A114 Sex Classification in a Sample of American Whites Using Interlandmark Distances of the Zygomatic Bone and Standard Cranial Measurements

Sarah M. Furnier, 1487 E Hull Road, Hope, MI 48628; and Stephen D. Ousley, PhD, Dept of Anthropology/Archaeology, Mercyhurst University, 501 E 38th Street, Erie, PA 16546*

After attending this presentation, attendees will understand a method of sex classification based on Interlandmark Distances (ILDs) of the zygomatic bone in combination with standard cranial measurements as well as the classification rates achieved in a sample of American Whites.

This presentation will impact the forensic science community by introducing a method of sex classification based on measurements of the zygomatic bone with cross-validated classification rates. This presentation will add to current research by providing an understanding of the utility of ILDs and sexual dimorphism in the zygomatic region of the cranium in sex classification.

Sex classification is a crucial part of estimating the biological profile of an unknown individual. Following the *Daubert* Supreme Court decision, an increased emphasis has been placed on the validation of traditional forensic anthropological techniques, including those for sex estimation, and on the development of statistically sound methods.[1,2] After an extensive literature search, it was found that little has been done with sex classification using metrics of the zygomatic bone. Bizygomatic breadth is generally regarded as one of the best indicators of sex, and previous publications have shown that differences between the sexes do exist in the upper face and zygomatic regions and have obtained high sex classification rates using measurements in these regions.[3,4] Therefore, it is clear that significant sexual dimorphism exists in this region of the cranium. The goal of this study was to determine if ILDs could be used to capture the sexual dimorphism present in the zygomatic and to evaluate whether or not these ILDs, in combination with standard cranial measurements, could accurately classify sex in an American White sample.

ILDs have been shown to be good group discriminators and have been used in the past to successfully estimate ancestry.[5,6] Linear Discriminant Function Analysis (LDFA) has been utilized heavily in metric sex estimation techniques from very early on in the development of metric sex estimation methods.[3,7] In this study, ILDs of the zygomatic bone in combination with standard cranial measurements were analyzed using LDFA in order to examine sexual dimorphism of the zygomatic bone and facial region and to evaluate the sex classification rate in a sample of American Whites from the Terry Collection. FORDISC® 3.1 was used to perform LDFA using stepwise selection to identify the best variables for classification and to provide cross-validated classification rates.[8,9]

Ten measurements — JUB, zygom to zyts, jug to zygoo, zygom to zygoo, fma to zyti, fmt to zygom, jug to zyts, mpl to zygom, fma to zygoo, and ZMB — were stepwise selected using LDFA. An overall classification rate of 82.7% was achieved. Females classified better with 86.5% accuracy in comparison to males at 78.9%. Another LDFA analysis using only unilateral ILDs yielded a classification rate of 78.5%, with females classifying at a rate of 73.7% and males at 82.9%. Five measurements — zygoo to zyti, mpl to zygom, fma to zyti, jug to zygom, and fma to zyts — were stepwise selected in this analysis. In general, the measurement means for males were significantly greater than those for females, except in the case of two ILDs, which were not significantly different between the sexes. Shape analysis resulted in a lower classification but selected variables that reflected width, height, and curvature differences, indicating that there are some shape differences between the sexes.

In conclusion, the results of this study provide evidence that sexual dimorphism does exist in the zygomatic bone. When ILDs of the zygomatic are used, in combination with standard cranial measurements or on their own, this sexual dimorphism can be useful in sex estimation.

*Presenting Author

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