A3 Landmark and Measurement-Based Data Assistant (LAMbDA): A Pedagogical Tool for Cranial Landmark Data Collection

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After attending this presentation, attendees will be familiar with the Landmark and Measurement-based Data Assistant (LAMbDA) interactive website, which can be used as a pedagogical and/or reference tool for aiding in the collection of cranial landmark data. Additionally, attendees will understand the need for standardized cranial landmark definitions and a centralized data repository of definitions and diagrams for cranial landmark data collection in forensic anthropological analyses.

This presentation will impact the forensic science community by addressing inconsistencies within standardized definitions for all cranial landmarks. This information will be located in an online repository that includes standardized cranial landmark definitions, their locations, exceptions to certain definitions, depictions and photographs, and currently available reference material. A document repository is especially useful for learning and/or practicing a skill by allowing the user to easily access all related material in one location.

Cranial landmark data is one of the most informative components of data collection in forensic anthropological analyses. This data is used in more refined analyses to estimate sex and ancestry as components of the biological profile. When learning data collection procedures for landmark digitization, users refer to various sources for standardized definitions and diagrams. Definitions of some landmarks can be found in the literature, but there is not an available definition for every cranial landmark. Therefore, word-of-mouth definitions are transmitted from instructors to students, further emphasizing the need for a comprehensive and standardized list of cranial landmarks. Additionally, discrepancies between landmark definitions across separate sources can contribute to interobserver error. Further, unclear or imprecise definitions in reference material can lead to differences in interpretation of a given definition. This error can lead to flawed reference data (e.g., via multiple contributors to reference data in FORDISC®) or incorrect measurements through misidentification of landmarks, ultimately impacting classification.

Currently, cranial landmarks are defined across at least ten references, yet a single complete reference for all landmarks used in forensic anthropology does not exist. LAMbDA serves as a repository for all cranial landmark definitions, with accompanying diagrams and depictions. The LAMbDA website (www.locatelambda.org) features a 3D, interactive digital model of the human cranium labeled with cranial landmarks. Pop-up definitions of each landmark appear when the cursor is scrolled over the landmark. These definitions come from their original references when definitions are clear and consistent. Cranial landmarks previously undefined, with inconsistent definitions across references, or those that lack precision, are defined by the authors and approved by a panel of experts on this topic. The website includes 2D photographs demonstrating proper placement of cranial landmarks on bone exhibiting anatomical variants, such as lambdoidal and bregmatic ossicles. LAMbDA is designed to be compatible with 3Skull, as this program uses the most comprehensive list of 108 cranial landmarks; however, the website can be used to aid with data collection using other software programs, such as CRANID. Each written definition includes the landmark's associated measurements to aid in the interpretation of landmark placement. This presentation's goal is to provide LAMbDA as a pedagogical tool both in the classroom and in practice to assist students and practitioners in collecting standardized cranial landmark data for forensic anthropological analyses.

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