

JA McNamara, Jr

Lysle E. Johnston, Jr: a perspective

Author's affiliation:

James A. McNamara, Jr, Department of Orthodontics and Pediatric Dentistry, The University of Michigan, Ann Arbor, MI, USA

Correspondence to:

Prof. James A. McNamara
Department of Orthodontics and Pediatric Dentistry
The University of Michigan
Ann Arbor, MI 48104-1078
USA
Tel.: (734) 763 3213
Fax: (734) 761 4759
E-mail: mcnamara@umich.edu

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I am pleased to provide some information about the life and times of Dr Lysle E. Johnston Jr, whom I have known for nearly three decades and with whom I have had the pleasure of working at the University of Michigan since 1991. Lysle served as the Robert W. Browne Prof. of Dentistry and Chair of the Department of Orthodontics in Ann Arbor from 1991 to 2004. I will attempt to summarize the many and varied contributions of Prof. Johnston to our specialty.

Lysle was raised in East Jordan, MI, and attended Central Michigan College before entering the School of Dentistry at the University of Michigan in 1957. He began his research career in 1959 as a technician tracing serial cephalograms as part of the *University of Michigan Elementary and Secondary School Growth Study*. After graduation from dental school in 1961, he spent a year at the Queen's University of Belfast in the laboratory of Dr James H. Scott, a noted craniofacial biologist, where Dr Johnston applied cephalometric methods (including what turned out to be a precursor of Fred Bookstein's method of tensor biometrics) to the study of prenatal facial growth. Prior to its publication in *The Anatomical Record*, an expanded version of this research received one of the *American Association of Orthodontists* research prizes in 1964. Dr Johnston then turned his attention to the problem of cephalometric growth prediction, a topic to which he has returned periodically for over 30 years. His original conclusion that, because of technical error and a paucity of information content, true prediction of how the face grows probably is impossible has yet to be refuted.

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After 5 years of cephalometric research, Lysle received a Career Development Award from the *National Institute of Dental Research* and moved to Cleveland and to the Western Reserve University School of Medicine, where 6 years later he received a PhD in anatomy. Based on the technical expertise gained from his PhD program, for the next 15 years Dr Johnston's research efforts focused primarily on problems of experimental craniofacial biology, including the testing of various contemporary hypotheses about the mechanisms regulating the growth of the head and face. In collaboration with a number of associates, Dr Johnston examined such questions as the role of the nasal septum and the septo-premaxillary ligament, the *in vivo* and *in vitro* growth potential and growth properties of condylar cartilage, cybernetic control mechanisms (*à la* the late Alexandre Petrovic), and experimental modification of condylar/mandibular growth (amount and direction), as well as hormonal and environmental influences. Toward the end of this phase of his research career, Dr Johnston began to turn his attention more and more to clinical investigation of the problem of describing and comparing the impact of common orthodontic treatment strategies and tactics.

Over the past 25 years, Lysle has developed a cephalometric analysis – the so-called 'pitchfork analysis' – designed to quantify the skeletal and dental components of the molar and overjet corrections achieved by various fixed and functional orthodontic treatments. Given this method of analysis, he has examined nearly 2000 carefully documented treatment outcomes, thereby providing the specialty of orthodontics with comparative data on the mode of action of a wide variety of common treatment options, including Tweed edgewise, pre-adjusted edgewise, Begg light wire, functional appliance therapy (bionator, activator and sagittal), premolar extraction (both first and second; one arch and two), non-extraction and second-molar extraction. This standardized retrospective approach has been used to describe treatment effects of various therapeutic regimens and later was modified to allow the comparison of protocols that can be used equally well in so-called 'borderline' patients.

For the past decade or so, many dentists and even a few orthodontists have argued that orthodontics causes a variety of untoward sequelae (e.g. temporomandibular disorders and poor facial appearance). Unfortunately there is little in the way of evidence either to support or refute their claims. An obvious solution to

the problem would be to gather prospective data; however, the treatments that are most often criticized and thus most in need of study are the ones for which ethical randomization would be nearly impossible. Lysle has devised an approach that controls susceptibility bias (the differences that cause a clinician to choose one strategy over another) and thereby permit valid comparisons based on retrospective data. Dr Johnston has modified the method of 'discriminant analysis' to permit the identification of groups of patients who, at the beginning of treatment, were equally susceptible (borderline) to whatever treatment strategies are being compared. This method has generated considerable interest and, in conjunction with two 5-year R01 grants from NIDR, has permitted Dr Johnston to conduct long-term (10–20 year) comparisons of orthodontics and surgery; extraction and non-extraction edgewise; and one stage and two (functional/fixed). Most recently, this approach has been employed as part of an extensive long-term study of the effects of orthodontic therapy (including its periodontal implications) in African American patients. Dr Johnston and his colleagues now are using the extensive data base assembled in these studies to validate the various orthodontic indices (e.g. the so-called PAR and IOTN indices) whose use currently is being assayed by a variety of American orthodontists and orthodontic groups.

Dr Johnston's overall research program is well respected and has earned, in addition to 10 years of research support from NIDR, numerous honors, both for him and his students. In the last 20 years of *American Association of Orthodontists* research prizes, his students have won four Milo Hellman Awards, six Sicher First Research Awards, and 13 Awards of Special Merit (in addition to one Hatton Award finalist). He was the winner of the 1993 *B.F. and Helen E. Dewel Award* for the year's best clinical paper published in *The American Journal of Orthodontics and Dentofacial Orthopedics* and the 1995 World Prize from *The Italian Society of Orthodontists* (10 000 000 lire and honorary membership) for the best paper in the orthodontic literature during the previous 2 years. He has been elected Fellow in the *Royal College of Surgeons of England*, as well as the *American and International Colleges of Dentists*. Because of his clinical research, he has been asked to address the annual national meeting of the *American Association of Orthodontists* 20 times since

1975 and has been invited to deliver a wide variety of named lectures, including the 1990 Mershon Lecture and the 1998 Salzmann Lecture of the *American Association of Orthodontists* and the 1983 Northcroft Lecture of the *British Society for the Study of Orthodontics*.

Most professional organizations have a lifetime achievement award that recognizes those individuals who have made outstanding contributions to their organization during their lifetime. Lysle received the *Albert H. Ketcham Award* from the *American Board of Orthodontics* in 2001 in recognition of his numerous contributions to our specialty. This award is recognized internationally as the highest and most prestigious award given in orthodontics and craniofacial biology.

The credentials of Dr Lysle E. Johnston speak for themselves. He has had a long and productive career, not only as a productive researcher as described above,

but also as Chair at three orthodontic programs (Case Western Reserve University, St Louis University, The University of Michigan). During his 33 years as departmental chair, his graduate programs have produced over 300 orthodontists. Whether as department chair, mentor, lecturer, or researcher, his focus never has strayed much beyond the day-to-day concerns of the clinician. He has served as a key spokesman who has questioned, scolded, asked for data, and generally served as resident skeptic when new (and often unproved) techniques and protocols have been advocated. Lysle Johnston has served our profession and our specialty well, not only providing leadership and direction within the context of a graduate orthodontic program, but also through his lectures and published research. His work has made and continues to make a difference to orthodontics, to craniofacial biology, and to dentistry.