Exploratory study of instrument combinations in orchestral music

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ABSTRACT

Background

There exist a number of classic treatises in orchestration (Adler, 2012; Berlioz, 1855; Piston, 1955; Rimsky-Korsakov, 1922). Although they may recommend certain instrument combinations, there is surprisingly little theorizing concerning the implicit principles that might inform how to combine instruments.

Aims

In this study we examine patterns of orchestration within a historical context. Specifically, we trace changes in instrumentation patterns over the period of 1701 to 2000. In addition, in examining the instrumental combinations, we include information regarding specific pitches and dynamics played in various sonorities. This is a bottom-up data-driven exploratory study; hence there is no preset hypothesis to test.

Method

In brief, the method involved sampling 10 random vertical moments (hereafter sonorities) from each of 300 orchestral works composed between 1701 and 2000. Each sonority was coded according to the instruments present, as well as their pitches, dynamic levels, tempo, and date of composition.

In creating a longitudinal set of samples, we aimed to sample 50 works in each 50-year period from 1701 to 2000. In order to maintain high data independence, no more than three works by any given composer were sampled.

We will employ for analysis the instrumentation clustering methods used by Johnson (2011) with the additional factors of tempo and dynamics (see also Horn and Huron, 2012).

Results

Data collection remains in progress. Although premature, several predictable patterns are already evident. These include, for example, the high popularity of the harpsichord during the 18th century, its decline in the 19th century, and its resurrection among new music composers in the late 20th century. Similarly, the use of more “exotic” instruments (especially percussion instruments) is a notable trend in the 20th century. Not surprisingly, the ensemble size for orchestral works can be observed to have increased through the 300-year period.

We expect to observe some interesting interactions from the longitudinal data, such as for the correlation between pitch and loudness of an instrument or that between pitch and tempo. The data are also expected to reveal different patterns in instrument doubling across the three centuries considered.

Conclusions

This is our first effort to examine possible latent patterns in orchestral scores through the last 300 years. Apart from the rather obvious informal observations mentioned above, we are yet uncertain of what patterns will surface from the collected data. We presume that our analysis will replicate the instrument combination patterns in Romantic orchestral music observed by Johnson (2011), as well as replicate the musical expression clusters found by Horn and Huron (2012).

Keywords

Orchestration, historical patterns, instrument combinations

REFERENCES


