Peak Height Velocity – Time to Bury a Persistent Musicological Myth?

Martin Ashley PhD

Peak Height Velocity (PHV) is an event that occurs towards the end of the period of male puberty. Most boys grow at an average rate of between 5 – 6 cm per annum during that period of childhood when they have useful, unchanged voices. Growth rate accelerates at the onset of puberty when voices begin to deepen. Towards the end of puberty, for a relatively short period it can more than double. 10.3cm per annum is given as an average, but that is over a period of several months. I have regularly recorded peaks of 14cm per annum or more over a single month. The significance of this is that PHV and "voice break" coincide quite closely. I use the term "voice break" advisedly because although we prefer to say "change", the fall in pitch during PHV can be quite rapid, measured in months, not years. Before PHV, a voice will still sound "boy like" even if quite a lot lower in pitch than during its unchanged period. After PHV it will sound unmistakably "young man like". Whether we like the term or not, this is "voice break", at least of the speaking voice. The biggest problem is that no satisfactory definition of "break", has ever been produced, still less consistently applied by musicologists. In 2013 a colleague from Leipzig and I undertook a meta-analysis of all the historical and musicological literature we could find on the timing of "voice break". We wrote in our conclusion that "It is frustrating that the statistical investigations reviewed regarding the voice change have used criteria and methods too inconsistently across studies to permit completely reliable comparison or the confident identification of a trend."[i] Nothing I have read since then has induced me to revise my position. The various fragments of documentary evidence presented in musicological texts fail to cohere into a plausible biological narrative.

2013 was before 2015 when a major new bioarchaeological study was published by Mary Lewis and her colleagues at the University of Reading.[ii] This study used advanced techniques of dental and skeletal analysis to identify growth patterns in adolescence. The sample was large. Nine hundred and ninety-four skeletons from four diverse UK sites were examined. The researchers were able the ages at which growth began to accelerate and the age ranges during which PHV was attained. Since then several similar studies of significance from across Europe have been published[iii] and all are agreed on three key points. First, that puberty began in historic times at much the same age as it does now,

between ten and twelve. Second that progress through puberty was slower, and third that these growth patterns were subject to significant regional and temporal variations associated with wealth, nutrition and the prevalence of disease. Since 2015, several more studies from various sites across Europe have appeared with similar results and an even greater stress on significance of population health and the extent to which infant and child mortality were part of normal life.

The significance of all this work is that it is not so much the time of "voice break" that we should be attending to as the time of PHV. The latter is a biological measurement whilst the former a subjective interpretation and not infrequently a cultural choice. Paradoxically, bioarchaeological studies may provide an explanation of why the documentary records of musicology can give such a range of conflicting results. No general statement such as "voices in the time of Bach broke much later than they do now" is possible. If we look at the timing of growth acceleration and PHV in modern boys, we find a considerable range either side of the mean,[iv] a fact that is almost invariably overlooked in generalised statements purporting to compare modern boys with their ancestors from the period covered by early music.

It is possible to find in the Lewis et al study examples of boys who reached PHV as young as eleven or twelve. A thirteen-year-old bass would have been perfectly possible in the sixteenth century much as it is possible now, particularly if from a wealthy family as in the famous Master of the Countess of Warwick portrait.[v] At the other extreme the Lewis study shows that in a small number of cases growth did not accelerate until as late as between 22 and 25. Such a voice might not "break" until perhaps age 30 if it did at all. Death before that age would perhaps have been at least as likely an outcome as the statistic was associated with considerable poverty. So the range really was remarkably large. It is large today but was evidently considerably larger in the past. The wealthiest site in the Lewis et al study (Barton upon Humber) shows a peak in the attainment of PHV at age 15, with a range at age 16 from puberty not begun to puberty completed. By way of comparison today, a boy should be referred to a paediatric clinic if there is no sign of accelerated growth by age 14 or no PHV by age 17.[vi]

This raises particularly significant questions about the social status of sixteenth century choristers. Were they from aspirant families of some wealth and consequent health as they generally are now or were they as one text has it "a poor and beggarly sort"?[vii] One thing I find interesting in the study of historic trends of growth is the coincidence of the Oxford Movement with a nadir in growth and health in those impoverished Victorian industrial towns where robed choirs were introduced in the interests of "beauty and holiness". Another thing to be wary of in reading any evidence is therefore the baseline against which measurements are made. If it were around the late 1800s, nearly all studies show modern boys quite significantly taller and heavier, but an earlier baseline such as the late 1500s in a wealthy area would show a rather smaller trend.

The timing of PHV in modern boys is in principle easy to identify if regular and accurate measurements of height are made, an exercise surprisingly rarely undertaken. Too much of what we believe we know is from cross-sectional rather than longitudinal studies even now. The key "takeaway" from this essay is that what should count is not the age at which somebody decides a singing voice has "broken" but the age at which a boy can be shown to have attained PHV. Once we know that we can begin to make some sensible deductions such whether or not he might be using some variety of falsetto to produce his singing range. If that is true today, it is certainly true for the period covered by early music, so musicologists should be searching for anything they can find about how rapidly a boy might have been growing.

Boat of Garten
October 2025

[i] Ashley, M. and Mecke, A-C. 2013. "'Boyes are apt to change their voices at about fourteene yeares of age': an historical background to the debate about longevity in boy treble singers." Reviews of Research in Human Learning and Music. 1 1-19.

[ii] Lewis, M., Shapland, F. and Watts, R. (2016) On the threshold of adulthood: A new approach for the use of maturation indicators to assess puberty in adolescents from medieval England, Annals of Human Biology, 28(1): 48– 56. doi: 10.1002/ajhb.22761

[iii] Doe, D. (2017) Assessing pubertal stage in adolescent remains: an investigation of the San Nicolás Maqbara burial site (Murcia, Spain), *Archaeological Anthropological Science*, 11: 541- 544; Sanchez, J. and Hoppa, R. (2019) Assessing Pubertal Stage from Adolescent Skeletons in Two Early 20th Century Documented Skeletal Collections, poster presentation to Canadian Association for Physical Anthropology; Arthur NA, Gowland RL, Refern RC. 2016. Coming of age in Roman Britain: Osteological evidence of pubertal timing. American Journal of Physical Anthropology 159: 698-713; Blom, A., Schats, R., Hoogland, M. L. P., & Waters-Rist, A. L. (2020). Coming of age in the Netherlands: an osteological assessment of puberty in a rural Dutch post-medieval community. American Journal Of Physical Anthropology, 174(3), 463-478. doi:10.1002/ajpa.24161

[iv] [iv] Cole, T., Pan, H. and Butler, G. (2014) A mixed effects model to estimate timing and intensity of pubertal growth from height and secondary sexual characteristics, Annals of Human Biology, 41 (1): 76– 83. DOI: 10.3109/ 03014460.2013.856472.

[v] Reproduced on p40 of McCarthy, K. (2013) *Byrd*. Oxford: OUP.

[vi] Royal College of Paediatrics and Child Health (undated), Boys UK 2-20yr Childhood and puberty close monitoring chart.

[vii] Flynn, J. (1995) The education of choristers in England during the sixteenth century, in J. Morehen (ed) *English Choral Practice 1400 -1650*. Cambridge: CUP.