

The science of attraction

'BEAUTY', the philosopher David Hume declared in the mid-18th century, 'is no quality in things themselves; it exists merely in the mind that contemplates them; and each mind perceives a different beauty.' Since then, the idea that beauty is in the eye of the beholder – that standards of attractiveness are arbitrarily defined and rapidly changing – has become the dominant view in much of philosophy, art, science and history.

Driven by evolutionary theory, however, many psychologists have argued that there are certain physical features of the body and face that are found attractive across all individuals and cultures. The same is true across the animal kingdom, with most non-human species relying on external factors such as the sizes, shapes and colour of adornments to attract mates. Darwin, for example, reasoned that the peacock's tail could only have evolved if it conferred an advantage on the animal in terms of mating, which could compensate for the lowered survival probability under natural selection. Similarly with humans, evolutionary psychologists have argued that the attractiveness of individuals is directly linked to their value as procreative mates (Buss, 1999). Within this tradition, humans are said to select mates that will enhance their reproductive success, and there has been a concurrent emphasis on the importance of certain species-typical features.

Thus, if the markers of fecundity are known, they may become agreed criteria of attractiveness in all cultures. Hence we can develop and test theories in the new science of attractiveness. Much of this work has converged on facial attractiveness, with research suggesting little variation in preferences of beauty across cultures (Perrett & Little, 2002; see tinyurl.com/br5eh). In recent years, however, attention has focused on the female body (mainly because of the link with fertility), with researchers identifying two potentially critical cues for attractiveness: body shape and weight scaled for height, or the body mass index



VIREN SWAMI and ADRIAN FURNHAM go in search of cultural universals.

(BMI). This article looks at the contributions of both variables to female physical attractiveness.

Body shape

In a series of studies conducted in the early 1990s, Singh (e.g. 1993) identified a particular bodily feature that he claimed reliably conveys information about female mate value. The waist-to-hip ratio (WHR) refers to fat distribution regulated by sex hormones (testosterone in men, oestrogen in women) that primarily sculpt typical body shape differences. Before puberty, body shape is more or less similar for both men and women; after puberty, however, women have greater amounts of body fat deposited in the lower part of the body. This engenders what is known as gynoid fat distribution, whereas men have greater amounts of fat in the upper body, or what is known as android fat distribution. Women typically maintain a lower WHR than men throughout adulthood, and it is this difference in fat distribution that engenders a noticeable and typical sex difference. In short, it gives women their 'curves' or hour-glass figure.

Singh also made the point that the WHR reliably signals hormonal status, susceptibility to endocrinological disorders and, most importantly, fertility. In particular, a low WHR (typically 0.7) is said to confer advantages over a high WHR (0.9 and above) in terms of health and fertility, thus reinforcing the evolutionary assumption that this feature of the female body conveys information about mate value. In support of this thesis, Singh (1993, 1994) developed a set of line drawings with which he amassed evidence for an evolved male preference for a low

WHR (typically 0.7). This ratio happens to correspond closely to the measurements of supermodels of various sizes, like Anna Nicole Smith (0.69), Kate Moss (0.66) and Cindy Crawford (0.69).

Although this research is typically framed in terms of the comparison of low to high WHR, most authors suggest a specific preference for a WHR of 0.7. Burnham and Phelan (2000), for example, write: 'Although subconscious, there's something about that 0.7 that only a gene could love.' Singh's line-drawing studies have been replicated in a number of countries (e.g. Furnham *et al.*, 1997; Henss, 1995), and Singh (1993, p.304)

himself argued that the WHR 'acts as a wide first-pass filter, which would automatically exclude women who are unhealthy or who have a low reproductive capacity'. It is only after this 'culturally invariant' filter is passed that other features such as the face, skin, or weight (which may vary between cultures) become utilised in final mate selection.

The problem with Singh's line drawings is that they lack ecological validity (Tassinari & Hansen, 1998). Line drawing stimuli are often impoverished and unrealistic, relying on a single original image from which modifications are made. Henss (2000) attempted to overcome this problem by using photographs of different women with computer-altered WHR. For each photograph, two versions of the WHR were created using morphing techniques – in one picture, the waist was tightened and in the other it was widened. Using these revised techniques, Henss found support for Singh's contention that the WHR is an essential attribute of the attractiveness of the female figure. Whether line drawings or morphed photographs are used, females with a low WHR of about 0.7 seem to be judged as most attractive.

Body weight

But not everyone is in agreement that WHR acts as a first-pass filter for female attractiveness. Using a new set of line

drawings, Tassinari and Hansen (1998) found the weight of the figure to be a more potent factor than the WHR. Streeter and McBurney (2003) are also quick to point out that the WHR effect is only evident when body weight is controlled; when both WHR and body weight are manipulated, it is evident that weight accounts for more variance than WHR. Other studies have shown that participants prefer figures that have a WHR around 0.7, but as body size increases, larger WHRs tend to be preferred (Forestell *et al.*, 2004). In addition, when photographs of women with WHR manipulated either by hip or waist changes are used, attractiveness seems to be more influenced by changes in waist than hip size (Rozmus-Wrzesinska & Pawlowski, 2005).

Importantly, Martin Tovée and his colleagues (e.g. Tovée & Cornelissen, 2001; Tovée *et al.*, 1999) have criticised the assumption held by WHR researchers that the body weight of figures is held constant when narrowing the waist. When the figures are modified by altering the width of the torso around the waist, this not only alters the WHR, but also apparent body mass index (BMI). As the value of WHR rises, so does that of apparent BMI, and so it is not possible to say whether changes in attractiveness ratings are made on the basis of WHR or BMI, or both. This error is intrinsic to most studies that have used line drawings.

To investigate the relative importance of BMI and WHR in the perception of female attractiveness, Tovée and his colleagues (1999) used images of real women in a standard pose and distance from view. By using images of real women, both BMI and WHR were known precisely, and their effects on attractiveness ratings could be estimated separately. A further advantage of these stimuli was the fact that the heads of the women were obscured, so that facial attractiveness (and racial cues) would not be a factor in the observers' ratings. Regressions of attractiveness ratings for these images suggest that although both WHR and BMI are significant predictors of female attractiveness, BMI is a far more important factor than WHR. BMI in these studies account for more than 70 per cent of the variance, whereas WHR accounts for little more than 2 per cent. These results also hold when women are presented in profile, using computer-generated photographic stimuli and using three-dimensional images (e.g. Fan *et al.*, 2004).

The finding that BMI may be the primary determinant of female attractiveness is consistent with the fact that successful female fashion and glamour models all fall within a narrow BMI range (Tovée *et al.*, 1997). There are advantages to using BMI as a basis for mate selection, as BMI is strongly correlated with female health (e.g. Manson *et al.*, 1995) and reproductive potential (e.g. Lake *et al.*, 1997).

Perhaps, then, a 'hierarchy of cues' is used in partner selection. Features such as the WHR may be used to discriminate between broad categories, such as male from female or pregnant from non-pregnant. Discriminating within the category of potential partners, men may use such cues as BMI and then other cues such as the proportions of the body to discriminate between women of very similar BMI. Evolutionary theory suggests that attractiveness is determined by cues linked with fecundity and that BMI and WHR are both important. However, there are other 'third filter' cues, such as skin quality.

Attractiveness across cultures

A further problem for WHR research is that cross-cultural replications have not generally supported the notion that there is a universal preference for low WHRs. Although preferences for a low WHR have been found in a number of countries, all these studies were carried out in industrial societies (Swami & Tovée, 2005). What is clear from the literature is that cultures differ widely in their attitudes toward such things as obesity and body shape (Furnham & Alibhai, 1983).

Recently, Wetsman and Marlowe (1999) elicited preferences from a hunter-gatherer tribe called the Hadza, in Tanzania, who subsist almost exclusively from foraging wild foods. They found that the size of the WHR does not affect judgements of attractiveness. Instead, the Hadza prefer heavy over medium and medium over lightweight line drawings when selecting for attractiveness, health and desirability as a wife, regardless of WHR. Marlowe and Wetsman (2001) recently returned to Tanzania with a new set of line drawings in which only the WHR was varied. With no weight variation, Hadza men preferred high WHRs, which the authors argue is nevertheless an artefact of the preference for heavier women.

These results are strikingly similar to

that of a previous study conducted among the isolated Matsigenka of southern Peru (Yu & Shepard, 1998). They tested three groups of the same population, differing in their degree of contact (and, therefore, their degree of 'Westernisation'). The least Westernised group, like the Hadza, ranked figures first by weight (high preferred to low) and then high WHR over low WHR, once again opposing findings from industrialised societies. The second, moderately Westernised group differed in that they rated low WHR females as being more attractive and more desirable as spouses, but not more healthy. The third and most Westernised group (first contacted 20 to 30 years previously) did not differ from male participants in the US. For Wetsman and Marlowe (1999) this conclusion suggested to them that a first-pass filter would consist of partner preferences based on body weight. Individuals in environments where food scarcity is a constant threat might make mate choice decisions based solely on the weight of a potential partner. The influence of WHR may only become relevant when food resources are plentiful enough that the risk of women's starvation during pregnancy and lactation is minimal, thereby acting as a second-pass filter.

Explaining cross-cultural differences

Tovée and Cornelissen (2001) have argued that the reported difference in preferences for WHR across culture may instead be based on BMI. Combined with the argument that WHR and body weight are confounded in line drawings, they suggest that the same ideal BMI should not be expected for all ethnic groups and environments. Epidemiological evidence

Cindy Crawford – WHR 0.69

suggests that different ethnic populations may have differing risk for negative health consequences with changing BMI (e.g. Kopelman, 2000), and so there may be a different optimal BMI for health and longevity in different racial groups.

As a consequence, there will be a preferred optimal BMI for each group, which will balance environmental and health factors, but this optimal BMI may differ between groups and environments. This is reflected in the observation that in economically poor societies a high BMI is regarded as attractive whereas the opposite is true in wealthy societies. Thus, while some cultures attempt to 'fatten up' young women to make them more desirable mates, other attempt 'radical slimming' to achieve the same end.

A series of recent studies sought to test this hypothesis by examining preferences for female attractiveness in different cross-cultural settings (e.g. Knight *et al.*, 2004; Swami, Caprario *et al.*, 2006). Swami and Tovée (in press), for example, examined preferences for female attractiveness along a socio-economic gradient in Malaysia and Britain, from rural to semi-urban to urban. Their results show that, regardless of the cultural setting, BMI is the primary predictor of physical attractiveness, whereas WHR failed to emerge as a strong factor. The authors also found that preference for physical attractiveness varied with socio-economic status, with

rural observers preferring larger figures than semi-urban observers, who in turn preferred larger figures than urban observers.

To test Tovée and Cornelissen's (2001) hypothesis that the same ideal BMI should not be expected for all groups, this study also examined people of different racial origin from the same environment (Malay, Chinese and Indian in Kuala Lumpur). Studies have indicated that ethnic Malays, Chinese and Indians in Southeast Asia have different optimal BMIs for risk factors for morbidity and mortality (e.g. Deurenberg *et al.*, 2002), which would suggest that these ethnic groups should have different preferences for body weight. However, this was not the case: Malays, Chinese and Indians in Kuala Lumpur all have a similar preference for slender figures, lending credence to the view that physical attractiveness may be linked less to ethnicity than to modernity or socio-economic status. Elsewhere, this group of researchers have shown that attractiveness preferences can be modified, as attested by the changing preferences of migrants. For example, in Swami, Tovée *et al.* (in press) we reported significant changes in the attractiveness preferences of South African Zulus who had moved to Britain, showing that attractiveness preferences are malleable, and can change with exposure to different environments

A symptom of resource scarcity

The finding that preference for body weight varies according to socio-economic status is in line with earlier ethnographic reports (e.g. Brewis & McGarvey, 2000). Until recently, this pattern linking resource availability (as indicated by socio-economic status) and female body weight lacked an obvious psychological mechanism. Nelson and Morrison (2005), however, proposed an explanation based on the situational influence of environmental conditions, which does not require the invoking of any evolved mechanism. They argue that the affective and physiological states associated with the resources available to an individual provide implicit information about collective resource availability, and that this information then plays a role in the construction of preferences.

In a series of imaginative studies, Nelson and Morrison (2005) tested this hypothesis by manipulating people's

DISCUSS AND DEBATE

Is facial attractiveness a separate entity, or does it interact with or influence bodily attractiveness?

BMI and WHR are both static measures of bodily attractiveness. Does body motion affect attractiveness?

What role does behaviour/personality play in physical attractiveness?

Is beauty merely skin deep?

What is driving the contemporary obsession with being thin, especially among young women?

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financial satisfaction or hunger (both these being proxies for personal resources in industrialised societies) and measuring their preferences for potential romantic partners. Their studies confirmed that financially dissatisfied and hungry men preferred a heavier mate than did financially satisfied men or satiated men respectively. We have since confirmed the finding by manipulating hunger using photographic stimuli, with hungrier men preferring larger figures than satiated men (Swami & Tovée, in press).

These studies provide evidence that temporary affective states can produce individual variation in mate preferences that mirrors patterns of cultural differences. In this sense, ratings of attractiveness vary over time. The mood or state of the rater can subtly but significantly influence his or her ratings of the physical attractiveness of a possible mate. This helps explain why preferences for body weight should vary according to socio-economic status, as individual preferences depend on situational feelings of resource scarcity. In rural contexts, where resource scarcity is more likely to be prevalent, affective and physiological states associated with individual-level resource availability provide implicit information about collective resource availability, and this information then plays a role in the construction of preferences for a heavier body weight. This hypothesis appears to have firm grounding in the psychological literature: feelings not only often serve as 'information' about the environment, but can also influence behaviour without the engagement of complex cognitive processes.

Biology as destiny

Evolutionary theory has proved to be a powerful theoretical tool in exploring female bodily attractiveness. Slogans like 'biology is destiny' have been used by both supporters and critics of evolutionary theory, which always attracts both philosophic and socio-political criticism. Certainly, some aspects of attractiveness

seem to be ingrained in our biology: characteristics associated with evolutionary advantages (e.g. a low WHR) seem to be perceived as attractive.

The cross-disciplinary research in this area has led to the beginning of a new science of attractiveness, and has had implications for our understanding of body image and eating disorders. Through experimental studies we are beginning to

understand how, when and why beauty is not only in the eye of the beholder, but can also be determined in the facial and bodily characteristics of human beings.

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NEXT MONTH

Look out for another article by Viren Swami and Adrian Furnham, this time in collaboration with a computer scientist offering a new way of investigating attractiveness and related psychological areas.