H83   A Test of Methods: Implications of Dimorphism, Population Variation, and Secular Change in Estimating Population Affinity in the Iberian Peninsula

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The educational objectives of this paper are to discuss multiple cranio- metric and statistical methods for estimating population affinity, test the extent to which population variation may effect sex estimation, and explore the applicability of using cross-population data for individual biological profiling.

This presentation will impact the forensic science community by providing an uderstanding of human variation and applying appropriate methods for identification across populations. Importantly it is demonstrated that population specific data are needed for accurate calibration when using metric analyses for sexual dimorphism and ancestry estimation. The outcome of this research is to demonstrate why forensic anthropologists should approach international work through a framework that accounts for population variation.

One of the key components in the identification process is the ability to determine ancestry from a skeleton. Craniofacial variation defined by skull dimensions of size and shape are estimated by a proportion of both intrinsic (genetic) and extrinsic (environmental) factors. Because human populations differ morphologically in relation to size and shape, identification formulae should be customized to be population specific. The knowledge of the ethnic origins of an individual drastically narrows the search for missing persons that can ultimately result in victim identification. However, this is becoming increasingly challenging as individuals migrate to different populations and *standards* have been continuously appraised. The *standards* for classifying or differentiating closely related populations (e.g., "Hispanic") using both traditional and modern three-dimensional methods are currently being addressed by numerous researchers.

Recent studies have paid much attention to the problematic nature of using biologically meaningless terms such as "Hispanic", which ignore geographic heterogeneity throughout the New World. To this end, we present a comparative study of among-group variation for two samples from the Iberian Peninsula (Oloriz Regional 19th Century, F= 27, M = 27; Wamba Local 16-17th Century, F = 25, M= 26) and Terry Whites (F = 22, M = 22) using a combination of traditional linear metric methods and modern approaches from the geometric morphometrics. The sample sizes for the traditional craniometric study was slightly smaller for each sample as those with any missing values were not included in the analyses. For this study sixteen traditional craniometric measures were utilized in the analyses. A discriminant function analysis was conducted using the traditional cranio- metrics to allocate crania into groups using *crossvalidation*. The degree of differentiation between the groups was measured using Mahalanobis D^2. Although human levels of sexual dimorphism are low compared to other primate species, males and females appear skeletally very different. Because the degree and pattern of sexual dimorphism vary by population, which can further complicate the accurate assignment of ancestry and sex in different populations, the degree of sexual dimorphism was also evaluated. The degree of sexual dimorphism was assessed with an index of sexual dimor- phism or ISD [(male mean/female mean)/1] X 100. The similarity or dissim- ilarity in the degree of sexual dimorphism was evaluated using a nonparametric Spearman rank correlation coefficients. Fourteen standard craniofacial Type 1 and Type 2 landmarks were used in the geometric morphometric part of the analysis. The among-group variation of the coor- dinate data was examined using multiple pairwise comparisons with Bonferroni correction.

Both the traditional and morphometric cranial analyses detected signif- icant differences among the samples (*p-values* > 0.001). Interestingly, 19th Century Spanish males were closer to Terry White males, but both Spanish female samples were closer to each other than they were to the Terry females. The average ISD for all measurements is slightly higher for the Wamba Local 16-17th Spanish sample suggesting that they are somewhat more sexually dimorphic. The intraspecific rank correlations among the ISDs for all craniometric variables detected a moderate difference in the pattern of sexual dimorphism between the two Spanish samples (*r=0.55*) possibly indi- cating secular changes in sex dimorphism within the Iberian Peninsula. The varying levels of dimorphism among populations could affect the classifi- cation accuracy when attempting to assign an "unknown" to a particular reference group and further skew results for sex estimation when applying different *standards* across populations. These results obviate the importance of investigating regional or geographic morphological variations and further underscore the importance of calibrating methods to reflect the biology of the local population.

Population Affinity, Sex Dimorphism, Spain