Systematic musicology meets historical musicology: Quantitative indices of non-linear changes in durational variability of European art music

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Background. Research has used the normalised Pairwise Variability Index (nPVI) to examine relationships between musical rhythm and durational variability in composers' native languages (Patel & Daniele, 2003a, 2003b; Huron & Ollen, 2003). Syllable-timed languages like Italian and French have low nPVI while stress-timed languages like German have higher nPVI. Recent analyses of historical developments have ascribed linearly increasing nPVI in Austro-German, but not Italian music to waning Italian and increasing German influence on Austro-German music after the Baroque (Daniele & Patel, 2013). This is, however, a post-hoc hypothesis (VanHandel, 2005), and since we cannot perform controlled experiments on historical data, replication with more sensitive methods and new repertoires is required. Turning to French music, we hypothesise both an initial increase and a subsequent decrease in nPVI, based on documented increasing German influence on French music after the Baroque and reported decreasing nPVI in French vocal music composed in 1840-1900 (VanHandel, 2005). This prediction necessitates polynomial modelling.

Aims. We aim to replicate, refine and extend previous findings by including French composers and investigating the advantage of more sophisticated analytical strategies to detect non-linear historical developments.

Methods. Mean nPVIs were computed for 34 French composers (midpoint years: 1700-1941); previous data (Daniele & Patel, 2013) were available for 21 Austro-German (1672-1929) and 15 Italian composers (1613-1928). Polynomial modelling was used to predict mean nPVI from midpoint years.

Results. A 2nd-order polynomial outperformed a linear function for French composers, $Adj. R^2 = .284$, $F(2, 31) = 7.559$, $p < .002$; adding another parameter did not improve this fit significantly, $F(1, 30) = 2.012$, $p = .17$. Linear analyses showed non-significantly decreasing nPVI specifically for composers born after 1820, $r(21) = -.34$, $p = .11$; a preceding increase in nPVI was revealed, $r(9) = .73$, $p = .01$, which was identical in terms of effect size to that previously found for Austro-German composers. Previous findings for Austro-German (linear increase, $Adj. R^2 = .489$, $F(1, 19) = 20.138$, $p < .001$) and Italian composers (no change) were replicated.

Conclusions. Using musical nPVI analysis, we provide quantitative support for music-historical accounts of an Italian-dominated Baroque (composer birth years 1600-1750), a Classical Era (1750-1820) with Austro-German centres of gravity (e.g. Mannheim, Vienna), and a Romantic Era (1820-1900) with greater national and stylistic independence.