

Online Lecture #01

Thursday, 23rd January 2025, 12:00 – 14:00 CET

Moderator: Dr. Stephan Zahno (University of Bern; on behalf of the TREND Consortium)

Link to join: <https://unibe-ch.zoom.us/j/6447676603>

Analyzing Functional Variability – Decomposition and Quantification

Variability is ubiquitous in human movement control, compromising reliable achievement of action goals. Stochastic fluctuations, so-called noise, exist in the environment, in sensory input, in signal transduction, and/or in the functional state of the effectors. Yet, the control system exploits multiple strategies to reduce the negative consequences of such noise.

These strategies not only imply pure reduction of noise but can also involve specific adjustments to the task requirements. The variability in different parts of the movements may be shaped in a way that deviations in one part may compensate for deviations in other parts. Such variability can be considered as being “functional”. It does not endanger movement success but rather contributes to a reliable outcome. Furthermore, in case tasks can be solved in different ways, skilled people typically select solutions that are tolerant to variability in movement execution. Overall, these different strategies may all contribute to reducing the negative effects of noise; however, their specific relevance may differ from case to case.

Different methods have been introduced to quantify the contribution of each of these factors on overall performance and performance improvements during learning. These methods will be discussed with regard to their usefulness to describe and explain differences in learning and performance across different populations, also including clinical aspects.

Prof. Dr. Hermann Müller



Hermann Müller is full professor for Exercise Science at Justus Liebig University Gießen. His main research focus is on movement variability, particularly its relevance for motor control and motor learning. Moreover, he has also taken a leading role in a research consortium studying human multitasking.

Suggested Reading

Müller, H., & Sternad, D. (2004). Decomposition of variability in the execution of goal-oriented tasks – Three components of skill improvement. *Journal of Experimental Psychology: Human Perception and Performance*, 30(1), 212–233. doi: 10.1037/0096-1523.30.1.212

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