The Secrets of Faces*

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The human face is a bewildering source of information and admiration, and our abilities to read and remember faces and facial expressions are extraordinarily developed[1]. How faces and our recognition skills have co-evolved, and what information a face can convey, offer many avenues for scientific study.

One thing faces can tell us is the sex of the person. Although there are only two sexes, we experience many degrees of femininity and masculinity. Perrett and colleagues, reporting on page XXX of this issue[2], asked human subjects what these differences mean. They manipulated photographs of human faces by enhancing or diminishing differences between the sexes, then they let the subjects rate these manipulated images. The images were produced by first defining a number of reference points such as the location of eyebrows, lips, nose, and so on. The position of these points differs in male and female faces, and these differences can be enhanced with computer graphics. For instance, males have bigger jaws than females. So, by increasing the size of the jaws a more extreme male face is obtained. The authors produced images in which faces varied from feminine to masculine, in this sense, based on the faces of people from Scotland and Japan.

In four experiments human subjects (men and women from both Japan and Scotland) were asked to give their opinion about the images with respect to attractiveness, as well as personality traits such as honesty, intelligence and dominance. Female faces were generally judged more attractive when they were made more feminine. In contrast, and surprisingly, slightly feminised male faces were preferred over original and more masculine faces. Generally, the Japanese and Scottish subjects agreed in their judgements, with one interesting variation — both groups preferred more exaggeration in faces of their own nationality than in faces of the other country.

When both male and female faces were feminised, subjects rated the person behind the face more honest, cooperative and emotional. But the result was mixed regarding parental abilities. Whereas the feminised male was rated the better father, the average female was rated a better mother than the feminised

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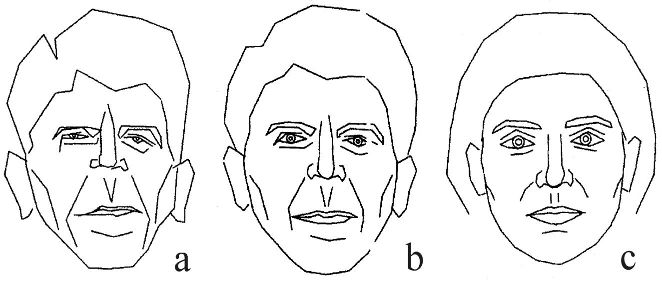

Figure 1: Face to face — three faces showing different features. The supernormal caricature fo Ronald Reagan (a), produced by Susan Brennan's caricature generator, exaggerates features that are particular to Reagan's face (b), in relation to an average face (c). It is very difficult to give any biological significance to the "Reagan-ness" of these faces, suggesting that principles of recognition are important in the evolution of signals. Reproduced with permission of Susan E. Brennan, State University of New York at Stony Brook.

female. More masculine faces were thought to be more dominant and older, but judgement of intelligence did not depend on masculine or feminine appearance.

Based on these results, Perrett *et al.* suggest that if a female chooses a male with feminine characteristics, she may get a more honest and cooperative partner who is a better father to her children. The authors also suggest that this might have limited the degree to which male and female faces differ in humans (sexual dimorphism). But masculinity may be an advantage in social competition and dominance — this might explain why male faces do not exactly match female preferences.

Perrett and colleagues have dealt with a classical subject, dating back to Darwin's theory of sexual selection[3–5], that is still not satisfactorily resolved. Why do sexual signals look the way they do, and what information do they convey? According to one opinion (favoured in the article) sexual signals convey important information about the quality of a partner[4]. All aspects of the signal serve this function. This view holds that, during evolution, signals that are reliable cues for fertility, genetic quality (yielding high-quality offspring) and parental abilities have evolved. Males and females have evolved to respond accurately to these cues in partner choice.

A different opinion is that factors related to the transmission and recognition of signals are important for the evolution of signals[5,6]. According to this theory, biases in the sense organs or nervous system influence how we perceive and react to signals. So, sexual signals may just signal sex — the fact that we find some faces more attractive than others may be a by-product of recognition and may not be linked to partner quality. For instance, it is well known that by altering specific aspects of a familiar stimulus supernormal effects (stronger reactions) can usually be produced, even when the new stimulus does not provide the receiver with more information.

As an example of this second view, Fig. 1 shows an average face, a faithful portrait of the former President of the United States, Ronald Reagan, and a caricature of him[8]. The caricature has been produced by an algorithm similar to that used by Perrett and colleagues, enhancing the differences between the average face and the face of Ronald Reagan. This caricature clearly captures and enhances some "Reagan-ness" from the original portrait. But it is very difficult to ascribe a biological value to such a quality or to argue that we have evolved a Reagan-ness detector.

Thus, before we can distinguish between these two theories, we need to learn more. Studies of faces may provide an excellent testing ground for this. Perhaps the final outcome will be a little of both — some aspects of sexual signals will be informative about partner quality and others will not. But it is not enough to know what is preferred. We need to find out whether the emotions that faces evoke really do reveal qualities such as parental or social abilities, and we also need to know more about recognition.

This paper is available as electronic text at:
`http://rerumnatura.zool.su.se/stefano/biology.html`
`http://cogprints.soton.ac.uk`

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