

Perceptual categorization of musical interaction: Case study on mixed music for the digital instrument Karlax and acoustic instruments

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A digital musical instrument (DMI) is a controller capable of novel sound controls using physical gestures of performance [1]. Despite burgeoning studies on the design of DMIs, there is less on how DMIs are used in real-world music and strategies of writing for them from an artistic perspective [2]. Compared to conventional live electronic music, a DMI “embodies” the otherwise disembodied electronic component due to the physicality of its performance, with a sense of “instrumentality” [3] that can be comparable to (and therefore interact with) an acoustic instrument.

A recent article [2] has proposed a set of interaction strategies for composing for a DMI and acoustic instruments. However, it is yet to be tested whether listeners can perceive any such compositional intentions of a composer, specifically the categorical differences between different types of musical interaction. The current study examines how listeners categorize interaction between Karlax, a model of DMI, and an acoustic instrument in real pieces. This study also aims to understand what contributes to the perception and understanding of musical interaction at large, which has not received much empirical investigation.

Six pieces (each for Karlax and a different acoustic instrument) were composed by student composers. Eight interaction categories (conceived as two-way communication) were first proposed and defined by the experimenters after viewing all pieces. These initial categories then guided the selection of 32 audiovisual excerpts, which all experimenters agreed to be salient and appropriate to the predefined categories. 36 musician participants watched the excerpts and were asked to sort them freely into groups according to the type of interaction they perceived. Participants rated each group on how well-defined it is and verbally described the perceived interaction.

Compared to the eight predefined interaction categories, hierarchical cluster analysis of the co-occurrence data from excerpt groupings suggests that three categories (termed “as-one-instrument”, “background”, and “disparate contact”) were distinctly grouped by participants, whose verbal descriptions of them match closely with those predefined by the experimenters. The data also suggest that excerpts belonging to the predefined super-category “dialogue” were relatively well grouped separately from other “non-dialogue” ones. Within the “dialogue” excerpts, participants were able to further focus on the temporal relationship between the two instruments and group together those that show an alternating call-and-response relationship. Multidimensional scaling of the co-occurrence data suggests that the perception of musical interaction in general is largely underpinned by two independent conceptual dimensions: the temporal behaviour (simultaneous vs. alternating playing), and the degree of sonic and physical synergy (disagreeing vs. agreeing).

The study aims to shed light on a DMI and its functioning in music as an embodiment of electronics capable of interacting with traditional instruments in meaningful ways. Moreover, the study provides some preliminary insights into the mechanisms of the perception of musical interaction. With issues like “interactivity” at the center of live electronic music [4], we expect the study to kindle further research on the perception of DMIs in action and encourage reflection on how to write for DMIs in mixed music.

References

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