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Standard for Population Affinity Estimation in Forensic Anthropology

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Foreword

This document has been developed with the objective of improving the accuracy, quality, objectivity, and consistency of estimating population affinity. Anthropological conclusions derived from the morphologic, metric, and medical imaging analyses of human remains are often supported by statistical frequencies, error probabilities, and confidence intervals from available reference data in the peer-reviewed published literature. It is acknowledged that the reference samples used in various methods do not reflect the totality of global human variation; therefore, conclusions cannot always be supported by these statistical measures. As such, this document encourages continued research and scholarly debate to improve the scientific validity of estimating population affinity.

Internal and external sources of bias and procedures to mitigate these factors are considered during any anthropological analysis.

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This document was revised, prepared, and finalized as a standard by the Anthropology Consensus Body of the AAFS Standards Board. The draft of this standard was developed by the Anthropology Subcommittee of the Organization of Scientific Area Committees (OSAC) for Forensic Science. This document was originally conceived by the Scientific Working Group of Forensic Anthropology (SWGANTH).

Questions, comments, and suggestions for the improvement of this document can be sent to AAFS-ASB Secretariat, asb@aafs.org or 410 N 21st Street, Colorado Springs, CO 80904.

All hyperlinks and web addresses shown in this document are current as of the publication date of this standard.

ASB procedures are publicly available, free of cost, at www.aafs.org/academy-standards-board.

Keywords: *ancestry; population affinity; biological profile; personal identification.*

Table of Contents

Standard for Population Affinity Estimation in Forensic Anthropology

1 Scope

This standard provides procedures for the estimation of population affinity from skeletal material. Specific methods and techniques are not included. This standard is not applicable to subadult skeletal remains when cranial and postcranial features are not fully developed.

2 Normative References

There are no normative references.

3 Terms and Definitions

For purposes of this document, the following definitions apply.

3.1
biological profile
The description of an individual's estimated age, sex, population affinity, and stature derived from skeletal analysis.

3.2
morphometric data
Quantitative data that incorporates both size and shape.

3.3
non-metric data
A skeletal variant or morphological feature that is classified categorically rather than quantified by a measurement (e.g., discrete, macromorphoscopic, or discontinuous trait).

3.4
population
Individuals grouped by shared factors such as geography, biology, culture, language, etc**.**

3.5
population affinity
A measure (e.g., distance, probability of membership) of similarity between the individual and reference groups (see Annex A).

3.6
reference group
A sample of a population used in a method.

4 Requirements

4.1 General

The estimation of population affinity (see Annex A) shall be based on peer-reviewed, published, and validated methods that utilize reference samples appropriate to the case (e.g., contemporaneous). These methods have procedures for objectively recording well-defined data (cranial and dental

measurements, coordinate data, and non-metric data, etc.). Well-defined traits or measurements have written descriptions and are often accompanied by photographs or line drawings. Methods often include statistical analyses of data on skeletal remains. Practitioners shall be knowledgeable about the statistical techniques employed (e.g., discriminant function analysis), including underlying theories (e.g., limitations and results interpretation).

Due to the variation in condition, preservation, and recovered skeletal elements, the methods applied are determined on a case-by-case basis. All methods used shall be documented to allow verification and replication of the work performed.

Population affinity should be estimated independently of suspected or presumptive identification to minimize confirmation bias.

4.2 Procedure

4.2.1 General

Population affinity shall be estimated from the adult skeleton using morphometric and/or non-metric data. Choice of population affinity method(s) shall be dictated by the skeletal elements available and their condition/degree of preservation.

All methods applied to the estimation of population affiliation shall have an associated degree of certainty, and therefore require a quantitative analysis (e.g., error rates, probability or likelihood).

4.2.2 Non-metric Assessment

Methods using non-metric traits shall meet these requirements:

a) appropriate reference groups;

b) clear trait descriptions and scoring systems;

c) a quantitative analysis.

4.2.3 Morphometric Assessment

Methods using morphometric data shall meet these requirements:

a) appropriate reference groups;

b) clear landmark, measurement, and data acquisition descriptions;

c) a quantitative analysis.

4.2.4 Considerations and Adjustments

The practitioner shall consider potentially confounding factors in method selection, such as secular change, pathological conditions, trauma, taphonomy, and biomechanical demands on the skeleton. Sex estimation may be informative in population affinity estimation.

The practitioner shall consider the following in reporting population affinity estimates:

— a major assumption inherent in any method is that the unidentified individual comes from one of the populations represented by the reference groups;

— methods cannot allocate individuals into specific groups for which there is no reference;

— implications of the final population affinity estimation and whether it should be more broadly or narrowly defined;

— individual methods to estimate population affinity may result in different levels of specificity.

4.2.5 Reporting

Reports and/or case files shall contain documentation of the methods used to estimate population affinity, including applicable software and relevant output (e.g., probabilities of the estimate and measures of model performance). Raw measurements/coordinates and/or non-metric scores shall be recorded and maintained.

Methods' reference samples can never reflect the totality of worldwide human variation; accordingly population affinity should not be reported as absolute. Alternatives such as "consistent with" are appropriate.

When ambiguous results are obtained, the practitioner shall caveat a final estimate accordingly. When population affinity cannot be estimated, it shall be reported as undetermined.

As with any other single parameter of the biological profile, population affinity is not the sole basis for recommending an exclusion.

Annex A
(informative)

Population Affinity Rationale

The term population affinity is used in this document not to the exclusion of ancestry, but as a more inclusive term encompassing the estimation of an individual's similarity to various groupings of populations (see 3.5). Forensic anthropologists employ a variety of methods that draw on reference samples (i.e., populations) grouped in a variety of ways (social race, nationality, ethnicity, and others). Interpreting assigned group outcomes likewise has a variety of approaches, depending on the case context and the method(s) used. Traditionally, the practice of estimating a group affiliation has been described as ancestry, but because ancestry is not inclusive of the terms used in methods and reporting, we propose a more encompassing term. Ancestry is ambiguously defined, oftentimes conflated with race, and does not encompass how the population is defined in datasets. Population affinity as a term is more appropriate because it does not refer to a particular kind of grouping (e.g., geographic/temporal), and can include both social and/or biological groupings. This shift away from the estimation of ancestry was chosen to reflect publication trends and practices in forensic anthropology, and to distance this process from other disciplines' estimates such as DNA-based ancestry estimation.

Population affinity estimation is a component of the biological profile typically developed for comparison to the description of a missing person. This document is intended to assist forensic anthropologists when estimating population affinity from complete or partial adult human remains. The estimation of population affinity is based on skeletal variation (see 3.4), which results from microevolutionary mechanisms over time (both recent and remote) and space (from broad to microregional).

This document does not endorse races as valid biological categories.

The dynamic nature of research in this area precludes listing specific methods and techniques.

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