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Why Do the Karo Batak Prefer Women with Big Feet?

Flexible Mate Preferences and the Notion That One Size Fits All

Geoff Kushnick

Abstract Men may find women with small feet relative to body size more attractive because foot size reliably indexes nubility—i.e., age and parity. I collected judgments of attractiveness in response to drawings of women with varying foot sizes from a sample of 159 Karo Batak respondents from North Sumatra, Indonesia, as part of a collaborative project on foot size and attractiveness. The data revealed a contrarian preference among the Karo Batak for women with big feet. The judgments were compared with the results of an existing cross-cultural study that found a preference for women with small feet in aggregate, but a mix of small- and large-foot preferences in the societies taken individually. Using contingency table analysis, I found that ecology and less exposure to Western media were associated with a preference for women with big feet; patriarchal values were not. The findings suggest that human mating preferences may arise in response to local ecological conditions, and may persist and spread via cultural transmission. This has implications for the concept of universality espoused in some versions of evolutionary psychology.

Keywords Mating preferences · Evolutionary psychology · Universality · Karo Batak

Men might prefer women with smaller feet because they reliably index age and parity, two important components of female reproductive potential (Barber 1995; Symons 1995). Fessler et al. (2005b) found support for this hypothesis in a study of nine countries where, in aggregate, people found drawings of women with small feet the most attractive and drawings of big feet the most unattractive. I collected judgments among the Karo Batak—a group of Indonesian agriculturalists—to add to a collaborative study of foot size and attractiveness (Fessler et al. 2012). Because the data I collected revealed a preference running counter to the prediction that women with

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small feet should be judged most attractive, I set off to reanalyze the data from Fessler et al. (2005b) with the new data from Indonesia (Kushnick 2010a). The purpose of my study is to explore potential explanations for the contrarian mate preferences of the Karo Batak. In light of my results, I examine issues related to the evolution of flexible mating preferences and the concept of universality in evolutionary psychology.

Sex-specific fitness consequences of mate choice may have led to the evolution of differences in the criteria by which human males and females judge attractiveness (Barber 1995; Buss 1994; Geary et al. 2004; Shackelford et al. 2005; Symons 1979, 1995). For example, it appears to be universal that females put relatively more weight on mating with males with greater social status, and males put relatively more weight on the attractiveness of potential female partners (Shackelford et al. 2005; Buss 1989). The emphasis on female attractiveness makes sense because there would have been strong selection on males to choose nubile (i.e., young and nulliparous) females—those with greater reproductive potential and fewer offspring sired by other males to compete for parental care (Symons 1995). Because nubility is not directly observable, males are selected to judge attractiveness based on cues that provide reliable indexes of this quality, such as an hourglass figure or smooth skin.

Barber (1995) identified feet as another potential index of nubility because they provide reliable information about both age and parity. As a woman ages and bears children, the size of her foot increases. Fessler et al. (2005a) argue that sexual dimorphism in foot size (relative to stature) suggests that intersexual selection has shaped this trait, especially given that regular natural selection should have favored larger feet in women due to the fitness risks of falling during pregnancy. Fessler et al. (2005b) tested this hypothesis with data from nine societies. He and his colleagues asked participants from nine societies which line drawings of an individual with varying foot size (five variants shown in random order) were most and least attractive. The design was 2×2, in that both male and female respondents were asked to judge both male and female images with foot size manipulated. In aggregate, both sets of respondents showed a preference for women with small feet and men with intermediate-sized feet, as predicted. In my reanalyses, I consider only judgments of female images.

Methods

In 2009, I collected data on judgments of attractiveness among the Karo Batak of North Sumatra, Indonesia, to add to the growing dataset being used to test the idea that foot size plays a role in mate choice. The Karo are one of six "Batak" groups from North Sumatra. Karo Batak culture and society have changed considerably over the past 150 years under missionary, colonial, and national pressures (Singarimbun 1975). For instance, they have changed from a reliance on shifting cultivation to a more intensive blend of subsistence and cash-cropping. The majority of Karo Batak people have abandoned their traditional animistic beliefs and have converted to Christianity. Despite these changes, some aspects of Karo Batak lifeways have gone unchanged. For instance, their strong patrilineality remains intact, as does many aspects of their ritual life and their use of Bahasa Karo to converse on a day-to-day

basis. Today, as in the past, Karo people live in ethnically homogeneous villages scattered across the highland plateau and its escarpment that are, together, known as Tanah Karo. There is some limitation of fertility—probably to conserve scarce landholdings under a pattern of equitable inheritance to sons—yet fertility rates are still moderately high: around four live births per woman (Kushnick 2010b).

Participants (n=159) were Karo Batak adults from two villages: Doulu (3°13′ 21″N, 98°32′3″E) and Laubuluh (3°10′50″N, 98°16′12″E). Participants ranged from 19 to 90 years of age; the mean age of a participant was 40.2. The number of males and females was nearly equal. Participants were only included in the study after they provided informed consent (using procedures approved by the IRB board at the University of Washington). The materials used in the study were a series of five images of a woman that varied only in foot size (−12%, −6%, baseline, +6%, +12%). The respondent was presented the full array of female images, arranged in random order, and asked to identify the most- and least-attractive individual. The interviews were done semi-privately in or near the office of the village head (*kepala desa*). Judgments were made by pointing to the pictures so onlookers would not hear the participant's choice. Raw data on participant judgments is included in the online supplement [ESM]. The participants were not told that the images varied in foot size (though some participants noted this, others seemed completely unaware). Finally, participants were asked their age and they were paid 5,000rp (approximately U.S. $0.65) for their time. Fessler et al. (2005b) used the same procedures except for the details of the respondent payments and the images used as stimuli. Both sets of images varied as described above, but the actual drawings were different (Fig. 1). Both were created with cross-cultural testing in mind. Clothing is modest and generic; ethnicity is ambiguous (Fessler et al. 2005b, 2012).

Results

Comparison with Aggregate Sample

The Karo Batak judgments revealed a striking preference for the images of women with big feet. As shown in Table 1 and Fig. 2, the results were almost a mirror image of the aggregate data from Fessler et al. (2005a). The mean most attractive image among the Karo Batak was larger than the baseline (+0%) image; in the other study it was smaller. The mean least attractive image among the Karo Batak was smaller than the baseline image; in the other study it was larger. Following, Fessler et al. (2005b), all of these comparisons were made using judgments from both male and female respondents. Although this was not ideal, it was justifiable because male-only judgments did not differ statistically from the male-female combined judgments, and because the analyses done here are based on average judgments and not their variance.

Comparison with Disaggregated Sample

Are the Karo Batak really that different, and if so, why? To answer the first part, it will be useful to compare the Karo Batak results with those of Fessler et al. (2005b),

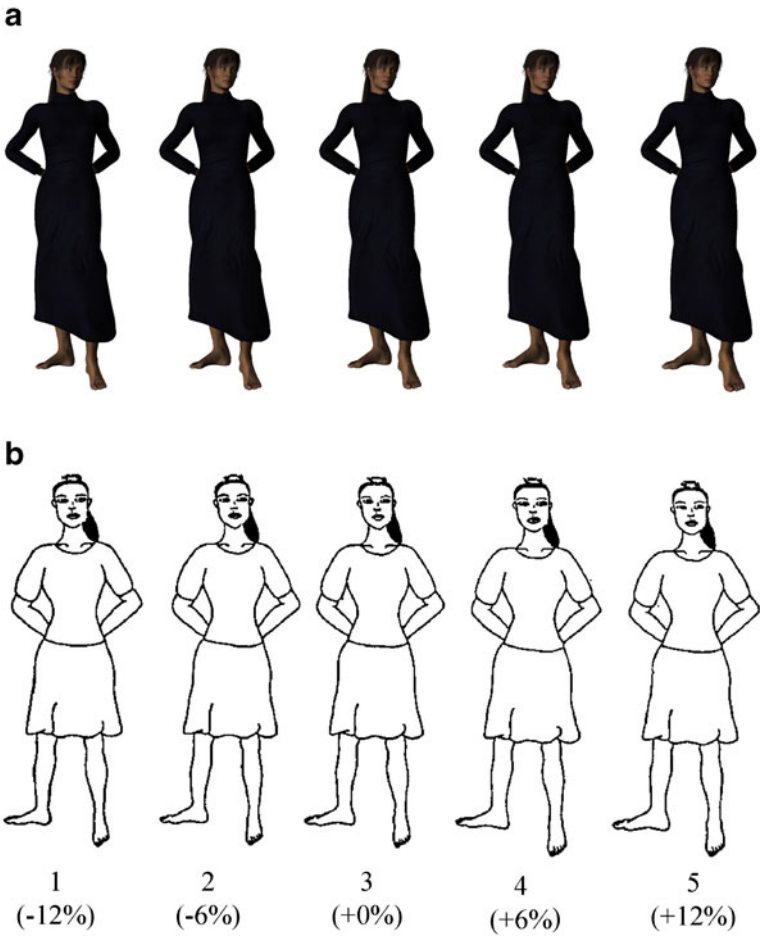

Fig. 1 Stimuli: **a** is from this study; **b** is the original. The former is reprinted from Fessler et al. 2012:150, with permission from Elsevier. The latter is reprinted from Fessler et al. 2005b: Fig. 1, with permission from Springer Science+Business Media

disaggregated by population (locale). The preferences of each population are summarized in Fig. 3, where the mean of the following measure is plotted: the individual-level most attractive minus least attractive female drawing. Clearly the Karo Batak are not unique, since three other populations (those with positive values) appear to share their preference for women with big feet. But why do the preferences of those four societies run counter to the others, and to the seemingly reasonable evolutionary hypothesis that all men in all societies should find women with smaller feet attractive? To examine alternative explanations for cross-cultural variation in foot-size preferences, the populations were rated along the following lines, all potentially related to mate choice and perceptions of opposite-sex attractiveness: presence of strong patriarchal values,

Table 1 Comparison of responses from Karo Batak and from Fessler et al. 2005b

	Karo Batak	Fessler et al. 2005b
All respondents		
Modal most attractive	+12%	−12%
Modal least attractive	−12%	+12%
Mean most attractive (SD)	3.23 (1.38)	2.86 (1.45)
Mean least attractive (SD)	2.93 (1.49)	3.38 (1.44)
Male respondents only		
Mean most attractive (SD)	3.25 (1.34)	2.85 (1.43)
Mean least attractive (SD)	2.89 (1.53)	3.31 (1.46)

rural or urban environment, and exposure to Western media. These ratings were based on my own knowledge of Karo Batak society and the brief society descriptions written by the site researchers in Fessler et al. (2005b). The data are summarized in Table 2.

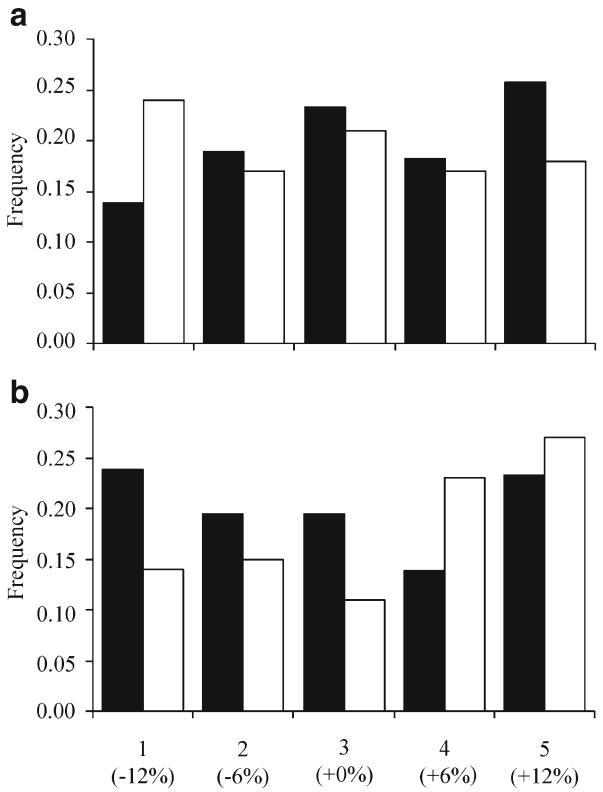

Fig. 2 Proportion of judgments of (**a**) most and (**b**) least attractive female images in each of the categories from largest, +12%, to smallest, −12%, among the Karo Batak (*black bars*) and Fessler et al. 's (2005b) cross-cultural sample (*white bars*)

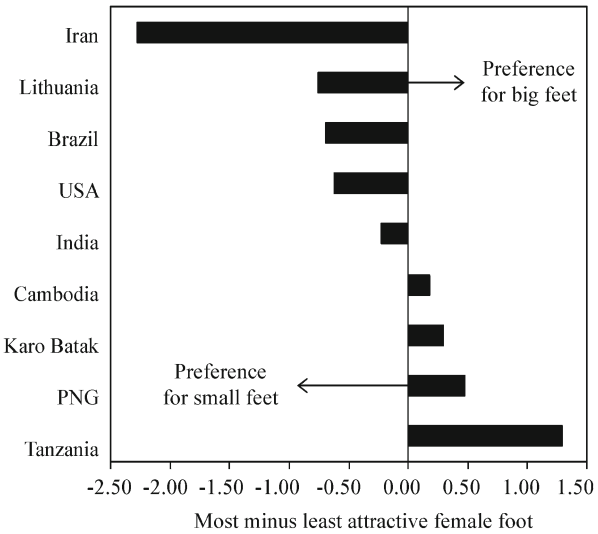

Fig. 3 Mean values for most minus least attractive female foot (negative values indicate a preference for women with small feet; positive values a preference for big feet). Note that the Russian sample is excluded because judgments of least attractive images were not collected (Fessler et al. 2005b)

Patriarchal Values One possibility is that a preference for small feet is a product of patriarchal values. Take, for example, the Chinese practice of footbinding, in which the female foot was molded from childhood into a tiny malformed appendage. Although some believe the practice emerged as a by-product of an aesthetic and erotic preference for small feet (Levy 1966; cf. Gates 2008), a number of lines of evidence support an explanation centering on male control over female sexuality. First, the practice arose at some time after AD 960 during the Sung Dynasty, concomitant with a decrease in female status (Ebrey 1991). Second, there is some convergence on a cloistering explanation in the historical and theoretical literatures (Dickemann 1981; Ebrey 1991). Among the societies considered here, the association

Table 2 Societies used in disaggregated analyses. Note that the Russian sample is excluded because judgments of least-attractive images were not collected (Fessler et al. 2005b)

Population	Sample size	Foot preference	Strong patriarchal values?	Rural/ Urban	Exposure to Western media
Iran	36	Small	Yes	Urban	High
India	47	Small	Yes	Urban	High
Lithuania	102	Small	No	Urban	High
Brazil	48	Small	No	Urban	High
USA	150	Small	No	Urban	High
Cambodia	50	Large	No	Urban	Low
Tanzania (Pimbwe)	29	Large	Yes	Rural	Low
PNG (Sursurunga)	32	Large	No	Rural	Low
Indonesia (Karo Batak)	159	Large	Yes	Rural	Low

between strong patriarchal values and a preference for small feet is found in Iran and India. The Karo Batak, however, run counter to prediction—large feet are preferred despite patriarchal values, such as the lack of entitlement to land inheritance (Kushnick 2010b). In the sample as a whole, 2 of 5 societies with a preference for small feet, and 2 of 4 with a preference for large feet, were characterized by patriarchal values. The null hypothesis that foot-size preferences were independent of patriarchal values, thus, could not be rejected (Fisher's exact test: $p=0.643$).

Ecological Context Another possibility is that foot-size preferences are shaped by local ecology. For instance, Wetsman and Marlowe (1999) found that the Hadza find plump women the most attractive with little regard for waist-to-hip ratio (WHR), despite the finding in a wide range of societies that a slender woman with a WHR of 0.7 was the most attractive. They interpret this as an adaptive result of living in a remote environment with relatively poor resource access (Marlowe 2004; Marlowe and Wetsman 2001; Wetsman and Marlowe 1999; cf. Dixson et al. 2010). Swami and Tovee (2007) found that mate preferences could be adjusted facultatively to environmental variation. The relationship between ecological context and foot-size preferences was strong among the societies considered here. All of the societies with a preference for small feet were urban; 3 out of 4 with a preference for large feet were rural. Hence, the null hypothesis that foot-size preferences were independent of ecological context could be rejected (Fisher's exact test: $p=0.048$).

Media Exposure The final possibility explored here is that foot-size preferences are shaped by the amount of contact a society has had with Western media, which constantly portrays exaggerated (and perhaps historically specific) ideals of beauty. A number of studies have shown that Western media exposure affects perceptions of attractiveness, especially as it relates to ideals of body size and shape. Although body shape (i.e., WHR) appears to play a role in ratings of attractiveness in a wide range of societies, those with less exposure to Western media appear to be more concerned with overall body size rather than shape. Yu and Shepard (1998) found that Machiguenga with more exposure to Western media paid more attention to body shape and those with less exposure paid more attention to body size. Swami et al. (2011) found that exposure to Western media affected judgments of attractiveness in Bali and Lombok (Indonesia), and England. Of the potential explanations for the contrarian foot-size preferences of the Karo Batak, exposure to Western media was the strongest. All of the societies considered here that had relatively high exposure exhibited a preference for small feet; all of the societies with relatively low exposure preferred big feet. The null hypothesis that foot-size preferences were independent of media exposure could therefore be rejected (Fisher's exact test: $p=0.008$).

Discussion

The Karo Batak showed a marked preference for women with large feet, and when taken together with the disaggregated cross-cultural sample from Fessler et al. (2005b), there was a statistically significant tendency for rural societies and those with less exposure to Western media to exhibit a similar preference. The results

contradict the hypothesis that a preference for small feet should be found cross-culturally, adding to the evidence challenging the notion of universality espoused in some forms of evolutionary psychology (Wetsman and Marlowe 1999; Marlowe and Wetsman 2001; Sear and Marlowe 2009; Yu and Shepard 1998). Universality is central to many early evolutionary psychology writings on mate choice (e.g., Buss 1989; Singh 1993; Symons 1995) and has given shape to the hypothesis that mating preferences should be the same in all cultures. Although objections to these claims of observed universal mate-choice criteria have been made on the basis that small-scale societies have been underrepresented, studies that have included them have found a lack of universality for waist-to-hip ratio preferences but support for the prediction that, relative to the opposite sex, males will value attractiveness and females will value resource access (Gottschall et al. 2004; Pillsworth 2008).

Cross-cultural studies have long been viewed as a means of identifying "universal" features of human psychology, as preferences and behaviors that recur in diverse socioecological contexts are consistent with the notion that all humans share a set of psychological adaptations originating in our hunter-gatherer past (Gaulin 1997; Norenzayan and Heine 2005; Brown 1991). A fair proportion of researchers in the field today view universality as a hypothesis and recognize that cross-cultural similarities can arise not only from a universal set of biological mechanisms but also from a shared cultural history or convergent cultural evolution (for a useful discussion of universality as a hypothesis, see Fessler and Machery 2012). Nonetheless, universality is still thought to be an assumption of evolutionary psychology as viewed from the outside (Laland and Brown 2011; Buller 2006). Some evolutionary psychologists share this view. Swami and Furnham (2007), for instance, characterize evolutionary psychology as having a number of "core commitments"—universality is the fifth. Further, whereas early studies in the evolutionary psychology of mate preferences used cross-cultural methodologies to test explicit hypotheses about the universality of mate preferences (e.g., Buss 1989), in many studies, including Fessler et al.'s (2005b) study of foot-size preferences, the hypothesis is implicit.

To be fair, many early and foundational writings in evolutionary psychology (Tooby and Cosmides 1989a, b, 1992) and more recent applications to human mate choice (Gangestad et al. 2006; Sefcek et al. 2006; Sugiyama 2004) have hypothesized that an evolved universal "human nature" could produce facultative behavioral responses based on environmental inputs. This approach, however, may undervalue the power of cultural transmission and general-purpose cognitive mechanisms for shaping human adaptive responses to novel environments (i.e., those that our ancestors would not have faced in the environment of evolutionary adaptedness). In other words, although standard evolutionary psychology recognizes that the cognitive mechanisms responsible for producing human behavior would have been shaped by natural selection to respond in adaptive ways to environmental contingencies of past environments, it does little to accommodate adaptation to recent environments via biological and cultural evolution (but see Little et al. 2011). This is particularly troublesome for the question of foot size because if the preference for small feet arose in our foraging past, we might expect that preference to be manifest in rural environments (Fessler et al. 2012). More accommodating to these results might be evolutionary frameworks that combine evolutionary psychology's emphasis on innate psychological mechanisms with a concern for flexible adaptation to diverse (and

novel) environments and the dynamics of cultural transmission. There has long been a call for such a synthesis (e.g., Laland and Brown 2011; Smith 2000), and one might argue that the most interesting ongoing work in evolutionary psychology is the application of this type of synthetic framework to questions about human behavior in general (e.g., Fessler 2006; Schaller et al. 2010), and to human mate choice in particular (e.g., DeBruine et al. 2010; Jones et al. 2007; Little et al. 2011; Swami and Tovee 2012; Tovee et al. 2006).

The preference for women with big feet in rural societies suggests that it may be adaptive. In the Karo Batak communities I studied, men were overheard saying that a woman with larger feet was stronger and thus more productive in the rice fields. In *We, the Tikopia*, Firth (1936) noted that "the feet of the natives are large." When this was taken up by Berliner (1962) as an example of the tendency of anthropologists to make odd observations of their research subjects, Firth (1962) pointed out that large, rough feet were quite useful given the economic importance of reef fishing among the Tikopia. Fessler et al. (2005a) outline a number of adaptive advantages to large feet in women, including better balance when pregnant. Of course, that the preference for women with big feet was also found in societies with less exposure to Western media suggests that small-foot preference may have have spread via cultural diffusion. Further tests in a wider range of societies, including those with almost no access to Western media, might be required to make a definitive statement. It might also be useful to test for correlation between intra-societal variation in judgments of the most and least attractive feet and intra-household variation in access to outside media. As is evident in Fig. 2, although the modal most attractive woman had the largest feet, and the least attractive had the smallest, a fair proportion of Karo Batak respondents rated the large-foot model the least attractive. Coincidently, only about 30.5% of the households in these two villages have televisions. If it happened that the TV owners were the ones with a distaste for large feet, the access-to-media explanation would be strengthened.

The results add to a growing body of evidence that mating preferences may be governed by socially transmitted norms of recent origin (Tovee et al. 2006; Little et al. 2011). Given the vast diversity of human mating preferences (Darwin 1871; Ford and Beach 1951), one might argue that this sort of social influence on mating is a human universal. Perhaps the rules of the mating game are transmitted socially but constrained, or otherwise influenced, by a set of innate preferences that are themselves universal—closer to "structure-rich information acquisition" along the continuum proposed by Fessler (2006). Current evolutionary thinking about flexible mating behavior (Ah-King 2010) suggests that individuals might fail to act upon innate preferences in certain situations (e.g., a non-preferred mate might be settled for if no preferred mate is available). Hypotheses about this type of psychological universal—one that exists but is not always physically manifested—are the most difficult to test (Norenzayan and Heine 2005). Regardless, the results here show a preference for large feet among the Karo Batak and other rural societies, not a preference for small feet upon which they fail to act.

If a norm of recent origin is, indeed, at the root of the preference, one should not discount that *recent* sexual selection might have given rise to smaller feet relative to body size in women (see Moorad et al. 2011 for an example of recent sexual selection in a human population), and that sexual dimorphism in foot size relative to body size

might be an interesting case of gene-culture coevolution. Fessler et al.'s (2005a) analysis of existing data on sex differences in relative foot size is convincingly cross-cultural, but the samples are relatively recent (i.e., within the past 100 years). Would the same pattern emerge in an analysis of prehistoric osteological materials?

In summary, the Karo Batak prefer women with big feet. This runs counter to predictions derived from mate preferences theory (Barber 1995) and previous research which found, on average, that people in diverse societies prefer women with small feet (Fessler et al. 2005b, 2012). The Karo Batak are not unique, however, as people in a number of societies have similar contrarian preferences, in particular in rural communities with less access to Western media. These findings suggest that future effort toward studying the underlying causes of mate-choice diversity might focus on the human ability to adapt to diverse environments using transmitted culture (Little et al. 2011; Tovee et al. 2006).

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