



### H82 The Problem of Estimating Sex From the Skull: A Comparison of Methods Applied to a Modern Colombian Sample

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The goal of this presentation is to demonstrate that metric methods of sex estimation from the skull do not yield classification accuracies of over 80% in a modern Colombian sample while visual methods applied to the same population perform slightly higher.

This presentation will impact the forensic science community by suggesting that forensic anthropologists utilize skeletal elements other than cranial remains for estimating sex. In cases when only cranial remains are present, caution should be exercised in arriving at sex estimates, particularly in cases where no population-specific standards are available.

In forensic anthropological contexts, estimating the biological profile from skeletal remains is of paramount importance. Researchers agree that elements of the bony pelvis provide the most reliable sex estimates, typically from visual assessment. Until recently, in cases where pelvic elements were absent or too damaged to be of use, protocols historically called for workers to preferentially choose the skull, as it was considered the second-best sex indicator. Recent publications in the literature have challenged this notion and have convincingly argued that post-cranial elements are much more sexually dimorphic than the skull. While this shift has been embraced in the United States, forensic anthropologists working in diverse international contexts often encounter solitary crania or work in locales where population-specific criteria for sexing post-cranial remains are non-existent. As a result, the skull is often still considered as a reliable indicator of sex despite evidence to the contrary. This is particularly true in Colombia where practitioners are currently in the process of identifying scores of unidentified skeletons while simultaneously developing population-specific standards for the Colombian population. Given this reality, there is a strong need for researchers to understand which methods for estimating sex from cranial remains are suitable and which might be appropriately abandoned in Colombia.

The influential work of Giles and Elliot ushered in an era of intense interest on quantifying sexual dimorphism from metric analyses of cranial remains.<sup>1</sup> Typical approaches utilized discriminant function analysis of interlandmark craniometric distances for sex estimates. Many of these studies used skeletal collections derived from the late 19<sup>th</sup> and early 20<sup>th</sup>-centuries to generate standards that were utilized by forensic anthropologists around the world. During this influential time period, the work of Acsadi and Nemeskeri also brought attention to five non-metric cranial characteristics that could be used to visually assess sex (i.e., nuchal crest, mastoid process, glabellar prominence, supraorbital margin, and mental eminence).<sup>2</sup> These morphoscopic traits are well known today and have been reproduced in numerous protocols which have been adopted by both forensic anthropologists and bioarchaeologists.

Though the work of Spradley and Jantz convincingly argued that practitioners should shift their attention to post-cranial sex estimation, more work remains to be done on modern samples drawn from populations outside of the United States.<sup>3</sup> The work presented in this study was based on an analysis of cranial remains from 198 individuals (m=133; f=65) drawn from two modern Colombian reference collections currently curated in Bogotá, Colombia, and Medellín, Colombia. The pooled samples' average age-at-death was 45.8 years for males and 56.79 for females. Each cranium was digitized with a Microscribe digitizer interfaced with the software program 3Skull. Sixteen interlandmark distances mined from 3Skull were then used to calculate univariate sectioning points in order to determine classification accuracies of each interlandmark distance. In addition, a subset of the Bogotá sample was visually assessed and five morphoscopic traits were recorded blind to real sex.

Classification accuracies of the 16 interlandmark distances ranged from 55% – 77%. Of all interlandmark distances, bizygomatic breadth (ZYB) achieved the highest classification rate, a result mirroring findings of Spradley and Jantz.<sup>3</sup> In the case of visual assessment, the observer estimated sex based on the *gestalt* of morphoscopic traits. Overall, 81.8% of the Bogotá subsample was sexed correctly. This result mirrors the work of others who have achieved classification accuracies of over 80% from visual assessment of cranial remains.<sup>4</sup> Ultimately, in both this study and that of Spradley and Jantz analyses of craniometric dimensions indicate that other areas of the skeleton should be preferentially chosen for sex estimation and that in cases of isolated crania, workers must qualify the limitations of currently available methods.<sup>3</sup>

#### References:

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3. Spradley MK, Jantz RL. Sex estimation in forensic anthropology: skull vs. postcranial elements. *J Forensic Sci* 2011;56(2):289-96.
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#### Sex Estimation, Colombia, Skull