



### **F14 Use of Common Orthodontic Measurements to Investigate the Uniqueness of the Human Dentition and Biting Complex**

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After attending this presentation, attendees will see results of applying existing objective tools utilized within the specialty of orthodontics to forensic odontology to investigate the uniqueness of an individual's dentition and biting complex.

This presentation will impact the forensic science community by furthering the body of evidence needed to investigate the uniqueness of the human dentition and biting complex.

The American Board of Orthodontics (ABO) has adopted a measurement, called the Discrepancy Index, to evaluate the severity of malocclusions in cases that are submitted by candidates for board certification. The discrepancy index consists of objective categories that are scored individually. In this manner malocclusions can be categorized by severity. The following dental categories are included in this model and used for this study: overjet, overbite, anterior open bite, lateral open bite, maxillary crowding, mandibular crowding, molar relationship, lingual posterior crossbite, and buccal posterior crossbite. The following cephalometric measurements are included and utilized in this study: ANB, SN-MP, and lower incisor to mandibular plane. Finally, the following distinctive traits are scored: supernumerary teeth, ankylosis of permanent teeth, anomalous morphology, impaction, midline discrepancy, missing teeth, missing teeth-congenital, spacing, midline diastema, tooth transposition, and skeletal asymmetry.

In addition to the ABO's Discrepancy Index tool, for many years the specialty has utilized Bolton's tooth size discrepancy values to evaluate difficulty of cases. Bolton's tooth size discrepancy takes into account the summary of the mesial-distal width of the maxillary dentition from first molar to first molar and compares this to the mandibular summary. An ideal ratio has been established. An anterior ratio comparing canine to canine and a posterior ratio was utilized in this study. The last measurements used in this study were intercanine width and intermolar width for both arches. These twenty nine variables were analyzed individually to determine a distribution within the population as well as for their dependence/independence on other variables.

This study consisted of over one hundred pretreatment records from a private orthodontic practice in which digital radiography and Orthocad digital models were utilized. All dental measurements were made using the Orthocad software and specifically the Discrepancy Index module developed for the American Board of Orthodontics.

To determine the probability of uniqueness of the dentitions of the subjects in this study, a series of analyses were performed. First a sample distribution probability density function (pdf) from the sample data for each of the twenty nine variables was determined. Secondly, for each individual, an overall uniqueness index was created and the probability of this individual having this index was determined.

The results of this study indicate that the individuals in this study demonstrates a unique combination of variables. The "Bite Index" for each individual in the study was unique.

**Forensic Odontology, Uniqueness, Bite/Bite Marks**