Talk Title: Adaptive Metronome: A MIDI Plug-In for Modelling Cooperative Timing in Music Ensembles

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Abstract (max. 250 words)

We present a plug-in for music production software (i.e., digital audio workstations) that simulates musicians synchronizing to other musicians, either virtual or controlled by users. Notes of the parts controlled by users are played according to MIDI input (e.g., a drum pad). Notes associated with virtual musicians are played according to a linear phase correction model, where the time of the next note of each part is produced in weighted proportion to the asynchrony of the previous note and the notes of each of the other parts. Each virtual musician's performance is controlled by: two noise parameters defining the variability of central timer and motor implementation processes (Wing and Kristofferson 1973); a delay parameter, defining the variability in lag to play a note; and a set of alpha parameters, defining the correction to the asynchrony to other players (both human and machine). These parameters can differ between musicians and can be adjusted in real-time. The number of musicians can be configured allowing studies involving any mixture of virtual and human players. The plugin has been tested with the homophonic part of a Haydn piece with three virtual musicians and one user. Event times are logged to study ensemble synchronisation. The plug-in will be used as part of an interactive augmented reality ensemble (https://arme-project.ac.uk).

Wing, A.M., Endo, S., Bradbury, A. and Vorberg, D., 2014. Optimal feedback correction in string quartet synchronization. *Journal of The Royal Society Interface*, *11*(93), p.20131125.