H20   Classification and Evaluation of Unusual Individuals Using FORDISC

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After attending this presentation, attendees will have a greater appreciation of how to interpret FORDISC output, especially when using it with crania originating from populations different from FORDISC's reference samples. The importance of the use of an appropriate reference sample will be emphasized.

This presentation will impact the forensic community and/or humanity by increasing the forensic investigator's knowledge of the utility of the FORDISC program and other discriminant function analyses in identifying unknown remains.

FORDISC is an interactive computer program designed to classify an unknown adult cranium based on known samples from the Forensic Anthropology Data Bank and the Howells (1989) world sample. FORDISC uses discriminant functions to construct a classification matrix and assign group membership of the unknown cranium into one of the selected reference groups.

The utility of FORDISC for use in classifying worldwide populations has been criticized in the past for its "attempts to constrain worldwide human cranial variability into discrete biological groupings, or races" [1] and for classifying sex based on size (robust vs. gracile) rather than shape. These analyses are misleading for two reasons and demonstrate the two most common misapplications of FORDISC: use of inappropriate reference samples and failure to properly evaluate the typicality and posterior probabilities provided by the program.

FORDISC is designed to classify unknown crania based on the reference samples in its database. The researcher guides the analysis by choosing the populations against which to classify the unknown, choosing from eleven population samples from the Forensic Anthropology Data Bank or 28 population samples from Howells' worldwide database. Reference samples chosen for comparison should be those most likely to be the source population of the unknown cranium. The posterior and typicality probabilities together indicate the strength of the classification. The posterior probability evaluates the probability of group membership under the assumption that the unknown belongs to one of the groups in the function [3]. Under the assumptions of the discriminant function analysis, the unknown cranium must be assigned to one of the groups chosen. The typicality probability, however, represents how likely the unknown belongs to any particular group, and includes the probability that the unknown may belong to several or none of the groups selected. This value indicates how atypical the unknown skull would be in the populations chosen for comparison.

In this paper, classifications will be evaluated using data from the Forensic Anthropology Data Bank and Howells' worldwide data, using crania from populations known not to belong to any of the reference samples. Posterior and typicality probabilities usually indicate that a cranium is not similar to any reference sample. In order for FORDISC to perform effectively, it must be applied in regions or contexts where reference samples adequately represent cranial variation.

References:

1.   Belcher R, Williams F, Armelagos GJ. (2002) Misidentification of Meroitic Nubians using FORDISC 2.0. Am J Phys Anth: 42-42 Suppl. 34
2.   Ousley SD, and Jantz RL. (1996) FORDISC 2.0: Personal computer forensic discriminant functions. The University of Tennessee, Knoxville.
3.   Tatsuoka MM. (1971) Multivariate analysis. New York: John Wiley and Sons.

FORDISC, Classification, Unusual Crania