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Robert Burriss

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Symmetry is sexy: reply to Hodgson's 'Symmetry and Humans'

Robert P. Burriss

Department of Anthropology, Carpenter Building, The Pennsylvania State University, PA 16802, USA (Email: rob [at] oraclelab.co.uk)

In his contribution to the *Antiquity* debate over the viability of Kohn and Mithen's 'Sexy Handaxe Theory' (1999), Hodgson (2009: 195-8) asserts that *'symmetry is not connected with health and thus cannot have served as a sign of genetic worth'*. Because I find his interpretation of the current literature on symmetry and its relationship to health and attractiveness to be flawed, I cannot accept Hodgson's argument. I address each of my concerns below in the first part of this response. I also remain unconvinced that, even if Hodgson's assertion were supported by the literature, it would necessarily follow that symmetry in manufactured objects, including Acheulean handaxes, cannot signal 'sexiness'. In the second part of my response I explain why I consider this to be so.

Symmetry, attractiveness and health

Developmental stressors, such as pathogenic infection, genetic homozygosity and environmental trauma, can result in deviations from perfect bilateral symmetry that are known as fluctuating asymmetries (Mealey *et al.* 1999). A person's symmetry may therefore honestly advertise their phenotypic health and genotypic quality, and this information may prove useful in a mate selection context (Grammer & Thornhill 1994). Although the link between fluctuating asymmetry (FA) and health remains controversial, there is a good deal of support for symmetry as a measure of quality. As Hodgson correctly states, several authors have demonstrated that facial FA is negatively correlated with perceived health in humans (Fink *et al.* 2006; Grammer & Thornhill 1994; Noor & Evans 2003). It is true that Rhodes *et al.* (2001b) did not show a link between FA and *actual* health, but their participants were young (17 years) and it is possible that the effects of certain developmental stressors do not manifest themselves fully until adulthood (Wilson & Manning 1996). It is well established that body FA is positively associated with the incidence of health problems such as low back pain and a number of genetic disorders (Al-Eisa *et al.* 2004; Milne *et al.* 2003; Thornhill & Møller 1997; Waynforth 1998), as well as with

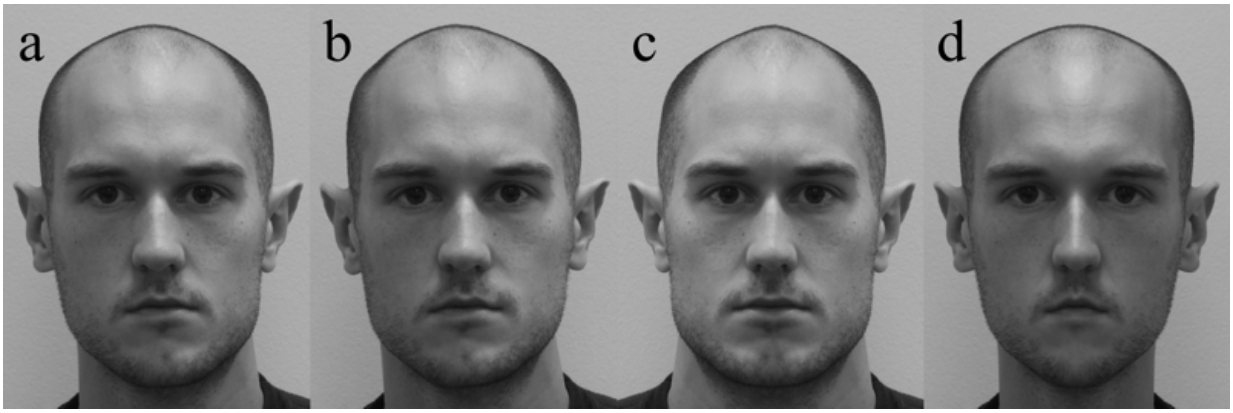

Figure 1: Two methods used to experimentally manipulate facial symmetry. (a) Original image. (b) Symmetrically remapped image, after Perrett *et al.* (1999). Note that asymmetries in pigmentation and shadow present in the original face remain. (c,d) Right-right and left-left chimæric faces similar to those used in earlier studies. Note the abnormalities in face shape that this technique produces.

measures of psychological, emotional and physiological stress (Shackelford & Larsen 1997), and is negatively related to IQ (Furlow *et al.* 1997). What's more, persons with less symmetrical faces and bodies tend to experience longer and more frequent respiratory infections (Thornhill & Gangestad 2006) and, in chimpanzees, facial FA is negatively associated with zookeeper assessments of physical and mental health (Sefcek & King 2007). Though I would agree with Hodgson that the link between facial (rather than body) FA and real (as opposed to perceived) health remains equivocal, on the whole I am unconvinced by his argument that symmetry is unlikely to be connected with health.

Hodgson makes the further assertion that facial symmetry may not be attractive. Here he is on discernibly shakier ground. Older studies that have demonstrated a preference for asymmetry (e.g. Kowner 1996; Langlois *et al.* 1994; Mealey *et al.* 1999) used chimæric ('mirrored') faces. Chimærae are now agreed to represent a suboptimal method of asymmetry manipulation. Figure 1 shows an unaltered facial photograph (a) and two chimæric images made from the left (c) and right (d) sides of the face, demonstrating that this method produces abnormalities in shape and pigmentation. These abnormalities become more pronounced as the asymmetry of the original face increases. This is because facial features such as the nose or mouth that are positioned asymmetrically with reference to the facial midline cannot be satisfactorily bisected. It is therefore unsurprising that in these earlier studies asymmetry was

preferred over symmetry. More recently, authors have used sophisticated computer graphics techniques to manipulate facial asymmetry, warping an image's RGB information to fit a symmetrically remapped shape (see Figure 1b). This method preserves asymmetries in pigmentation, shadow and hairstyle and produces no abnormalities in shape. Studies that have incorporated this method have overwhelmingly demonstrated that symmetry *is* attractive (Hume & Montgomerie 2001; Jones *et al.* 2001; Little *et al.* 2001; Perrett *et al.* 1999; Rhodes *et al.* 1998). This effect holds across cultures (Little *et al.* 2007a; Rhodes *et al.* 2001a) and species (Waitt & Little 2006). Hodgson also cites the work of Koehler *et al.* (2002), which suggests that the female preference for facial symmetry is unaffected by ovulatory cycle phase. Hodgson incorrectly states that Koehler *et al.* (2002) compared the responses of women *'nearing conception'* with those *'taking contraceptives'*, when in fact the comparison was between preferences expressed during the early and late follicular phase. Nevertheless, Koehler *et al.*'s (2002) methods may have been insensitive to the effects of cycle phase because progesterone, the hormone linked to cyclical shifts in preference for properties of the face (Jones *et al.* 2005a; Jones *et al.* 2005b; Rupp *et al.* In Press), voice (Puts 2005) and body odour (Garver-Apgar *et al.* 2008), does not vary in concentration over the follicular phase. More recent work has shown that women do indeed prefer symmetrical faces during periovulation as opposed to the luteal phase, the time during the cycle when progesterone is high (Little *et al.* 2007b).

There is strong evidence that symmetry is attractive, but how do we know that another trait that covaries with symmetry is not driving these preferences? As Hodgson points out, it is certainly true that the effects of symmetry may be confounded with those of averageness, given that an average face is by definition more likely to be symmetrical. But what is also true is that symmetry remains attractive even when controls are made for averageness (Jones *et al.* 2007; Rhodes *et al.* 1999). Symmetry is, therefore, an independent predictor of attractiveness.

I also wish to address Hodgson's suggestion that, because symmetry appears to be important in the directing of attention to objects of significance in the environment, preferences for symmetry in potential mates *'can more readily be explained by way of a perceptual bias rather than sexual selection'*. Here Hodgson overlooks the fact that the perceptual bias and evolutionary advantage accounts are not mutually exclusive. As Jones *et al.* (2007) point out, biases in the visual system that favour symmetry detection could be the proximate mechanism that underpins adaptive preferences for symmetrical and therefore healthy individuals. We also

know that preferences for facial symmetry can be disrupted by inverting faces (Little & Jones 2003). The perceptual bias view alone cannot explain this finding because both inverted and upright faces are bilaterally symmetrical and should therefore be equally preferred. That they are not supports the evolutionary advantage explanation.

The several signals of symmetry

After dismissing the link between symmetry and health, Hodgson goes on to argue that the degree of symmetry found in Acheulean handaxes may have resulted from a general preference for symmetry in the environment. On one level, I can understand the appeal of this explanation, and yet I find it difficult to conceive of such effort being expended in the knapping process simply to produce a product that is aesthetically pleasing; *'l'art pour l'art'* is a philosophy I doubt was shared by *Homo ergaster*. The idea that an individual might turn out many more handaxes than were necessary, merely in order to *'engender feelings of reassurance'* that their perceptual system was functioning correctly, also fails to ring true. Why not save oneself the effort and instead examine a naturally symmetrical leaf? Rather than conceiving of the pursuit of symmetry in handaxe design as autotelic, I favour the idea that, because symmetry is a difficult property to fake and is perceivably intentional (that is, to happen upon a symmetrical design by chance is unlikely), it is therefore the best advertisement of knapping skill. This skill is likely to have been associated, as Kohn and Mithen (1999) propose, with an individual's ability to secure food because it requires strength, patience and precision, all valuable characteristics in a hunter. We know that women value cues to hunting ability in modern hunter-gatherer populations (Apicella & Feinberg 2009), and a similar preference is likely to have obtained in the Pleistocene. This is why I do not consider it necessary to invoke a penchant for symmetry, whether stemming from perceptual bias or preferences for developmentally stable partners, to explain the value of symmetrical handaxes. Symmetry in a person is likely to signify health, whereas symmetry in a handaxe is likely to signify skill in its maker; both are potentially sexy properties that happen to have co-opted symmetry as an indicator because it is difficult to fake. If biological symmetry did not signal health or attractiveness, the fact that it takes skill to produce a symmetrical handaxe would persist.

Finally, I would like to briefly suggest that sexual selection for the manufacture and display of symmetrical handaxes could have operated not only via female choice but also by

male-male competition. Kohn and Mithen (1999) suggest that the manufacturing process itself must be observed in order for handaxe morphology to remain an honest signal. Machin (2008: 763) finds this argument problematic, pointing out that female bowerbirds do not observe males in the construction of bowers and yet bowers remain a powerful signal of male quality (Wojcieszek *et al.* 2007). I also have difficulty accepting Kohn and Mithen's argument in this case, but I find in the example of the bowerbird support for the idea that a difficult-to-manufacture object can retain its signalling power even when its production goes unobserved. As Machin points out, male bowerbirds steal from and destroy one another's bowers, but far from this lessening the impact of the signal it has been suggested that females use bower quality to assess not only vigour (building ability) but also dominance (Borgia 1995). The same may have been true of handaxes if the display of a well-made example signalled dominance, not only to women but to other men. The modern equivalent might be mobile phones, which men are known to display more prominently when the ratio of men to women in their immediate social environment increases (Lycett & Dunbar 2000). I find it entirely plausible that symmetrical handaxes may also have had a secondary function as a 'lekking device'.

Conclusion

Hodgson's (2009) argument that physiological symmetry is not connected with health or attractiveness is not only unsupported by the literature but is also irrelevant to the debate. At present I agree with Mithen's (2008: 766) assessment that the 'Sexy Handaxe Theory' remains the most parsimonious and complete explanation for the level of symmetry evident in Acheulean handaxes, as well as their various characteristics of dispersion, persistence and morphology.

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