

[\[Print Version\]](#)

[\[PubMed Citation\]](#) [\[Related Articles in PubMed\]](#)

The Angle Orthodontist: Vol. 65, No. 5, pp. 327–334.

Reliability of the Bolton tooth-size analysis when applied to crowded dentitions

W. Craig Shellhart, DDS, MS;^a D. William Lange, DMD; G. Thomas Kluemper, DMD, MS; E. Preston Hicks, DDS, MS, MSD; Alan L. Kaplan, PhD

^aDepartment of Growth and Development, School of Dentistry, UCHSC, 4200 E. Ninth Ave., Box C284, Denver, CO 80262

ABSTRACT

The Bolton tooth-size analysis is widely taught and used in orthodontics. However, its reliability has not been documented. The purpose of this study was to evaluate the reliability of the analysis when performed with needle-pointed dividers and a Boley gauge. Four clinicians measured the teeth on 15 sets of casts with two instruments at two sessions. The measurements were used to calculate tooth-size excess. To evaluate the measurement error, the difference between the two analyses made by the same investigator on the same set of casts was calculated. More of the same-investigator analyses were significantly correlated when the Boley gauge was used than when the needle-pointed dividers were used. Between-investigator analyses revealed significant correlations for each measurement session with both instruments. Every investigator was found to have at least one measurement error for each analysis and with each instrument that was as large as a clinically significant result of a Bolton analysis. The results of this study demonstrate that clinically significant measurement errors can occur when the Bolton tooth-size analysis is performed on casts with at least 3 mm of crowding. The Boley gauge demonstrated a higher frequency of significantly correlated repeated measures and thus may be somewhat more reliable for this analysis than the needle-pointed dividers.

W.C. Shellhart is an associate professor in the Division of Orthodontics, School of Dentistry, University of Colorado. This work was completed during his tenure at the University of Kentucky

D.W. Lunge is in the private practice of orthodontics in Ohio and was formerly a dental student at the University of Kentucky

G.T. Kluemper is an assistant professor, Section of Orthodontics, College of Dentistry, University of Kentucky

E.P. Hicks is an associate professor and director of the graduate program, Section of Orthodontics, College of Dentistry, University of Kentucky

A.L. Kaplan is an associate professor, College of Dentistry, University of Kentucky

KEY WORDS: Bolton, Tooth-size analysis, Needle-pointed dividers, Boley gauge, Reliability.

