H64 The Value of Experience, Education, and Methods in Ancestry Prediction

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After attending this presentation, attendees will be introduced to the results from a survey conducted at the 58th Annual Meeting of the American Academy of Forensic Science in Seattle, WA.

This presentation will impact the forensic community and/or humanity by providing insight into the value of experience, education, and methods in ancestry prediction.

At the 58th Annual Meeting of the American Academy of Forensic Science in 2006, the authors conducted a volunteer survey and exercise to examine the methodological approaches to sex and ancestry determination. Exercise participants were asked to rank the techniques they use and to determine the sex and ancestry of seven specimens. A total of 76 individuals participated in the survey. Participant education levels included 15 with Bachelor degrees, one DDS, three MD, 22 Masters, 35 PhD, and one "other." Additional information from participants included the number of crania examined, years of professional experience, preferred methods of sex and ancestry determination, classes taught, etc. This presentation will focus on the determination of ancestry.

Results support the adage "experience matters," but only to a point. Individuals with advanced degrees performed superior to others and, as would be expected, individuals with an anthropology background performed better than those outside of the field. Correct estimation of ancestry for all seven crania by education level is as follows: MDs (19%), DDS' (28.6%), BS/BA (31.4%), MS/MA (42.2%), PhD (43.3%). Among anthropologists, experience levels ranged from 0 years to more than 30. To determine experience levels for Masters, mean years in school was added to mean years of professional experience to equal a mean of 8 years of experience. PhDs had a mean of 13.5 years, indicating a considerable difference in the experience levels between Masters and PhDs. Despite the large disparity in years of professional experience, participants with Masters degrees performed about as well as PhDs.
To determine if the number of correct ancestry estimations is significantly related to factors such as "level of education," "number of crania examined," and "number of years as a professional," a Kruskal-Wallis analysis of variance test was performed. Significant interaction was noted for several key factors related to experience, but not degree level (e.g., Bachelors vs. Masters or Masters vs. Doctoral). For example, the total number of years as a graduate student was significant ($p<0.05$, assuming X^2 with 6 df), specifically for several problematic crania like the Hispanic individual. The number of years as a professional was also significant ($p<0.05$, assuming X^2 with 6 df) for the Black male. This suggests the obvious: the more human variation someone has observed, the higher the likelihood of arriving at a correct evaluation. However, the parametric tests for experience and number of crania examined were not significant, and there are some indications that the methods and/or traits used influence the likelihood of being correct the most.

Correspondence analysis (CA), an ordination procedure used to map out the relationship of variables to one another in multivariate space, was used to explore other aspects of the results. Participants were asked to describe and rank the methods they prefer to use when determining ancestry. Results of the CA demonstrate that persons with Bachelor degrees prefer to use basic, pre-defined characteristics such as "facial prognathism." Masters students prefer multi-state morphological variants such as "the shape of the zygomatic" or multiple aspects of "the midfacial skeleton." Surprisingly, more Masters students cited "metric analysis" than did PhDs, suggesting a generational shift in emphasis to metric analyses. Those with PhDs present the most surprising results. PhDs are associated with the following responses: "nasal morphology," "nonmetric," and "none." These results suggest that PhDs rely on aspects of morphology not readily defined, perhaps Stewart's (1979) "indefinable something."

Taken as a whole, the results imply that White crania may be more often estimated accurately: 92% of all participants correctly assessed ancestry for the White female. This result may be due to more frequent exposure to Whites in reference skeletal collections. The Hispanic individual was the most difficult for participants to correctly classify: only 11% of the participants answered correctly, a pressing problem which may be due to a lack of Hispanics in collections as well as their mixed ancestry. There were also significant indications of ambiguity in assessing ancestry, which may be due to the presence of discordant traits within individuals. "Mixed ancestry," or a similar response was used as a designation 22 times, six times alone for the black male case consisting of a cranium and femur, which appeared to have nonmetric traits traditionally associated with both American Whites and Blacks. In several cases, participants weighted certain traits more heavily than others, despite a declared preference for other

traits. In other words, it appears that the relative importance of traits in assessing ancestry is adjusted based on the case under examination, and may reflect *post hoc* trait selection after a general impression is formed, as suggested by Hefner and Ousley (2006).

Table 1. Percentage of Masters and PhDs correctly estimating ancestry.

CASE M.A./M.S.	PhD (n = 22) % Correct	(n = 35) % Correct
East Asian	63.7	60.0
White	91.0	94.3
Hispanic	9.1	14.3
Black	18.2	22.9
East Asian	50.0	62.9
Black	31.8	20.0
American Indian	31.8	31.3
Overall % Correct	42.2	43.3

References:

1 Stewart, TD (1979) Essentials of Forensic Anthropology. Springfield, IL: Charles C. Thomas.

2 Hefner, JT and SD Ousley (2006) *Morphoscopic Traits and the Statistical Determination of Ancestry II*. Proceedings of the Annual Meeting of the American Academy of Forensic Science, 58th Annual Meeting, Seattle, WA.

Ancestry, Nonmetrics, Correspondence Analysis

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