## A101 Thirty Years of the Forensic Data Bank and Data Collection Procedures (DCP) 2.0: Continuity and Transformation

*Stephen D. Ousley, PhD*, Dept of Anthropology/Archaeology, Mercyhurst University, 501 E 38th Street, Erie, PA 16546; Richard Jantz, PhD, University of Tennessee, Dept of Anthropology, Knoxville, TN 37996-0720; Natalie R. Langley, PhD, Lincoln Memorial University, DeBusk College Osteopathic Med, 6965 Cumberland Gap Parkway, Harrogate, TN 37752; Kate Spradley, PhD, Texas State University, Dept of Anthropology, 601 University Drive, San Marcos, TX 78666; and Beatrix Dudzik, PhD, 250 S Stadium Hall, Knoxville, TN 37996*

After attending this presentation, attendees will learn some results of 30 years of data collection and new directions with the Forensic Data Bank (FDB), an important resource for forensic anthropology.

This presentation will impact the forensic science community by highlighting the ongoing growth and evolution of the FDB, assuring its continued relevance to forensic anthropologists.

The FDB was established through a grant from the National Institute of Justice (NIJ) in 1985 to meet the recognized need for updated osteological data. Modern forensic cases could not be analyzed adequately based on data from 19th-century anatomical collections.[1] For 30 years, the FDB has been a source for much of the research in forensic anthropology.[2] Numerous researchers have requested and used data from the FDB. The main goal of the FDB — to update data for estimates of sex and ancestry — has been accomplished, but data collection, like human variation, is an ongoing process. The data have been used to more fully appreciate the secular changes in American groups that have occurred over the past 200 years. Also, reflecting demographic trends, the data have expanded to include a substantial number of Hispanics, the largest ethnic group in the United States, which includes individuals from at least six countries from North, Central, and South America.[3]

Contributions from other forensic anthropologists, which were to sustain the FDB, have waxed and waned, but thanks to the efforts of Richard Jantz, data collection through the University of Tennessee (UT) students has been ongoing and includes new and expanded data sets. For example, when the FDB began, 3D digitizers were unknown in anthropology. Digitizers record 3D landmark coordinates, which can be analyzed using Geometric Morphometric (GM) methods. Additionally, Interlandmark Distances (ILDs) can be calculated from the landmark coordinates. Both GM analyses and ILDs have proven valuable in the statistical classification of human remains. Digitizers have figured prominently in FDB data collection, with nearly all craniometric data collected in the past 15 years using a digitizer. In recent years, more cranial and postcranial data have been collected from Mexico, Guatemala, Germany, South Africa, Japan, Korea, China, and Thailand.

Thanks to the collection of traditional craniometric and postcranial measurements, new methods were developed for statistical classification methods using FORDISC® or other programs and have made it easier to understand morphological variation and sexual dimorphism in American groups.[4] Stature estimation has been greatly simplified, refined, and standardized thanks to FDB data and FORDISC®. The new methods of estimating ancestry, sex, and stature demonstrate the synergistic connection between data and practical applications to help answer forensic questions. The ongoing FDB data collected will reflect upcoming measurement changes and improvements known as DCP 2.0.

One unexpected result was that age indicators, such as Todd and Suchey phases, have not been as informative as hoped. The scores show much higher correlations to known age than any published blind studies, meaning that most observers scored the indicators after a positive identification and knowing the age of the decedent. Hopefully, recording of other age-informative traits, such as traits that can be used in transition analysis, scored before positive identification, will be more valuable in the future.

More recently, other data, such as dental morphology observations, which have been shown to be useful in ancestry estimation, have been added to the FDB.[5] The new kinds of data in the FDB will be incorporated into new statistical software for sex and ancestry estimation and will necessitate new statistical methods to analyze them, such as logistic regression, Bayesian classification, kernel probability density classification, and k-Nearest Neighbor classification.[6] Additionally, the new software will incorporate machine learning classification methods. Additional features such as outlier detection and data transformations will make the software useful for exploratory data analysis and general research, and routines for handling missing data will help make the most of the reference samples.

The data banking concept was recently extended to subadults through the Pediatric Radiology Interactive Atlas (Patricia), which contains more than 45,000 radiographs from individuals up to 20 years old; other researchers have been compiling measurements, radiographs, and Computed Tomography (CT) and Magnetic Resonance Imaging (MRI) scans, and making them available online.[7] Data and methods from publications, Patricia, and other online sources could also be incorporated into the FDB and software. Age estimation for adults and subadults using transition analysis and other methods will also be part of the software package, which will make it much easier to record wide-ranging standardized osteological observations and submit information to the FDB.

**Reference(s):**


1. Jantz R.L., Moore-Jansen P.H. A data base for forensic anthropology. *Final Technical Report*, National Institute of Justice award number 85-IJ-CX-0021, 1987. Available at: https://ncjrs.gov/pdffiles1/nij/grants/111608.pdf.
2. Ousley S.D., Jantz R.L. The forensic data bank: documenting skeletal trends in the United States. In: Reiches, K. editor. *Forensic osteology* (2nd ed.), Springfield, IL: C.C. Thomas, 1997;297-315.
3. Spradley K. Project IDENTIFICATION: developing accurate identification criteria for Hispanics. *Final Technical Report*, National Institute of Justice award number 2008-DN-BX-K464, 2013. Available at: https://ncjrs.gov/pdffiles1/nij/grants/244194.pdf
4. Jantz R.L., Ousley S.D. *FORDISC 3: Computerized forensic discriminant functions*. Version 3.1. The University of Tennessee, Knoxville, 2005.
5. Edgar H.J.H., Ousley S.D. New approaches to the use of dental morphology in forensic contexts. In: Scott J.R., Irish J., editors. *Anthropological perspectives on tooth morphology: genetics, evolution, variation*. London: Cambridge University Press, 2013:510-534.
6. Hefner J.T., Ousley S.D. Statistical classification methods for estimating ancestry using morphoscopic traits. *J Forensic Sci* 2014;59:883-890.
7. Ousley S.D. A radiographic database for estimating biological parameters in modern subadults. *Final Technical Report*, National Institute of Justice award number 2008-DN-BX-K152, 2013. Available at: https://ncjrs.gov/pdffiles1/nij/grants/242697.pdf.


---

**Forensic Data Bank, Statistical Methods, Human Variation**