Symposium | Temporal Metacognition

Fri. Oct 17, 2025 9:15 AM - 10:45 AM JST | Fri. Oct 17, 2025 12:15 AM - 1:45 AM UTC Venue 2(Room 2)

[S2] Symposium 2: Watching the Clock Err: Different Levels of Explanation for Temporal Metacognition

Chair:Tutku Oztel(George Mason University)

Recent studies have demonstrated that the scope of the metacognitive abilities can be expanded to time and other metric domains, reflected in a trial-by-trial match between timing errors and error monitoring components. This reveals a robust temporal error monitoring ability that can also be observed in numerosity and spatial forms. The symposium aims at providing an extensive discussion on different levels of explanation of temporal error monitoring by bringing together speakers that employ diverse methodologies in humans, rodents, and computational modeling.
The first speaker will discuss how different methodological approaches can capture differential cognitive/phenomenological aspects of the metric error monitoring ability and shed light into our understanding of it at the cognitive level. The second speaker will discuss how this ability takes place at the computational level along with providing insights on its manifestation in mouse behavior. The last speaker will discuss how domain generality of temporal error monitoring can be investigated with motor action taking along with its physiological markers. While aiming at providing different methodological and theoretical approaches for the study of temporal error monitoring, this symposium series would be of particular interest for all researchers who aim to study time perception and magnitude representations at the consciousness level.

9:15 AM - 9:30 AM JST | 12:15 AM - 12:30 AM UTC

[S2-01]

Watching the Clock Err: Different Levels of Explanation for Temporal Metacognition

*Tutku Oztel[1] (1. George Mason University (United States of America))

9:30 AM - 9:45 AM JST | 12:30 AM - 12:45 AM UTC

[S2-02]

Cognitive Architecture Through Methodological Lenses: Understanding Temporal Error Monitoring

*Tutku Oztel[1] (1. George Mason University (United States of America))

9:45 AM - 10:00 AM JST | 12:45 AM - 1:00 AM UTC

[S2-03]

“Catching yourself trip” on timing errors

*Fuat Balci[1] (1. University of Manitoba (Canada))

10:00 AM - 10:15 AM JST | 1:00 AM - 1:15 AM UTC

[S2-04]

Exploring the Domain-Generality of Temporal Metacognition: From introspective reaction time to confidence in explicit timing

*Nathalie Pavailler[1] (1. CEA/DRF/Inst. Joliot, NeuroSpin; INSERM, Cognitive Neuroimaging Unit; Université Paris-Saclay, Gif/Yvette, 91191 France (France))

Watching the Clock Err: Different Levels of Explanation for Temporal Metacognition

*Tutku Oztel[1]

1. George Mason University

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Keywords: Temporal Error Monitoring, Metacognition, Time Perception, Levels of Processing

Cognitive Architecture Through Methodological Lenses: Understanding Temporal Error Monitoring

*Tutku Oztel[1]

1. George Mason University

Recent research indicates that error monitoring abilities extend to the metric domains of time, space, and number. In this talk, I will discuss our current understanding of metric/temporal error monitoring (TEM) by elucidating how diverse methodologies shape it.
First, I will focus on explicit measures of assessing TEM, delineating online and offline measurement. I will first discuss the discovery of phenomenological dissociation of timing error magnitude and direction within online measures. I will then identify key factors for monitoring cumulative timing errors within offline measures. Next, I will elaborate on TEM's application to non-motor timing, discussing how non-motor temporal biases are represented on a hypothetical mental timeline in temporal order judgment and why contextual temporal biases are exempt from metacognitive monitoring. Finally, I will address implicit indications of TEM through Bayesian integration of social cues in numerosity estimation. I will conclude by discussing implications for future investigations of TEM.

Keywords: Temporal Error Monitoring

“Catching yourself trip” on timing errors

*Fuat Balci[1]

1. University of Manitoba

Recent evidence shows that humans and rats can monitor their timing errors, namely “temporal error monitoring”. In the first part of this talk, I will present new evidence corroborating these observations in two mice studies. First study shows monitoring of temporal control, forming a rudimentary temporal error monitoring. The second study demonstrates a refined magnitude-based error monitoring. Together, these results demonstrate the nested architecture of temporal awareness. Next, I will present two drift-diffusion models of temporal error monitoring. First model affords the etrospective detection of timing errors, whereas the second model reads out and anticipates timing errors. Notably, second model affords the translation of real-time error signals into improved timing without violating psychophysical features of timing behavior. Finally, the task representation dependency of the refinement element accounts for the widely reported reward-rate maximizing timing behavior. Ultimately, this talk signifies the maturing empirical and theoretical scenery in temporal error monitoring research.

Keywords: Temporal Error Monitoring

Exploring the Domain-Generality of Temporal Metacognition: From introspective reaction time to confidence in explicit timing

*Nathalie Pavailler[1]

1. CEA/DRF/Inst. Joliot, NeuroSpin; INSERM, Cognitive Neuroimaging Unit; Université Paris-Saclay, Gif/Yvette, 91191 France

Temporal metacognition refers to the ability to monitor and evaluate timing-related processes but whether this type of metacognition is domain-general or domain-specific is unknown. To address this question, I will present two different lines of work. In the first one, we investigated introspective reaction time (iRT) judgments and showed their reliance on multiple sources of information combining direct readouts of mental operations and inferential processes (Pavailler et al, 2025). iRT is postulated to be linked to a generic performance monitoring system, as reflected by the Error-Related Negativity recorded with EEG (Pavailler et al., in prep).
In a second line of work, we used metaperception and developed a confidence forced-choice paradigm (de Gardelle & Mamassian, 2014, 2016) contrasting temporal and visual bisection tasks. I will discuss how these two approaches contribute to a better understanding of whether temporal metacognition relies on specialized or shared cognitive and neural mechanisms.

Keywords: temporal metacognition