H94   The Utility of the Samworth and Gowland Age-at-Death "Look-Up" Tables in Forensic Anthropology

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The goal of this study is presenting to the forensic anthropological community the forensic application of three new bioarchaeological age-at- death estimation methods recently developed by Samworth and Gowland (2007), stressing their utility and applicability in forensic settings.

This presentation will impact both forensic practice and future research, by demonstrating that the new methods, which were developed f bioarchae- ological intent, are in fact applicable and useful in forensic settings, and that the new statistics used in creating these age-at-death "look-up" tables are worth further consideration and study within the field, as well as for pale- odemographical purposes.

Accurate age-at-death estimates are crucial to the forensic anthropol- ogist when constructing a biological profile aimed at narrowing a missing persons list, to allow for timely and efficient identification of an unknown victim. To this goal, new methods are continuously constructed from known samples, while existing methods keep being updated, adapted and tested for their forensic use on contemporary populations. Validation of these newly developed methods for forensic purposes, in the spirit of the Daubert criteria, requires testing them on at least one independent sample of known indi- viduals. From the paleoanthropological or bioarchaeological points of view, method validation on independent samples serves to obtain the corresponding associated probabilities, aiding in decision-making and comparison with other methods, as well as to assess their applicability to samples and popu- lations different from those from they were obtained.

The present contribution evaluates the forensic utility of three new age- at-death estimation techniques recently proposed by Samworth and Gowland (2007). These techniques are based on: (1) the pubic symphysis, (2) the auricular surface of the ilium, and (3) a multifactorial combination of these methods. Forensic utility and their applicability to American populations, will be tested through their application to three contemporary forensic samples.

A particularly attractive feature of these three new procedures is that they are based on two well established ageing methods, widely known and regularly used within the forensic community. These techniques are the Brooks and Suchey (1990) pubic symphysis method, and the Lovejoy *et al.* (1985) auricular surface method. The Samworth and Gowland (2007) procedure provides individual corrected 68% and 90% confidence intervals for each of these methods, in the shape of user-friendly "look-up" tables. Even more interestingly, similar tools and statistics are provided for the combination of both methods (referred to as *combined method* hereafter).

These new procedures were developed with a focus on paleodemog- raphy, and Samworth and Gowland (2007) warn about their heavy reliance on the aprioristic knowledge of the precise age-at-death distributions of the samples under study, which may cause them to be highly population- or even sample-specific. If this hypothesis were true, the sensitivity of the method to deviations from the distribution of the original study sample would limit importantly their immediate utility in North American forensic contexts. This would require the anew estimation of all confidence intervals, in order to adapt them to the North American population, and would impede their appli- cation to individuals of mixed, unknown, or uncertain ancestry.

In the present study, the hypothesis of high sample-specificity is tested on three known samples of males and females of multiple, but predominantly European American descents: ((n=188) from the Bass Collection (University of Tennessee, Knoxville, TN); (n=66) from the Hamann-Todd Collection (Cleveland Museum of Natural History, OH) and (n=83) from the Forensic Data Bank (Jantz and Moore-Jansen 2000)).

Results indicate that, in the samples under study, the Samworth and Gowland estimates from the pubic symphysis and auricular surface actually perform slightly better than the previous methods from which they were developed. Similarly, the combined method performs better in these samples than most attempts at multifactoria age-at-death estimation (Martrille *et al.* 2007, Saunders *et al.* 1992 and Passalacqua and Cabo 2007). Interestingly, the combined method does not appear to further enhance neither the precision (bias/inaccuracy) nor the accuracy (percent correct classification) of the single pubic symphysis age-at-death estimate. On the contrary, it would in fact appear that the addition of the auricular surface estimate to the pubic symphysis estimate actually decreases the utility of the method. In conclusion, these new methods seem to be more robust to distribution devi- ations than originally proposed by Samworth and Gowland (2007). They are therefore suitable for immediate and reliable forensic usage in the United States and worth further research for their use in North American forensic contexts.

Age-at-Death Estimation, Forensic Anthropology, Validation Study