcome of the inherent propensity of an individual to mate more readily with certain phenotypes of the opposite sex (i.e., mating preference or bias) and the extent to which an individual engages in mate sampling before deciding to mate (i.e., choosiness)” (Kokko et al. 2006:49). The other six mechanisms of sexual selection that biologists have identified so far are: contests, endurance rivalry, scrambles, coercion, sperm competition, and infanticide (Andersson & Iwasa 1996). Darwin focused primarily on contests (fight over mates) and mate choice when he coined the term ‘sexual selection’, and to this day, that meaning remains its most simple and useful application (Andersson 1994:9) but sexual selection neither equals nor is restricted to these two strategies (rival battle and mate preference).⁵⁷ However, mate choice is of

⁵⁶ Darwin is often quoted as the first researcher to have drawn a link between sexual selection and the arts, but he actually dedicated few paragraphs to this issue and his opinions concerned mostly the occurrence of song and music, e.g.: “I conclude that musical notes and rhythm were first acquired by the male or female progenitors of mankind for the sake of charming the opposite sex” ([1859]2006:638, footnote 39).

⁵⁷ It should then be clear that whereas all mate choice is sexual selection, there reverse is not true. Notwithstanding, scholars, particularly in the humanities, often use both terms indistinctively. With the rising popularity and application of evolutionary theory in the human disciplines, this confusion might lead to misuses and misunderstandings. For example, art historian George L. Hersey writes: “Humans, like many other animals, have always made sexual choices. In this sense all the phrase

special interest precisely because it seems to be directly correlated with the evolution of the 'ornaments' and the extravagant traits which Darwin struggled to explain through natural selection (Kokko et al. 2003).

Because the sexes generally invest unevenly in offspring, there will be some conflict of interest between males and females leading to different reproductive strategies (Trivers 1972:173). Usually, the females invest considerably more than the males so they will tend to be the choosier sex, whereas the males will compete among themselves for mating opportunities. Hence, the most common mating dynamics in the animal world involve male-male competition and female choice (Geary et al. 2004:27), although these in no way exhaust the array of mate choice strategies. Mate choice can take several forms (Andersson & Simmons 2006; Jones & Ratterman 2009). The two best-known are mate choice for direct benefits and for indirect benefits. In the first, individuals choose for an *immediate fitness advantage*, that is, for direct phenotypic effects such as the procurement of resources, territory, parental care, protection, fertility, disease avoidance, etc. In the second case, individuals choose for *indirect benefits* (fitness advantages bestowed on the offspring in the long-run) on the basis of some trait that correlates with the desired advantage. For example, when a trait – such as an ornament – serves as an indicator of the genetic quality of the individual, potential partners can use that trait as a cue of quality and may evolve a preference for it, as in the case of the peacock's tail. In addition to selection strategies for benefits, mate choice may be based, among others, on sensory biases – when the selected trait exploits some perceptual preference that originated in a non-sexual context (Andersson & Simmons 2006:297; Jones & Ratterman 2009:10004),⁵⁸ or on social information, i.e. 'mate copying' (Dugatkin 1992; Mery et al. 2009). Through these various strategies, sexual selection has provided a theoretical framework to explain conspicuous anatomical, cognitive and behavioural traits, like the colourful plumage and intricate song of many birds, and the 'weapons' of several mammals, such as antlers, tusks, and horns.⁵⁹ These features apparently contribute little to survival effort, and at times even hinder it, but are essential for mate acquisition.

'sexual selection' means is that two potential partners consider each other more desirable, or at least less impossible, than other potential mates, and act accordingly" (1996:2). Similarly, art scholar Barbara Larson states: "Sexual selection refers to an individual of one gender making a choice between two or more potential mates of the opposite gender" (2009:174). Clearly both authors mean mate choice when they talk about 'sexual selection', and although such inaccuracies might seem harmless, they may become problematic when used as the basis for evolutionary explanations.

⁵⁸ For example, the preference of female guppies (fish) for more intense orange-tailed males might be traced back to a wide-species feeding preference for orange fruit (Rodd et al. 2002).

⁵⁹ See: Anderson & Iwasa (1996:53, Table 1). Sexually selected traits, however, are not exempt from natural selection, which can always counter them. In fact, sexual selection is sometimes seen as a 'special case' or subset of natural selection (Anderson 1994:7). But as Prum has rightly noted (2012:2255), Darwin formulated sexual selection precisely to account for those cases which could

As I explain in the next section, Miller clearly favours mate choice for indirect benefits,⁶⁰ where the preferred trait is assumed to be a reliable indicator of the individual's overall genetic quality.⁶¹ In the classical example of the peacock, the large, colourful, eye-spotted feathers of the long, heavy tail incur a huge energetic investment and, while attractive to the peahens, it makes the male bird less agile and more noticeable to predators. Because the state of the tail is correlated with the general physical condition of the male, the trait will be more elaborate among strong, healthy individuals. Therefore, the peacocks that despite the costs and risks of the tail can afford to sustain and display it conspicuously will be preferred by the peahens as high-quality mates; i.e. the tail serves as a wasteful or costly signal (Zahavi 1975:211),⁶² and becomes a reliable indicator of general genetic quality (Jones and Ratterman 2009:10004). In Miller's view, many characteristics of human cognition, behaviour, and culture, including language, humour, music, art, and altruism (1997, 1998, 1999, 2000a),⁶³ evolved precisely, like the peacock's tail, as fitness indicators "for a courtship function" (2001:20).

not be explained by natural selection, that is as an alternative to, not a special case of, natural selection.

60 Models of mate choice for indirect benefits also called 'good-genes' models, 'costly signalling', or as in Miller's work, 'fitness- indicator' models.

61 Simply defined, fitness is "an organism's expected contribution to the next generation's gene pool" (Sterelny & Griffiths 1999:157), meaning its capacity to survive, reproduce and pass on its genes.

62 However, alternative explanations have been put forward. Berglund et al. (1996) have suggested that the elaborate tail of the peacock might constitute an armament for intrasexual competition, rather than an ornament for courtship, and thus shaped by male-male conflict instead of female choice. Another recent study (Takahashi et al. 2008) has raised doubts about the categorization of the male peafowl's tail as a costly signal shaped by sexual selection; and suggests that the tail might actually be an ancestral trait that has been lost in the females who, in fact may not even choose mates on the basis of their tail. Instead, it is more likely that a whole set of behaviours, including shivering displays and vocalizations, influence peahen preference. The study concludes that there seems to be no absolute correlation between the size of the tail, or the number or symmetry of its eyespots, and the mating success of the bird. Also, a bigger and heavier tail does not make the peacock more susceptible to predation. If at all, it is the peahens who suffer more predation, being more vulnerable while nesting on the forest ground.

63 A similar argument has been posed by archaeologist Timothy Taylor in the past: "Culture provided sexual selection with a massive new scope. Mate choice was no longer solely a matter of sizing up the relative merits of the basic inherited personality and appearance of a prospective partner. Now learned skills – singing, hunting, dancing, and painting – came to play an ever greater role in sexual attraction. The human brain continued to enlarge, from 1.6 million years to sometime just after 150,000 years ago, when 'anatomically modern' humans first appeared. Since the period does not seem to have presented any obvious environmental challenge that only larger brains could meet, the enhanced cultural capacities of ever larger brains could have been a sexual fit. Love songs and nicely arranged bouquets may have been at least as important as aggression in the life of the species" (1996:7).

3.2 The bowerbird and the artist: Key arguments

When discussing the effects of sexual selection in *The Descent of Man*, Darwin alluded to a probable correlation between the human ‘passion for ornament’ and the affairs of choosing a mate. In a comparative exercise with the animal kingdom, he suggested that just as the vivid colours and patterns of some male birds, like the peacock, serve them to lure females, humans turn to decoration to enhance their natural qualities and make themselves more attractive to the opposite sex ([1871]2004:640).

Miller elaborates on Darwin’s thoughts (2000a:11) and suggests that the origin and proliferation of visual art probably are the product of sexual selection through mate choice, or a ‘courtship adaptation’ (2000:258, 2001). Human art-production, Miller claims, is costly and wasteful, requiring energy and resources that could be better invested in survival efforts like foraging, rest, or defence. Therefore, to him, art making is not easily explained by natural selection, which is an economizing process that would not promote the persistence of an apparently superfluous behaviour. Sexual selection, on the other hand, often results in the development of exaggerated and seemingly useless but attractive traits, like the plumage of the birds-of-paradise. So for Miller, a strategy of mate choice that selects for indicators of ‘good genes’ provides a reasonable basis to explain the evolution of visual art.

Human mating preferences and strategies

Human mating preferences and mating strategies have been a frequent topic of research for evolutionary psychology. Unlike social scientists who usually claim that mating choices are a function of socio-economic pressures and culturally-shaped gender roles (Wood & Eagly 2002), evolutionary psychologists defend the view that mating preferences are innate psychological adaptations that guide individuals in choosing high-quality partners (Gangestad et al. 2006). Likewise, mating strategies are seen as the result of the reproductive problems faced by humans throughout evolution (Buss 1994); for example, whether to invest in offspring quantity or quality, or whether to invest in parental care or in multiple mates, etc. As in most mammals, human mating strategies are constrained by parental-investment, which determines that “the sex that invests more in offspring is selected to be more discriminating in choosing a mate, whereas the sex that invests less in offspring is more competitive with members of the same sex for sexual access to the high-investing sex” (Buss1994:240). Thus women are expected to be choosier, and men are expected to engage in sexual rivalry and prowess displays.

According to Miller, visual art evolved in the context of human mating strategies, in response to the problem of assessing the genetic fitness of a potential mate. He argues that because, for women in particular, it would be detrimental to incur the energetic costs of rearing unfit children, selecting a

mate on the basis of fitness indicators would have been more advantageous than selecting for direct benefits (1998:109):

Choosing males for their provisioning and protection abilities eases the energetic burden of motherhood, but choosing males for their indicators of genetic quality and aesthetic displays reduces the risk of producing sickly, unattractive offspring that may never reproduce.

He argues that the mental and physical abilities required for art making (e.g. creativity, concentration, coordination, dexterity, etc.) are condition-dependent indicators; that is, they are costly traits that correlate with the general condition of the individual, and thus are reliable indicators of genetic quality. Therefore, since artistic skill could serve as a cue of genetic fitness, people, especially women would be expected to evolve a preference for it. Seen in this light, artworks could actually be understood as fitness displays, “an occasion for demonstrating one’s ornamental skills and aesthetic taste” (2000:274). But, Miller states, our pronouncements regarding artworks have an effect beyond sexual selection. When formulating a judgement about a work of art, knowingly or not, one is also assessing the maker’s intelligence, creativity, skill, sociability, etc. which influence not only mate choice but also friendships, alliances, and all other types of social relations. In this sense, aesthetic judgments help us make “biologically significant decisions about other individuals on the basis of observable behavioural cues” (2001:24).

To illustrate how evolution could have moulded artistic behaviour in a sexual context, Miller draws a parallel with the courtship displays of the bowerbird. To woo a mate, the males of this bird family build an elaborate arrangement out of twigs called a ‘bower’. They further garnish their construction using colourful and lustrous materials, like berries, shells, bones, nuts, feathers, flowers, shiny insects, glass, and even plastic objects. The males lure females to their bower construction through displays of dance and song. Each individual bower is different, and the birds spend much time attending to it and protecting it from the elements and rivals.⁶⁴ Because of the use of specifically arranged and colourful items, reminiscent of decoration, since Victorian times bowers have often been referred to as ‘true artworks’ of the animal kingdom. Darwin himself said that the bowers “are tastefully ornamented with gaily-coloured objects; and this shews that they must receive some kind of pleasure from the sight of such things” ([1879]2004:115).⁶⁵ Human

64 The bower of the polygamous bowerbird is not a nest, its only function being for courtship display. Once a female approaches a bower and mates with its maker, she will leave to build a nest, hatch and care for the chicks on her own.

65 This kind of statements, however, have been disputed since the early 20th century: “No one will deny that structures, such as, for instance, the gardens of the atlas birds [vogelkop bowerbird *Amblyornis inornatus*], which have been depicted by Beccari, are most wonderful specimens of animal industry. But it is undoubtedly misleading to speak of them as artistic. [...] It has been noticed that the cock of the great bower bird amuses himself by flying to and fro in the bower carrying a shell in his bill, which he picks up on one side and carries to the other. On an

artistic behaviour, Miller says, is somewhat similar to bower building. Both are expressions of fitness located outside the body, and intended to attract mates (2000:267, 2001).⁶⁶ Male bowerbirds tend to be dull coloured, so instead of displaying their fitness through striking plumage –like other related species do – they make use of their bowers. Similarly, he says, humans use art (2000a:270):

The bowerbirds show the evolutionary continuity between body ornamentation and art. They happen to construct their courtship displays out of twigs and orchids instead of growing them from feathers like their cousins, the birds-of-paradise. We happen to apply colored patterns to rock or canvas.

In that sense, works of art are extensions of a person, they are ‘extended phenotypes’ or out-of-body manifestations of the individual’s self (2000a:270). Examples of extended phenotypes from the animal world include a spider’s web, a bird’s nest, or a beaver’s dam, which are essential components of the genetic and phenotypic makeup of these organisms, as much as their sensory or vital organs. These features, Richard Dawkins explains, must have an evolutionary purpose, for much time and energy is expended in their making: “whatever its benefits, a beaver lake is a conspicuous and characteristic feature of the landscape. It is a phenotype, no less than the beaver’s teeth and tail, and it has evolved under the influence of Darwinian selection” (1989:248). Miller suggests that, as a personal display of fitness like the bower, visual art must have evolved originally as an individual activity whose resulting products were kept in the intimate socio-personal space of the maker for all to see and judge. Positive valuations of visual art displays would then bring reproductive as well as social success to the artist (2001:25). In section 3.4 I will consider this prediction in light of the archaeological record of visual art.

In addition to being displayed for courtship purposes, according to Miller, visual art is consistent with a sexually selected trait in two other important aspects: Artistic skills appear late in ontogeny and are more prominent in sexually mature adults; and they are more frequently displayed by males who, as predicted by parental-investment theory, are generally more active in courtship than females (1998:117, 2000a:14).

In short, Miller’s hypothesis states that art is a uniquely human behavioural trait that evolved through mate choice to serve a courtship function by signalling

anthropomorphic interpretation such a behaviour would perhaps indicate a desire of trying some new decorative effect. But it seems more natural to assume that brilliant objects, even after they have been stored up in the nest, still exercise their irresistible attraction, and thereby tempt the birds to repeated trifling with them. If the supposed redecorations of the gardens be accounted for in this manner, then there is no reason for considering the collecting impulse in the Australian birds as anything more than a higher development of the same tendency which shows itself in our common magpies and jackdaws” (Hirn 1900:194-195).

66 For an alternative explanation, see: Madden & Balmford (2004); Madden & Tanner (2003). These authors suggest that bower preference may be based on perceptual biases for food, not mate fitness.

the artist's fitness. This intriguing idea has generated both interest and opposition in the field of art studies, as reviewed below.

The response to the ideas put forward by Miller has been rather mixed. His book *The Mating Mind* (2000a) has been well received by the general public, becoming a popular science bestseller. In the academic world, some scholars have followed his lead in using mate choice to explain various human cultural behaviours. For instance, Laura M. Bolt has published *Musical Matings: Sexual Selection and the Origins of Music* (2008). Literary scholar Jonathan Gottschall has applied the principles of sexual selection to explain universal themes in literary narrative, using Homer (Gottschall 2008), and global folktales (Gottschall et al. 2004) as examples. And in *The Art Instinct: Beauty, Pleasure and Human Evolution* (2009), the late philosopher of art Dennis Dutton built on Miller's argument to suggest that the arts may well be seen as costly signals.⁶⁷

Then again, Miller's hypothesis has been criticized for being too broad an explanation (Brown 2000:247). In Miller's own words, "sexual selection through mate choice can potentially explain anything you can ever notice about evolved human behaviour as something that needs explaining. This is because anything you can notice about other people, your ancestors could have noticed too, and perhaps favoured in picking their sexual mates" (1999:80). Certainly, he has had no reservations using mate choice for fitness indicators to account equally for language, music, religion, altruism, literature, visual art (2000a) and, more recently, consumer behaviour (2009). But the applicability of his model has been challenged for many of these aspects. For example, Steven Brown has opposed his ideas regarding music (2000:244), Tecumseh Fitch has refuted sexual selection's involvement in the origins of language (2005a:211) and music (2005b:12), Joseph Carroll (Carroll 2004:XX) and Brian Boyd (2009a:208) have both raised doubts about the influence of mate choice in the evolution of literature, and Catherine Driscoll (2006) has criticized Miller's model for art and altruism, respectively.

The span of Miller's account is certainly too ample and the aim here is not to evaluate its applicability to each of the themes the author has dealt with, nor to human culture in general, but to assess the theoretical soundness of his key arguments regarding particularly the visual arts.

67 Art-making, Dutton says, requires skill and coordination, insight and planning, and other demanding aptitudes as well as access to resources. Therefore artistic behaviour, and creativity in general, are indeed good markers of overall intelligence. The latter, in turn, is one of the most prized traits in human mate choice preferences. For this reason, Dutton suggests, art is proudly displayed, and the more costly and wasteful it becomes, the better it signals the artist's quality, augmenting his/her status. Dutton follows Miller in granting that the arts may have evolved in courtship contexts but in his view, art is nowadays better characterized as a conspicuous social signal that enhances the status of those engaged with the arts.

3.3 Visual art as a courtship display: Critical assessment

Geoffrey Miller's research has followed the revival and success of Darwin's sexual selection theory in biology, where this topic has become a prominent research theme over the past two decades. In this trend, mate choice preference patterns have been thoroughly examined and used to explain a great deal of animal behaviours and traits, beyond weapons and ornaments (e.g. territorial behaviour, life history patterns) (Anderson & Iwasa 1996; Anderson & Simmons 2006). For our species, mate choice makes a strong case for explaining certain anatomical features of the human body, such as body hair distribution, and the primary and secondary sexual characters of both sexes (Darwin [1879]2004:652).

Miller suggests that the influence of mating preferences might extend to mental and behavioural traits as well, and even artefacts. With animal examples like the peacock's tail and the bowerbird's bower, he builds up an analogy for human visual art. Such analogy has been around since Darwin's time. In 1900, art scholar Yrjö Hirn already noted: "The attraction of the Darwinian theory is of course obvious. After having realised the important part which sexual selection plays in the 'artistic' activities of animals, one is naturally tempted to apply the same principle to all similar activities in men" (1900:238). However, there are several problems with this proposal, as discussed below.

For this assessment, I focus on five key arguments put forward by Miller to support his model of visual art as a sexually selected trait: 1) late ontology of artistic behaviour; 2) sexual dimorphism in artistic production; 3) the function of visual art as a courtship tool; 4) the role of fitness indicators in human mating preferences; and 5) the evolution and structure of human mating systems. It is important to note that this assessment is intended for Miller's hypothesis regarding the origins of visual art only, not its applicability to other traits; nor is it meant to evaluate the theories of sexual selection or mate choice. Some of the issues mentioned in this section have already been pointed out by other scholars regarding Miller's ideas on music (Brown 2000), language (Fitch 2005a), culture (Jablonka & Lamb 2005:217), and the arts (Dissanayake 2007; Driscoll 2006), but are equally compelling for his model of visual art, and thus are also included in this review.

1) *Late ontology of artistic behaviour*

Miller has emphasized that visual art, like other sexually selected traits appears late in life and is only fully developed by the age of reproductive maturity, often being displayed by adults during courtship (2000a:14). This argument is contradicted by the fact that the faculty to produce visual art is present in normally developed individuals of pre-reproductive age (i.e. children). The development of drawing abilities in children has been well-studied, indicating that this skill is often cultivated by the 2nd year of life and is generally mastered

by 8-10 years of age (Milbrath 1998:31). If visual art were indeed a secondary sexual characteristic, artistic ability would somehow influence or be influenced by the onset of sexual maturity. However, there seems to be no correlation between the two; the latter is determined by energetic, nutritional and hormonal signals (Harris & Ross 1987:24; Short 1976:9), whereas the first depends largely on genetic endowment and developmental circumstances, particularly the sociocultural context (Rostan et al. 2002:128). Also, visual art activities remain effective and important among individuals of post-reproductive age. Furthermore, while displays of visual art may certainly be involved in adult courtship, they are equally if not more prominent in other contexts, especially in collective rituals, ceremonies and festivities that often include individuals of all ages (Dissanayake 2008).

2) *Sexual dimorphism in artistic production*

The mate choice model observes that, while the capacity to produce art is similar in both sexes, there is a certain degree of sexual dimorphism in art so that males will be either more productive or be “much more prone to publicly broadcast their cultural production” (1999:87) because they would be under greater pressure to show off their fitness (1998:108; 1999:72; 2000a:275). For Miller, this explains the predominance of male artists throughout (Western) history (1998:119, 1999:86, 2000a:275). This conclusion, however, is based on the questionable assumptions that the historical situation has evolutionary weight, and that men indeed produce more art than women.

First, we cannot simply transplant the historical situation of male artistic dominance onto the Pleistocene. Among various traditional societies, women play a prominent role in art production. For example, among the San hunter-gatherers, ochre and body painting are widely used in female initiation rites (Knight et al. 1995:93) and the rock art associated with these groups often depicts or refers to female-related themes (Solomon 1992), which makes it possible that women could have been the painters. Traditions of rock painting done by females during initiation ceremonies are known elsewhere in south central Africa (Zubieta 2014). Although projecting this ethnographic observations onto the past is also questionable, they do show that the Western situation is by no means universal. Second, male public visibility may be better explained by gender roles and the sexual division of labour than by male motivation to display fitness. Maternal care constraints the sorts of activities that women can carry out excluding, for example, those which require high mobility and continuous occupation, favouring home-based activities (Wood & Eagly 2002:708). This would limit the ‘public broadcast’ of female cultural production. Perhaps for this same reason, labour specialization is overwhelmingly a male domain. It has been recurrently observed that whenever a craft shifts from a household activity to the public or market domains, it tends

to become increasingly male dominated (Ehn 2009; Stymne 2009:23).⁶⁸ But if we dismiss the divide between artist and artisan, and between public and domestic craft, it becomes clear that women are as productive as men in the visual arts.⁶⁹ Gender differences in artistic output may then be purely contextual.⁷⁰

In support of his argument, Miller has contended that human cultural behaviour has a lot in common with the courtship behaviour of animals, such as birdsong, which is used in courtship, develops alongside sexual maturity, and is differentially produced by males and females. Therefore (1999:88):

Parsimony demands that if we see the same age and sex profiles for animal courtship behaviour and for human public cultural production, and if these behaviours show many of the same design features (e.g. high cost, aesthetic appeal, heritable variation in production ability, importance in mate choice), we should admit that the same theory, sexual selection through mate choice, might explain both phenomena.

The main problem with Miller's analogy is that whereas biologists have a good working definition of animal 'courtship behaviour', there is no comparable definition of what constitutes 'cultural behaviour' among humans; but even if we limit the argument to 'artistic behaviour', the similarities with animal courtship displays are not as straight forward as Miller suggests. Let us take birdsong as an example. Most biologists do agree that the primary function of birdsong is courtship (Naguib & Riebel 2006), but it is not limited to it. Singing in birds serves various functions besides sexual display, such as territorial defence, and individual recognition. So 'importance in mate choice' may well be a relevant 'design feature' of birdsong, but so are other aspects that are more susceptible to natural rather than sexual selection. Furthermore, birdsong is a trait that varies a lot between species (Naguib & Riebel 2006). For instance, among some birds, only the males sing and only during the mating season, whereas in others, singing takes place all year round and the females also sing. In the case of species where there is sexual dimorphism in song production, the disparity is correlated with differences in functional brain anatomy, i.e. the

68 Interestingly, even among Western academics, child rearing affects female productivity (Hunter & Leahey 2010), and women tend to specialize less than men (Leahey 2006).

69 Following Miller's argument, one could easily invoke the history of *haute cuisine* to argue that cooking evolved as male sexual display, since it is well-known that most top-chefs are men. Whereas, universally, domestic food processing and cooking are, and probably have always been, predominantly female activities (Wrangham 2009:147).

70 Like artistic production, technological production need not have been a male domain throughout evolution. Recent research has shown that among our closest primate relatives of the *Pan* genus – chimpanzees and bonobos – it is the females who exhibit a more extensive and avid tool-making and tool-using behaviour, often transmitting their knowledge and skills through the female line, from mother to daughter (Gruber et al. 2010). At least among these primates, then, technological 'output' is not male-biased. And if we suppose that some of the skills and abilities used in visual art production were co-opted from tool-making, as they must have, there is no reason to exclude the possibility that women produced many of the early artefacts found in Pleistocene archaeological sites, or even that visual art production might have had a female-based origin, as suggested by Camilla Power (1999, 2004) and Kathryn Coe (2003).

brains of males and females are different. Such neural differences between the sexes have never been observed among humans despite the supposed difference in artistic output. Therefore, as Steven Brown argued for music (2000:250), until convincing functional evidence suggests otherwise, we must take as our null hypothesis the biological equivalence of the two sexes in ability, motivation, and production.

Miller contends that his model explains the similarities between animal courtship and human cultural behaviours like art, but as the above example of birdsong shows, the resemblance is often only superficial. Even if courtship and artistic behaviours had the same patterns and features, it does not follow that sexual selection be the best explanatory framework, other alternatives might still apply. Going back to birdsong, research has shown that in many species of songbirds the song repertoires are not innate, but acquired during development and thus song is highly sensitive to the natural and social environment of the birds. In this aspect, birdsong in fact resembles spoken language (Naguib & Riebel 2006). Hence, if the similarity criterion points to the best research framework, as Miller argues, then “we should admit” that biological communication “might explain both phenomena” just as well.

Miller does in fact acknowledge the role of visual art as a communication signal, however, he sees its function as restricted to sexual selection (2001:20):

From the viewpoint of current animal communication research, art is a signalling system. There is a signaller (the maker of the art), and a set of receivers (who perceive the work of art). The prototypical functions for animal signals include long-range sexual attraction, short-range sexual courtship, sexual rivalry, territorial conflict, begging by offspring to solicit parental investment, warning signals to deter predators, and alarm signals to alert relatives of danger.

Out of these standard function for signalling, sexual selection for courtship produces the most complex and aesthetically pleasing signals. Insofar as we praise human art for its complexity and aesthetic value, it seems reasonable to focus on sexual courtship as the most likely adaptive function of human art-production – at least in prehistory, if not in modern society.

Although the prototypical functions of animal signals mentioned by Miller may indeed be the best known, and more commonly studied, this is but a small sample. Animal signals simply are “traits that are specialized for the purpose of communication” in general, and their diversity “is enormous” (Johnstone 2009:155). Sexual signalling is just one of many signalling modes. To be sure, courtship displays are often complex, striking and ‘aesthetically pleasing’ but so are other signals, like the bright colours of some frogs and insects whose primary function is to deter predators. Good genes mechanisms (e.g. ornaments) do not exhaust aesthetic evolution (Prum 2012:2259). Moreover, unlike the bowerbird’s bower, many conspicuous animal signals frequently

operate in various contexts. For example, the bioluminescent displays of some cephalopods are used to entice prey, scare off predators, and for communication with conspecifics, as well as to lure mates (Mather 2004). Likewise, the impressive ability of chameleons to change colour serves as a social signal, as well as for camouflage, and sexual display (Stuart-Fox & Moussalli 2008). So, the fact that visual art is complex and visually pleasing is not sufficient to maintain that it originated in courtship. Rather, and more interestingly, its potential use in mate choice points towards the versatility of visual art as a communicative signal.

3) *Visual art as a courtship tool*

Miller supports his mate choice hypothesis by drawing an analogy between the ‘artistic’ behaviour of the bowerbird, whose function like that of birdsong is clearly courtship, and human art-making (Miller 2000a:273). Superficially, as in the case of birdsong, the similarity is clear. Both the bower and visual art may be seen as artificially created displays of pattern and colour. However, there are again more fundamental differences than parallels between the two. Firstly, bower-building is an instinctive behaviour, which means that even captive male bowerbirds that have never seen another member of their species will still construct bowers, even if there are no females around. In contrast, visual art production is not instinctive but, like language, must be learned and prompted by the human social milieu.⁷¹ What is more, bowers are clearly restricted by their function to a particular form (specific to each bowerbird species) and a courtship context, whereas visual art can take place in a number of non-sexual situations, may take several forms, and be manifested in various media.

Moreover, the bower itself might not even be an infallible example of a fitness indicator. Some studies indicate that bowers may have nothing to do with the genetic quality of the male bowerbird (Madden & Tanner 2003). Some evidence suggests that the preferences of the female bowerbirds for bower decorations may have evolved originally through regular natural selection, as a sensory bias for efficient fruit foraging, and was co-opted in male sexual display. It may be that the females favour the bowers that for instance include more of their preferred berries or objects of that same colour. So, researchers have concluded that “the consistency of the proportional use of decorations across sites, and the similarity of objects that occupy similar positions, for example white stones and white shells, suggests that the bower conforms to a specific visual pattern, whose evolution can better be explained by invoking models of sensory bias” (Madden & Balmford 2004:594).

But even if the bower were in fact correlated to the overall fitness of the male bowerbird, its analogy with the human case of visual art would remain

⁷¹ The cases of neglected and feral children clearly show that lack of exposure to art in childhood will result in difficulty to produce and perceive art in adult life (see: Candland 1993).

unjustified. So far there is no concrete evidence that genetic quality in humans is in any way correlated with visual art production. As yet, there is no convincing data to support the notion that artistry may actually serve as a fitness signal or a relevant cue in human mate choice (Driscoll 2006:513).⁷² For example, a recent study originally designed to show that “creativity is desired in a potential mate” (Clegg et al. 2011:1), in fact ended up showing that artistic success, measured as high social status, is what people actually value as an attractive trait, not artistic creativity or skill, as predicted by Miller’s model. In conclusion, the bowerbird analogy is likely a classic case of projecting biological data onto human behaviour (Bolhuis & Wynne 2009).

4) *Role of fitness indicators in human mate choice*

Miller’s model assumes that ‘good-gene traits’ guide human mating preferences, particularly in women. Research has shown that some such traits do play a part in mate choice (Gangestad et al. 2006), but sexual selection for fitness indicators remains controversial, as explained by biologist Malte Andersson (1994:28):

Several empirical studies have provided support for indicator models, but the evidence can be interpreted in different ways. Indicator traits may be correlated with some direct (nongenetic) material benefit to the female or offspring, such as food, protection, or parental care. It has not yet been convincingly shown that an indicator process based on genetic benefits for offspring is involved in the selection of any secondary sex trait.

In many cases, indeed, the apparent preference for fitness indicators might be at least equally explained by mate choice for direct benefits, as in the case of human hunting. Anthropologists Kristen Hawkes and Rebecca Bliege Bird have suggested that human hunting might have evolved primarily as a form of male display (2002), and not for meat provisioning, a scenario also suggested by Miller (1998:108). As Hawkes and Bliege Bird clearly show, hunting certainly is a central arena for male competition in forager societies, and good hunters have a high social status and often father more children than other men. On that basis, the authors favour the idea that hunting might be a costly signal, or handicap, that could work as a reliable indicator of male genetic quality (2002:65).⁷³ However,

72 Some studies suggest that women prefer ‘creative’ men at the peak of their fertile cycle (Haselton & Miller 2006), and that there might be a correlation between intelligence and sperm quality (Arden et al. 2009), but more research is needed before any relevant conclusions on the subject can be drawn.

73 Costly signal or handicap models suggest that when a preferred trait, like an ornament, is energetically costly, only “males closer to the optimum with respect to the viability trait will be in better condition and will be able to maintain a more elaborate version of the ornament. Female choice evolves because females choosing males with more elaborate ornaments produce offspring with higher viability or that will be in good condition as adults [...] Because the ornament is condition dependent, it is always a reliable indicator of genetic quality” (Jones & Ratterman 2009:10004). However, as Gambetta has noticed, it is not necessarily the case that all honest signals

their work also reveals that whereas better hunters do seem to have more offspring, the survival rates of their children is not particularly higher (2002:61). So, hunting might truly be a form of male contest but that need not support an indirect benefits model. Women could be choosing better hunters as mates not for the higher genetic fitness of their offspring (indirect benefits) but for social prestige and securing of provisions (direct benefits). The latter is actually more compatible with data that fertility and fitness are greatly influenced by resource allocation to women, because this will determine their available energy for reproduction and parental investment (Harris & Ross 1987:24; Kaplan 1996). Selection for direct benefits is also better-suited with the general pattern of human reproduction which involves not only producing high quality offspring but also reducing the risk of early mortality (Hopkinson et al. 2013:62; Kaplan & Bock 2001).

In fact, cross-cultural studies on human mating preferences suggest that the mating choices are guided not by indicators of 'good genes' (indirect benefits), as suggested by Miller's model, but by direct phenotypic benefits instead, i.e. people generally choose potential partners on the basis of immediate returns, such as resource allocation, parental investment, disease avoidance, status, fertility, etc. Men, for instance, have been observed to show preference for young women, with a low waist-to-hip ratio – which are cues of imminent fertility and good general health (Buss 2004; Singh 2002; Zaadstra et al. 1993). Women, for their part, tend to prefer men who are expected to provide resources, protection, and/or parental care (Geary et al. 2004; Todd et al. 2007). This means that the correlation between certain behavioural traits and mate choice may still hold, but on the grounds of direct returns, not genetic fitness (e.g. hunting success). The types of direct benefits that are preferred, though, will vary across cultural contexts. So, if women prefer 'artistic types', as observed by Miller (2000a:273), it is probably due to the status of artists in today's society rather than to a 'universal preference' for creativity (cf. Clegg et al. 2011). In my view, there is just not enough evidence to support Miller's central premise that fitness indicators and aesthetic displays play a fundamental role in human mate choice.

Furthermore, natural selection may offer an equally good explanation for some of the patterns attributed to sexual selection. For instance, Miller argues that throughout human evolution male-male competition shifted from physical encounters to cognitive displays and signalling through 'extended phenotypes' (1998:115, 2000a:208). Following the work of archaeologists Marek Kohn and Steven Mithen (1999), Miller suggests that instead of direct physical competition, early hominins may have used stone tools, like the handaxe, to advertise their fitness to potential mates, and this in turn, may be a behavioural

are costly for the honest signaler. For example, showing one's face is a costless honest signal of one's identity (2009:182).

precedent for visual art (2000a:290).⁷⁴ The comparative values of hominid canine size and body mass indicate that indeed the frequency and intensity of male-male aggression and competition decreased progressively in Australopithecines and early *Homo* (Plavcan & van Schaik 1997:364). And certainly, handaxes and reduced male aggression might be correlated, but on the basis of natural, not sexual, selection pressures. As Hillard Kaplan and colleagues suggest (2000:161), a change in the hominin dietary niche towards more meat consumption would have produced coevolutionary selection pressures for tool-making technologies, food sharing, male parental investment, and larger group sizes, all of which required a reduction of male-male aggression.

Lastly, Miller simply assumes that all through evolution humans would have invariably chosen the fittest partner around (1998:108). However, recent studies have confirmed that social input and self-assessment are crucial in mating decisions. For instance, mate-choice copying is a common strategy among several species, including humans (Mery et al. 2009). This means that individuals often use social information (on the choices of others) to guide their own mate selection (Little et al. 2008). An individual's own fitness also plays an important role in mate choice. Studies show that in humans (as among zebra finches, incidentally), low-quality females prefer low-quality males as mates (i.e. women with low self-perceived attractiveness prefer less attractive men). This strongly suggests that individuals may be able to adjust their mating preferences according to their own developmental and contextual circumstances, and this may be a general aspect of mate choice across species (Holveck & Riebel 2010:158). Evolutionary psychologist David Geary and co-workers arrived at a similar conclusion (2004:33):

Women's ratings of men's physical attractiveness are influenced by social comparisons and other social processes, including their own attractiveness and thus value as a mate, above and beyond his actual physical traits.

It seems to me that the relevance of potential fitness indicators in human mate choice is often overestimated by Miller, whereas the actual importance of cultural input and context has been generally overlooked.

74 The "sexy-handaxes hypothesis", as it has become known, suggests that handaxes were made and used in the context of mate choice, acting as indicators of the maker's quality by advertising traits such as good health and physical ability (Kohn & Mithen 1999; Mithen 2003). Furthermore, the handaxe would exploit innate perceptual bias towards symmetry, in turn increasing the attractiveness of its maker (Mithen 2003). Miller agrees that "handaxes must have been to hominids what bowers are to bowerbirds: part of their extended phenotype, a genetically inherited propensity to construct a certain type of object" (Miller 2000a:289). For a detailed criticism of this argument see: Nowell & Chang (2009).

5) Evolution of human mating systems

Regarding human mating systems, Miller seems to presuppose that throughout evolution these ran on the principle of male display and female choice, which are characteristic of polygynous species (like the bowerbird, and lekking birds like the peacock), in which the male offers no parenting effort (Jones & Ratterman 2009:10003). That is actually how Miller envisions hominin mating dynamics throughout the Pleistocene (1998:108):

For the most part, adult male hominids must have been rather peripheral characters in human evolution, except as bearers of traits sexually selected by females for their amusement value or utility.

However, the mating strategies of Pleistocene humans are more likely to resemble the primate pattern, which is very different from that of bowerbirds and peacocks. Primate mating strategies are much more varied and complex (monogamy, but also polygamy and polyandry, are relatively common among primates), and the male often provides at least some parental care (Fuentes 1999). Moreover, the primate male-female pair-bond often lasts beyond copulation and involves more than mere reproduction, it actually constitutes the basis of the social system, as does the pair-bonded family in the human case (Aureli et al. 2008:648; Eldredge 1989:180). The evolutionary history of primate pairbonding, again, seems to be more closely related to mate choice for direct benefits – e.g. territoriality, protection, and sexual selection mechanisms other than mate choice, such as intrasexual competition (van Schaik & Dunbar 1990).

Likewise, there is strong evidence that in hominin evolution it has been in fact the females who have been more prone to selective pressures for the physical and energetic requirements of bearing increasingly larger, big-brained babies. This is particularly evident in the marked escalation of female size from *Australopithecus* to *Homo erectus* and onwards (Aiello & Key 2002; Wood & Eagly 2001:702). In turn, this suggests that natural selection pressures in response to changing environments and nutritional stress were probably more significant than mate choice preferences in shaping the anatomy and behaviour of the two sexes in our genus (Pawlowski 1999).

However, there is also something to say about the generally presupposed correlation between the costs of mating strategies and mating preferences. As biologist Richard O. Prum has observed, this is usually assumed but rarely well-supported (2012:2263):

Just because females are exposed to predation risks during mate searching, have limited energy budgets, or risk exposure to sexually transmitted diseases, etc., does not mean that variation in mating preferences will be correlated in any way with avoiding or minimizing any of these costs. The existence of costs of mating is not evidence of differential cost of variations in mating preferences, which are absolutely required for natural selection on mating preferences to occur. We will all die someday (i.e. viability is not infinite), but that fact

itself does not mean that we are under natural selection. To demonstrate natural selection on mating preferences, one has to show that natural variations in preference have consequences for the viability of the female, the number of her offspring or their viability. Natural selection cannot be merely assumed to exist.

So it may well be that human females have been under greater stress of natural selection pressures, but that need not bear any consequences for their mating strategies and preferences, as is usually assumed, for example in Hawkes and Bliege Bird's 'costly hunting' model discussed above. Prum's point is that in either case, whether one argues for natural or sexual selection, the predicted effects on mate choice should be well substantiated.

Finally, Miller also supposes that in evolution mate choice has been mostly a matter of free will and individual decision-making, merely on the basis of personal preferences (1998:110). However, it is quite likely that the social mediation of reproduction and the institutionalization of sexual relations happened early in human evolution (Deacon 1997; Dunbar & Shultz 2007; Harris & Ross 1987; Knight 1995), which would imply that mate choice has been, from early on, bound to cultural normativity (e.g. restrictions on marriage, exogamy/endogamy patterns, offspring affiliation and kinship rules). Certainly, in historical kin-based societies, human action is generally compelled to follow social roles and expectations, hence we must specially consider the influence of the social system on mating behaviour instead of the reverse (Meillassoux 1972:95). On this point, Miller overlooks a great deal of anthropological data indicating the relevance of the social environment in human sexual selection, particularly the influence of parental and close kin preferences (Apostolou 2007; Buunk *et al.* 2010). In arranged marriages, for example, where parental choice is predominantly exercised, physical traits and attractiveness are generally less important, while family history and personality traits gain prominence. Studies of parental choice reveal that desired traits in a son-in-law often include being hard-worker, a good provider, and having good family provenance, and a daughter-in-law is valued for her hard work and good family origin above physical appearance (Apostolou 2007:407).

In general, our understanding of human mating systems, past or present, is perhaps still too imperfect to make any universalist claims or suggest that humans have followed a single set of mating strategies throughout evolution (e.g. Buss 1994). In this regard, Geary and colleagues concluded (2004:37):

There is not one reproductive strategy for women and another for men, as the strategies adopted by both sexes often vary across contexts, historical periods, and characteristics of the individual.

In sum, although there is no consensus regarding the mating systems of Pleistocene humans,⁷⁵ there is abundant evidence that modern human mating strategies are not universal, but widely varied and flexible, changing according to specific cultural, ecological and economic circumstances (Fuentes 1999:897; Kaplan 1996:127; Rival et al. 1998:316; Schmitt 2005:273; Wood & Eagly 2002:709). Thus, there is little ground to favour a single mating pattern as evolutionary prevalent. In fact, the diversity and flexibility of human mating strategies may indicate that sexual selective pressures were “never so significant in the evolution of the Homininae as to require selection for any strictly defined type of reproductive strategy in *Homo*” (Pawlowski 1999:266).

In the following section, I examine the extent to which Miller’s model stands against the archaeological evidence from the Pleistocene.

3.4 Test against the archaeological record of visual art

As I have discussed throughout this chapter, the general hypothesis put forward by Geoffrey Miller states that many cognitively complex human behaviours evolved as courtship displays (1998, 1999, 2000a, 2001). More specifically, his model suggests that art evolved under the selective pressures of mate choice preferences, and predicts that visual art will be most salient in the context of mate acquisition and reproductive competition.

But testing Miller’s model against the archaeological record poses a challenge since, as the author himself acknowledged, he did not incorporate specific archaeological data into his account of the origins of art (2000a:22):

Anyone presenting a theory about human mental evolution is usually expected to present a speculative chronology of what evolved when, and to show how the current fossil and archaeological data support that chronology. I will attempt neither, because I think these expectations have too often led theorists to miss the wood for the trees. The human mind is a collection of biological adaptations, and an evolutionary theory of the mind must, above all, explain what selection pressures constructed those adaptations. Chronology is of limited use, because knowing when an adaptation arose is often not very informative about why it arose. Fossil and archaeological evidence has been enormously important in showing how many pre-human species evolved, when they evolved, where they lived, and what tools they made. This sort of evidence is crucial in putting human evolution in its biological and geological context, but it has not proven terribly useful in

⁷⁵ Scholars often diverge in their views of primate and human mating systems. For instance, Agustín Fuentes states that there is no indication that monogamy “is the predominant form of social grouping or mating system in *Homo sapiens*” (1999: 897); whereas Wendy Wood and Alice Eagly state that there seems to be enough evidence that “humans evolved with minimal competition between males and a monogamous rather than a polygynous mating system” (2002:702).

explaining why we have the mental adaptations that we do – and in some cases can be misleading.

Miller is to some extent right that archaeological evidence by itself cannot explain human behaviour, but it is hardly a justification not to take the Pleistocene art record into account. It is how researchers interpret and use that evidence to infer behaviours and test those inferences which can eventually provide a reasonable account of cognitive evolutionary processes. Therefore, Miller's choice not to integrate archaeological or fossil evidence in his model is questionable. As archaeologist David Lewis-Williams has stated, any explanation of the origins of art "must relate to verifiable, observable, empirical data" (2002:48), which in this case is provided by the archaeological record. The goal of the present section is precisely to assess Miller's claims in view of the material evidence from the Pleistocene.

As mentioned, Miller suggests that visual artworks originated as cultural displays for attracting mates and outcompeting rivals (1999, 2000b, 2001). According to parental-investment theory (Trivers 1972), due to the energetic load and physical constraint of pregnancy and childcare, women are the major investors in reproduction and as a result will be more selective in their mating choices. Following Miller, female choosiness renders males more motivated to produce competitive fitness displays, like visual art. So, *an intensification of visual art production in the archaeological record will correlate with periods of increased male-male competition and greater female choosiness* (prediction 1). We can actually suggest two opposing scenarios in which male competition and female selectiveness are high: in a harsh environment and in a situation of abundance. As I discuss below, the second scenario would be in accordance with Miller's proposal of mate choice on the basis of fitness indicators. The first is more in agreement with the hypothesis of mate choice for direct benefits.

The first scenario states that women become choosier in harsh environments. Because resource allocation determines the energy that females can invest in reproduction and parental investment (Harris & Ross 1987:24; Kaplan 1996), women will tend to choose males that are better at provisioning them and their offspring. So, female choosiness will increase in periods when conditions require greater parental investment, to increase the survival chances of mother and infant; for instance, in situations when there are more people than resources available (Geary et al. 2004:38; Kaplan 1996:108). Thus, under harsh conditions, partner provisioning to mother and child becomes crucial for survival, so finding a reliable, resourceful partner would be a female priority. Mate choice studies do indicate that in difficult or demanding environments where infant mortality might be high, women seek to pair up with long-term partners (Schmitt 2005:273). And, according to research of human mating strategies, women hold higher standards of selection when choosing a long-term mate (Buss 1994). In conclusion, this scenario predicts that *an increase of visual*

art in the archaeological record would correlate with periods of low resource availability (prediction 1a).

In the second scenario, consistent with mate choice for fitness indicators, women are expected to choose prospective mates on the basis of indicators of genetic quality and courtship displays and, contrary to the previous situation, would become choosier in conditions of prosperity (Miller 1998:109). When there is abundance of resources, there will be more fit males who can afford complex courtship displays. Some mate choice research indicates that, like female zebra finches,⁷⁶ women tend to become choosier when exposed to a greater number of potential high-quality mates with high fitness display rates.⁷⁷ So, in favourable environments women will have more fit potential partners to choose from and become choosier. This in turn induces male rivalry, increasing the quantity and quality of fitness displays. In brief, this scenario predicts that *an intensification of courtship displays, such as visual art, would correlate with periods of high resource availability* (prediction 1b).

Both predictions may now be contrasted with the data reviewed in chapter 2 from the African Middle Stone Age (MSA) between 130-70,000 years BP, and the European Early Upper Palaeolithic (EUP) between 45-25,000 BP.

Several of the MSA sites with early presence of visual art (e.g. Blombos Cave, Sibudu, Klasies River) have yielded evidence of resource exploitation. Unfortunately, the data is not detailed enough to get a clear picture of the complete range and frequency of the species extracted. However, some trends can be observed. At Blombos Cave, for example, the phases contemporaneous with the finds of shell beads, dating to 75,000 BP, indicate that diet was broad and included both mammals and shellfish. At the time, this coastal site was surrounded by forest, which means that humans could make optimal use of terrestrial and marine resources (Dusseldorp 2012; Langejans et al. 2012). As seen in chapter 2, the period of the MSA when the earliest evidence of visual art becomes visible was a time of high climatic variation. However, by occupying locations near different sources of food (e.g. coast-forest), humans could have maximized their access to supplies. It then seems that the time and location of early visual art production is correlated with potentially favourable conditions. That in the MSA visual art production may have been correlated to propitious circumstances is further supported by the fact that it seems to decline after 70,000 BP, when it is thought that conditions took a turn for the worse as consequence of the Toba eruption (Ambrose 1998b; Borroughs 2008:86).

In the European Early Upper Palaeolithic, personal ornaments may not be a good indicator to quantify visual art production over time, since they are present

⁷⁶ Experiments with these birds (*Taeniopygia guttata*) have shown that females elevate their mating preference standards after having been exposed to various males with high display rates (Collins 1995).

⁷⁷ Women do seem to become choosier when there is an oversupply of men, being better able to enforce their preferences (Geary et al. 2004:38).

in large quantities throughout the whole period. Archaeologist Michael Barton and colleagues have used figurative portable and rock art as a measure (1994). They observe that in the climatic downturn episode leading up to the Last Glacial Maximum (27-21,000 BP), when mean temperature deteriorated and glaciers advanced continuously, there was comparatively little figurative art production. In contrast, during the Last Glacial Maximum itself (21-13,000 BP), visual art became abundant, only to wane again at the beginning of the Holocene. As reviewed in chapter 2, visual art seems to have flourished during the Aurignacian and Gravettian periods (40-28,000 BP). On the one hand, it would seem that a decrease in art production during the downturn episode could be related to harsh climate change and a decline in available resources. During the Last Glacial Maximum, on the other hand, may correlate with the stabilization of the new cold conditions, where despite the low temperatures there was great availability of faunal resources to be exploited, specially of large grazing herbivores (Gamble 1999:280-283; Guthrie & van Kolfschoten 2000:17).

In sum, although the data available for the MSA and EUP in relation to resource availability and art production may be sketchy, it seems to better support prediction 1b that an intensification of visual art would correlate with periods of greater resource availability. This, in turn, would support Miller's model that in prosperous circumstances females will have more choice of high-fitness partners, becoming choosier and thus prompting male-male competition which will result in an increase of courtship displays, including visual art manifestations. However, I have argued against Miller, that visual art is unlikely to constitute a courtship display. So, the correspondence between a rise in visual art production and favourable environments for Pleistocene human groups should have an alternative explanation to a sexual competition scenario. For example, the decrease of food resources could imply a similar decrease in raw material access. Likewise, in changing or harsh climatic conditions social relations may be affected. In chapter 6, I suggest precisely that the correlation observed above might instead have to do with changes in demographic patterns and their consequences for human social organisation, as also proposed by Barton et al. (1994).

Miller has also argued that art evolved through mate choice to advertise the genetic fitness of an individual and so, visual artworks may be seen as 'extended phenotypes' of their makers. On this basis, he suggests that *visual art initially emerged as an individual practice in which people could show off their personal skill and creativity to attract potential sexual and social partners* (prediction 2). If that were the case, we should expect that *the earliest examples of visual art show a great deal of internal variation* (prediction 2a).

The earliest instances of systematic visual art activity found in the archaeological record of Pleistocene visual art – possibly body painting and ornaments (i.e. beads) – do indeed point towards personal display. As it was discussed in chapter 2, the evidence for body painting is difficult to assess.

However, the data for beads is more abundant and concrete. And contrary to the prediction, the increasing corpus of early body ornaments (seashell beads) recovered from sites in North and South Africa show a low degree of internal variation, and a high level of standardization and formal redundancy instead (Kuhn & Stiner 2007a:48). In all cases, the beads were made of the shells of a small sea snails (often of the genus *Nassarius*). The consistency of raw materials across sites despite chronological and geographical differences is particularly remarkable. This seems to indicate that even when the production and use of early Pleistocene beads was personal, their makers were probably being guided by established social conventions regarding the use of specific materials and natural forms, and not by their own individual choices, resources or skills. This of course, does not exclude the possibility that people displayed the ornaments in their own particular way (as discussed in chapter 6).

Finally, the fitness indicator argument implies that, *in order to function as proper extended phenotypes the earliest visual artworks would have been kept on or in the vicinity of their maker at all times so that they could be seen and judged by potential mates and allies* (prediction 2b).

The archaeological record of the MSA does not provide a clear answer, since in most cases it includes only isolated finds of ornaments and beads. And even when these artefacts are found in association to human remains, presumably as grave goods, it is almost impossible to know if the buried individual either made or wore the ornament in question. However the record of the European Upper Palaeolithic is more informative. In this period there are clear examples of personal ornaments that were not being used exclusively by their makers, or in courtship contexts, as the recurrence of beads in children's graves demonstrate (e.g. Krems-Wachtberg, Sungir). Furthermore, by analogy with contemporary hunter-gatherer societies, it is very likely that Pleistocene ornaments had a high exchange value and were much esteemed as gifts, transferred in trade networks and/or passed down the generations (Kuhn & Stiner 2007a:50). So it is unlikely that ornaments would have been invariably kept and displayed by their makers only, or that they were employed primarily for courtship. This does not mean that body ornaments do not convey information –however limited– about who made or wore them, on the contrary. It is precisely the fact that beads can transmit information in spite of being detached from their maker or wearer what probably incited humans to produce them systematically. In this manner, visual art might nonetheless play an important role in human mate choice. If visual art conveys identity and status – as suggested by Dutton (2009) – and, if these are important factors in mate choice, then we could expect individuals (male and female) to invest in visual art to influence potential partners, among other motives. In such case, visual artworks would work as indicators of a person's social identity, rather than their genetic fitness, and might be better described as artefact-signals than as extended phenotypes. These possibilities will be explored further in chapter 6.

3.5 Conclusion

Geoffrey Miller argues that visual art is a unique human adaptation that evolved to help humans solve the ancestral problem of finding and keeping a fit partner. In his courtship scenario, visual art is conceived as an indicator of individual quality to guide mate choice. Although I agree with Miller that visual art has the characteristics of a signal, in this chapter I have argued that contrary to his courtship hypothesis, visual art does not seem to have evolved under pressure of sexual selection. Moreover, I have pointed out that the cross-cultural studies on human mating systems do not support the premise that human mate choice is primarily informed by 'fitness indicators', but rather indicate that mate preference is based on direct benefits. The latter is actually more compatible with data that fertility and fitness are greatly influenced by resource allocation to women, because this determines their available energy for reproduction and parental investment. Mate selection for direct benefits is also better-suited with the general pattern of human reproduction which involves not only producing high quality offspring but also reducing the risk of early mortality.

The assessment of Miller's model in view of the archaeological record showed that the Pleistocene data do not coincide with the mate choice hypothesis either. The earliest manifestations of visual art are constituted by an increasing corpus of body ornaments (seashell beads) that show a low degree of internal variation, and a high level of standardization and formal redundancy, which is the opposite of what one would expect if the makers were 'showing off' their choices, resources, or skills. This contradicts Miller's ideas of visual artefacts as fitness displays and the notion of visual art as an 'extended phenotype'. Therefore, I suggest that the function of visual art as a signal includes but goes beyond a courtship context, and an evolutionary explanation should then account for both the functional diversity and formal evolution of visual artworks.