



## Physical Anthropology Section – 2009

### H106 Morphoscopic Traits: Mixed Ancestry, Hispanics, and Biological Variation

Joseph T. Hefner, PhD\*, *Statistical Research, Inc., 6099 East Speedway Boulevard, Tucson, AZ 85712*

The goal of this presentation is to highlight several multivariate statistical approaches that are useful for classifying these seemingly heterogeneous populations, which are often described as hybrid groups evincing cranial morphologies shared between multiple ancestries.

This presentation will impact the forensic community in general, and the forensic anthropological community in particular, by exploring the distribution of morphoscopic traits in groups with complex population histories.

The past decade has witnessed a dramatic increase in the number of research articles and presentations on cranial morphoscopic (nonmetric) traits within populations in the United States. Sadly, methodological and interpretative strategies applying these traits to predict ancestry in a forensic context remain largely unexplored. Previously, Ousley and Hefner presented multiple statistical methods appropriate for use with morphoscopic traits, yet the approach most often used by forensic anthropologists still relies almost exclusively on the experience of the observer rather than the distribution of these traits within populations. Recent research in the *Journal of Forensic Sciences* and in the *American Academy of Forensic Sciences Proceedings* underscores the ubiquity of the experience-as-evidence approach without acknowledging any inherent shortcomings.

By exploring the range in variation of several commonly used morphoscopic traits using a large, worldwide sample (n=845) that includes individuals of self-identified mixed-ancestry, Hispanics, Africans, Europeans, and American Whites and Blacks, this presentation will demonstrate that the old assumptions of trait distribution, and the emphasis given to the experience of the observer, are not only typological, but also lead to unempirical and often incorrect classifications of mixed ancestry. The results of this study suggest that classifying an individual to “mixed” ancestry based on discordant trait values would only be tenable if all ancestral groups have been “mixed” for some time. If that is the case, then forensic anthropologists can correctly conclude that every decedent is of “mixed” ancestry, although this would negate the role of ancestry prediction in the biological profile. Thus, what are forensic anthropologists to do when confronted with Hispanics—a population often described as a hybrid group evincing morphologies shared between American Whites, Native Americans, and Africans—if these seemingly isolated populations also present discordant trait values? Several statistical methods that account for variation in trait frequencies have cross-validated classification accuracies nearing 87 percent. In a three-way analysis (i.e., Native Americans, American Whites, and Hispanics) using 12 variables with an overall correct classification of 87%, the Hispanic sample had a cross-validated correct classification rate of 90 percent. The benefit of a statistical approach is thus twofold. First, the importance placed on the subjective experience of the observer is reduced, an attractive attribute in light of the *Daubert* ruling. The second benefit of a statistical framework is the attachment of variable weights in the analysis, empirically supporting and strengthening classification accuracies using morphoscopic traits, while accounting for the true nature of biological variation.

Morphoscopic trait analysis remains an essential factor in the prediction of ancestry because of the emphasis and importance forensic anthropologists have historically placed on these slight variations in cranial form. However, when the actual distribution of these traits is understood, the discordance of multiple traits should come as no surprise and should not be treated as evidence of admixture or hybridity. On the contrary, discordance is evidence against the typological approach to ancestry prediction and represents the true nature of the distribution of morphoscopic traits among human groups.

#### Morphoscopic Traits, Quantitative Methods, Ancestry