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The relationship between sensorimotor synchronization and attentional sensitivity to perceptual violations

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Studies on sensorimotor synchronization (SMS) have shown that the variability (CoV) of both asynchronies and inter-tapping-intervals (ITIs) decreases as the mean ITI (and Inter Onset Interval, IOI) decreases (Repp, 2005). Such relationship is particularly evident in self-paced tapping tasks. The literature also shows that SMS not only facilitates an accurate timing of motor responses, but also supports broader temporal processes involved in motor planning, sensorimotor prediction, and attentional allocation. The present study used an SMS task and an auditory oddball task (AOT) in 21 college students to investigate the characteristics of SMS and its relationship with attentional sensitivity. We focussed on: (1) the pattern of ITIs CoV across various IOIs (500, 750, 1000 ms); and (2) the association between SMS and the detection of rhythmic and pitch deviations in an AOT. Results showed that ITIs CoV was significantly greater at 500 compared to 750/1000 ms. A regression analysis showed that ITIs CoV at 750 ms predicted the efficiency (as RTs) of pitch deviations detection, but not of rhythmic ones. From a predictive coding perspective, our findings suggest that lower SMS stability at shorter IOIs may reduce the efficiency of updating internal predictive models, promoting the implementation of pre-existing routines. Conversely, higher SMS stability appears to support fine perceptual and attentional abilities. Our preliminary findings offer insights for future studies on perceptual and attentional skills through the analysis of temporo-motor models.

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