H9 An Evaluation of the Hartnett-Fulginiti Method for Age-Estimation on an Independent Skeletal Sample

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After attending this presentation, attendees will learn about an evaluation of the Hartnett-Fulginiti (H-F) method for estimating age-at-death.[1-3]

This presentation will impact the forensic science community by providing data concerning the efficacy of this method when applied to a known-age skeletal collection differing from its reference sample. Validation using an independent sample is essential given that age-estimation techniques impose the age structure of their reference sample skeletal to the samples under investigation.[4-5]

Accurate estimation of age-at-death is crucial for the development of biological profiles and, therefore, a foundation of forensic anthropology. The H-F method revises two of the more widely used methods for age-estimation: the Suchey-Brooks (SB) method employing pubic symphyses and the Işcan and Loth (IL) method utilizing the sternal end of the fourth rib. These revisions were based upon a sample of elements from 630 individuals curated at the Maricopa County Forensic Science Center in Phoenix, Arizona. The sample is predominately of European ancestry, and ranges from 18 to 99 years of age. The current research aims to assess the utility of the H-F revisions on a skeletal sample independent of its reference sample as well as its efficacy on a subsample of individuals of African-American descent.

This research employs a random sample of 200 individuals of known age and ancestry from the Hamann-Todd collection curated at the Cleveland Museum of Natural History. The sample consists of 39 females and 161 males ranging between 19 to 87 years of age. Nearly half of the sample is of African-American descent (n=90). Rib ends were unobservable for some individuals and so the H-F rib method was evaluated on a subsample of 182 individuals. Age-at-death was estimated for each individual by examining the pubic symphyses and rib ends and assigning them to one of the seven H-F phases. Spearman's rank correlation coefficients were calculated between estimated and actual H-F phases and the percentages of individuals whose known ages fell within their estimated H-F phase or an adjacent phase were calculated.

Results suggest that the H-F method performs slightly better than the SB and IL methods. Higher correlations were recorded between estimated and actual H-F phases than for similar evaluations of the SB and IL methods (H-F pubic: Spearman's ρ=0.768, p-value <0.001; SB: Spearman's ρ=0.699, p-value <0.001; H-F ribs: Spearman's ρ=0.771, p-value <0.001; IL: Spearman's ρ=0.720, p-value <0.01).[1] The H-F method estimates the correct age phase for a similar percentage of individuals as the SB and IL methods (H-F pubic=41.5%, SB=44%; H-F ribs=41.2%, IL=35%) and it estimates the correct age within one phase on a moderately larger percentage of individuals (H-F pubic=92%, SB=83%; H-F ribs=90.7%, IL=79%).[1]

When the males from the sample are segregated by ancestry, a higher correlation exists between estimated and actual H-F phases for individuals of African-American ancestry than for those of European ancestry (African-American pubic Spearman's ρ=0.770, p-value <0.001, European pubic Spearman's ρ=0.651, p-value <0.001; African-American rib Spearman's ρ=0.812, p-value <0.01, European rib Spearman's ρ=0.625, p-value <0.01), suggesting that the H-F method performs well on individuals of African-American descent despite being developed from a primarily European sample. Data from the female subsample suggest a similar pattern, but sample sizes are too small to permit statistical verification.

Twenty individuals were selected for re-evaluation to assess the degree of intra-observer error. Correlations between first and second age estimates were very high (pubic: Spearman's ρ=0.934, p-value < 0.001; ribs: Spearman's ρ=0.975, p-value <0.001), exceeding those reported for similar tests of the SB and IL methods.[1]

The results of this evaluation of the H-F method for age-estimation suggest that it performs as well as or better than the widely accepted SB and IL methods. Its performance on a subsample of individuals of African-American ancestry indicates that it is unhindered by the primarily European composition of its reference sample. Lastly, the H-F method exhibits low intraobserver error rates. These observations suggest that the H-F method can be employed consistently and fruitfully by forensic anthropologists.

References:

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4. Bocquet-Appel J, Masset C. Farewell to paleodemography. J Hum Evol 1982;11:321-33.
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Pubic Symphysis, Fourth Rib, Age-Estimation

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