



Universal mechanisms and cross-cultural variations in Sensorimotor Synchronization.

**Martin Le Guennec – Doctorant, EuroMov DHM**

Sensorimotor synchronization (SMS) is the temporal coordination between movements and an external rhythm. SMS relies on well-established mechanisms often represented through dynamical systems in mathematical models. While these "universal" mechanisms are thought to be well understood, research since 2 decades suggests that exposure to different cultural rhythms shapes our perception and execution of rhythmic patterns, focusing on polyrhythms. Our study investigated whether such cross-cultural influences extend to the fundamental mechanisms of synchronization by comparing Indian and French participants in a simple tapping task with an isochronous rhythm. This comparison provides insight into both shared and culturally specific aspects of SMS, illuminating the potential impact of rhythmic exposure on basic synchronization processes.

A review on human synchronization dataset.

**Théo Velletaz – Doctorant, EuroMov DHM**

Human synchronization refers to the coordination of timing between individuals' actions, movements, or physiological processes, in presence of a rhythmical context. This phenomenon can occur in various forms, such as matching rhythmic movements, aligning speech patterns, or synchronizing biological rhythms, and it plays a crucial role in social interaction, communication, and collaborative activities. Recognizing that empirical data are central to addressing any scientific question, this work aims to gather and centralize accessible online datasets related to human synchronization. One goal is make these datasets more visible and available to adjacent fields. By simplifying access to empirical datasets, we provide a first step toward a more comprehensive understanding of this highly interdisciplinary phenomenon.

Sommes-nous plus 'ensemble' lorsque nous sommes plus synchronisés ?

**Julien Laroche – Post-doc, EuroMov DHM**

L'optimisation de nos comportements sensori-moteurs passe souvent par une coordination spatio-temporelle fine de nos actions avec celles d'autres personnes. De nombreuses études, en laboratoire ou in situ, montrent que plus est que le degré d'alignement temporel entre les comportements de personnes en interaction co-varie avec diverses variables socio-affectives ('bonding', appréciabilité, pro-socialité, etc.). Cependant, la relation entre la synchronie des comportements et les variables socio-affectives est-elle strictement monotone ? De plus, ces modulations socio-affectives trouvent-elles leurs causes dans le produit de la synchronisation (i.e., le degré d'alignement temporel des comportements), ou bien dans les processus d'interaction qui conduisent à ces états synchrones (l'effort de réguler, ensemble, la temporalité de nos comportements et leurs relations) ? Ces questions sont une manière de réinterroger l'hypothèse selon laquelle l'optimisation des actions conjointes passe par une maximisation des synchronies interpersonnelles. Je ferai émerger cette discussion en présentant des travaux sur la synchronisation rythmique interpersonnelle, avec un accent marqué sur les interactions musicales.

Learning delays in SNNs using DCLS

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In SNNs, connections have a weight, but also a delay. It has been known for several decades that delays matter as much as weights for the dynamics, and that plastic delays strongly increase the SNNs' expressivity. What had been lacking is an efficient approach to train these delays. Here, we present our approach to do so, which outperforms previous proposals.