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Comment on: Sexual Selection, Physical Attractiveness, and Facial Neoteny: Cross-Cultural Evidence and Implications, by Doug Jones

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to be innate to generate sexual selection (Laland 1994). Rather than obscuring sexual selection, learned and socially transmitted preferences (for instance, for body shape, hair color, or foot size) may themselves generate sexual selection, increasing the frequency of the preferred trait. Since, in comparison with genetic transmission, social transmission typically results in a more rapid diffusion of a preference through a population, culturally generated sexual selection may be unusually fast, and the alleles underlying favored traits may be selected to high frequency in just a handful of generations.

This analysis suggests that (1) there should be local, society-specific correlations between favored traits and mating preferences; (2) sexual selection may account for cross-cultural variation in traits underlying attractiveness; and (3) recent selection may have modified any predilections favored throughout the Pleistocene. These theoretical findings reinforce the importance of empirical studies such as Jones's which explore mating preference patterns across societies. But in focusing on those aspects of human mating preferences which are universal, we should not neglect the fact that other aspects show considerable cross-cultural variability (Ford and Beach 1951, Rosenblatt 1974). Males in all societies may yearn for an attractive mate, but in some societies "attractive" means small feet, protruding buttocks, or pendulous breasts. How can we account for such local preferences? And could they explain cross-cultural variation in anatomical or personality traits?

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Jones's paper is an interesting treatise on the importance of physical attractiveness for sexual selection, but several points raised in it are in need of further consideration.

1. The nature of attractiveness. Jones claims that attractiveness is "undertheorized in psychology." In fact, there are two current theoretical perspectives on the nature of facial attractiveness that he does not consider.

One perspective, consistent with Jones's approach, centers on the importance of facial features for defining attractiveness. Cunningham and his colleagues (Cunningham 1986, Cunningham, Barbee, and Pike 1990) suggest that attractive faces are those that possess a constellation of mature, neotenous, and expressive facial features. Their approach involves measuring the sizes of particular individual facial features and correlating these measurements with overall facial attractiveness ratings.

We have offered a different theoretical approach in which we define attractive faces as those whose facial configurations are closest to the average population configuration (Langlois and Roggman 1990, Langlois, Roggman, and Musselman 1994). This approach differs from that of Cunningham and Jones in that it is not concerned with particular facial features; instead, it fo-

cuses on the facial gestalt as the basis for perceptions of attractiveness. This view is consistent with the literature demonstrating that faces are perceived as wholes (e.g., Hosie, Ellis, and Haig 1988, Morton and Johnson 1991, Purcell and Stewart 1988, Rhodes 1986, Sargent 1984, Young, Hellawell, and Hay 1987). Furthermore, this approach is more parsimonious than feature-based approaches; both Jones and Cunningham find different patterns of results for male and female faces, while we posit, and find, the same pattern of results for both male and female faces.

According to Jones's theory, faces with extreme features representing neoteny will be perceived as more attractive than other faces because of selection pressures. As he points out, directional selection favors traits that are extreme in their dimensions (large antlers, big tails, etc.). However, another form of selection—stabilizing selection—is more prevalent than directional selection and favors traits that are the average of values in the population (Barash 1982, Dobzhansky 1970). Thus, one could just as easily predict that selection would favor faces with average configurations rather than extreme features.

2. The relationship of neoteny to attractiveness. Jones claims, as does Cunningham, that neoteny is an essential component of facial attractiveness in females because it signals fecundity. However, we have shown that, although neoteny may be a component of attractiveness, it is not essential to it. Empirically, if neoteny is fundamental to attractiveness, judgments of neoteny and attractiveness must be significantly and highly correlated. However, we (Langlois, Roggman, and Musselman 1994) and others (Berry 1991) have demonstrated that judgments of attractiveness and age are unrelated in samples of college-age female faces, indicating that a neotenous appearance is not required for attractiveness. Furthermore, while of course Jones is correct in pointing out that old faces are perceived as less attractive than young faces, it is also certainly possible to think of young-looking faces that are far from attractive. Even infants, who are certainly all neotenous, show the full range of facial attractiveness.

3. Measuring faces. Jones measures relative eye width, relative nose height, and relative lip height from photographs and uses these measurements to produce equations that predict age on the basis of the size of these various features. These measurements are problematic for several reasons. First, thousands of facial measurements are possible (Farkas 1981), and Jones's selection of particular features to measure seems to be guided only loosely by a priori theoretical considerations related to neoteny. His theoretical discussion of changes in facial structure as a function of age does not mention cheek width, yet he measures it and then later omits it when he finds that it is not related to age. Furthermore, choice of cheek width as a neotenous feature is not consistent with the features chosen by Cunningham (Cunningham 1986, Cunningham, Barbee, and Pike 1990). According to Cunningham, "neotenous features" include eye height, eye width, nose length, nose tip width, nostril

width, forehead height, eye placement, and eye separation. Cheek width is a "mature" feature according to Cunningham's criteria. If Jones considers "neotenous" and "mature" features to be opposite ends of a continuum of age appearance, then he should also have measured chin area, chin length, chin width, eyebrow thickness, and cheekbone prominence, the other "mature" features measured by Cunningham et al. We wonder what results would be obtained if these other potential measures were used and whether a neotenous-feature approach can provide more than post-hoc explanations and predictions. For neoteny to be useful as a theory of attractiveness, researchers who employ it should (1) be consistent in their use of the same theoretically driven measures of neotenous features and (2) not conveniently omit features that they find to be unrelated to age.

Second, measurements obtained from photographs may not be accurate or reliable (Farkas et al. 1980). Evidence indicates that when measurements are taken from faces as opposed to photographs, attractive faces are more likely than less attractive faces to have facial features within ± 1 standard deviation of the mean (Farkas, Munro, and Kolar 1987). Farkas et al. suggest that "the face with most measurements in the range of ± 1 SD may be close to the 'ideal face'" (p. 128). Additionally, Jones's estimation that his stimuli would have the facial proportions of first- and second-graders suggests that the equations he has developed on the basis of measurements do not accurately estimate neoteny.

4. Coda. Jones claims that across five populations more neotenous faces are perceived as more attractive. However, of the 42 correlations measured (not including the data from pooled samples), only 11 (approximately 26%) were significant at the .05 level or greater. How are we to account for the 74% of the correlations that indicated no significant relationship between attractiveness and neoteny?¹ Although Jones has provided us with interesting cross-cultural data, thus far these data raise more questions than they answer.

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Jones is to be commended for a particularly clear, well-designed, and interesting study. As he points out, sexual selection theory has been neglected in relation to human morphology. This paper presents some of the first empirical tests of explicit evolutionary hypotheses concerning female facial attractiveness and provides reasonable evidence in support of the author's claim that neoteny acts as a kind of "superstimulus" signaling female fecundity. Finding Jones's study generally sound and his results plausible, I will limit myself to raising two issues that

1. If we restrict our comparison to female measures, of the 28 correlations measured only 11, roughly 40%, are significant at the .05 level or better.

may or may not serve as food for thought in this area of inquiry.

1. Does attractiveness necessarily equate with *sexual* attractiveness? For sexual selection (or any kind of Darwinian selection) to operate, the ultimate outcome has to be differential fitness. In the case of female neoteny, Jones argues that this process is actualized through males' being more attracted to youthful-looking females because, on average, these females make for *reproductively* more valuable mates. Hence, attractiveness is clearly equated here with sexual attractiveness. We are told, however, that neoteny also makes us perceive infants, animals, and even cars as "cute"—a quality closely analogous to attractiveness but without a sexual component. The article does not specify how attractiveness was defined for the raters. If Jones's subjects had been given a series of pictures of children (or dogs) to rate according simply to their "attractiveness," my guess is that we would find an age gradient running from younger to older, with babies (or puppies) being rated more attractive.

The implication is that the female-attractiveness—neoteny association reported here may reflect, at least in part, something other than an attractiveness-fecundity relationship. I am willing to take Jones's word that the female models' predicted age of about 7 years does not mean that their faces are identical to those of 7-year-old girls, but still, the models' "age" is considerably lower than that of an average sample of 20-year-old women whose very high fecundity men should have been selected to find extremely attractive. Again, might neoteny elicit something other than just sexual attraction? The answer may lie in Jones's n.3, where he mentions that neotenous features probably act as a release for parental behavior. Among other things, such behavior entails providing for and giving protection to individuals who are relatively dependent upon oneself. It could thus be argued that in the past neotenous adult females benefited disproportionately from male provisioning—in which case neoteny would not be the result of *sexual* selection.

2. Is female physical attractiveness really a human anomaly? Jones develops his argument for a human anomaly by pointing out that (a) in most sexually selected species males show greater development of sexual advertising than females and (b) this pattern is reversed in the case of humans, where men are more concerned than women with physical attractiveness. This seeming exception is explained by (c) the human female age-related variance in fecundity. Hence, female physical features linked to high fecundity and youth would have evolved to be attractive to males—that is, would have become criteria for mate choice by males. If we really want to find some originality in our species, I think we ought to look at *a* rather than *b*: as a sexually selected species, human males are exceptional in the degree to which male-male competition is played out not in sexual advertising but in control over resources (e.g., Pérusse 1993, 1994). Concerning *b* and *c*, however, the human situation fits strikingly well what seems a quasi-