


Please cite the Published Version

Enderby, Sean, Stables, Ryan, Hockman, Jason , Tomczak, Maciej, Wing, Alan, Elliot, Mark and Di Luca, Massimiliano (2023) Adaptive metronome: a MIDI plug-in for modelling cooperative timing in music ensembles. In: Rhythm Production and Perception Workshop 19, 19 June 2023 - 22 June 2023, Nottingham, United Kingdom.

Version: Accepted Version

Downloaded from: <https://e-space.mmu.ac.uk/633129/>

Usage rights:  In Copyright

Additional Information: This is an abstract of a poster presentation first presented at Rhythm Production and Perception Workshop 19

Enquiries:

If you have questions about this document, contact openresearch@mmu.ac.uk. Please include the URL of the record in e-space. If you believe that your, or a third party's rights have been compromised through this document please see our Take Down policy (available from <https://www.mmu.ac.uk/library/using-the-library/policies-and-guidelines>)

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

Sean Enderby^a, Ryan Stables^a, Jason Hockman^a, Maciej Tomczak^a, Alan Wing^b, Mark Elliott^c, Massimiliano Di Luca^b

^a Sound and Music Analysis Group (SoMA), Digital Media Technology Lab (DMT Lab), Birmingham City University;

^b University of Birmingham, Birmingham, UK;

^c University of Warwick, Coventry, UK;

e-mail address first author: sean.enderby@bcu.ac.uk

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.