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Li, Min Susan, Tomczak, Maciej, Elliot, Mark, Bradbury, Adrian, Goodman, Tom, Abdulkarim, Diar, Di Luca, Max, Hockman, Jason  and Wing, Alan (2023) Tempo change and leadership in ensemble synchronisation: a case study. In: 9th Joint Action Meeting (JAM 9), 10 July 2023 - 12 July 2023, Budapest, Hungary. (Unpublished)

**Version:** Published Version

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## **9<sup>th</sup> Joint Action Meeting**

July 10-12, 2023

Budapest, Hungary

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# Tempo Change and Leadership in Ensemble Synchronisation: A Case Study

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The ability to synchronise is a hallmark of professional music-making. Such synchronisation, without a conductor, is achievable by timing error correction, either through phase correction (Wing et al., 2014) or period correction (by adjusting the timekeeper interval; Schulze et al., 2005). Here we investigate how an ensemble employs such inter-personal adjustment of micro-scale timings to maintain synchronisation even whilst applying tempo changes associated with expressive musical interpretation. We invited the Coull Quartet to perform a Haydn excerpt in three different ways: 1) minimal temporal expression ('deadpan'), 2) 'normal' expression, 3) accelerando followed by rallentando. Leadership was assigned either to the first or second violin. Using linear and bounded generalised least squares (Jacoby et al., 2015) models of sensorimotor synchronisation, we estimated correction gain parameters for phase and period correction. Results suggested that the Coull Quartet tended towards a more democratic rather than hierarchical approach to group synchronisation. Interestingly, period correction was evident only when tempo changes were introduced into the performance, whereas phase correction was employed throughout, even during the 'deadpan' trials. These findings will help to develop interactive training tools for student chamber musicians.