Oral | Memory, Emotion, Decision

Sat. Oct 18, 2025 9:00 AM - 10:30 AM JST | Sat. Oct 18, 2025 12:00 AM - 1:30 AM UTC Venue 3(KOMCEE W Lecture Hall)

[20301-06] Oral 4: Memory, Emotion, Decision

Chair:Müge Cavdan(Justus Liebig University Giessen)

9:00 AM - 9:15 AM JST | 12:00 AM - 12:15 AM UTC

[20301-06-01]

Investigating the effect of emotion on the temporal resolution of visual processing in viewing flickering LED.

*Makoto Ichikawa[1], Misa Kobayashi[2] (1. Graduate School of Humanities, Chiba University (Japan), 2. Graduate School of Science and Engineering, Chiba University (Japan))

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

[20301-06-02]

Alpha power indexes working memory load for durations

*Sophie Herbst[1], Izem Mangione[1], Charbel-Raphael Segerie[2], Richard Höchenberger[2], Tadeusz Kononowicz[4,1,3], Alexandre Gramfort[2], Virginie van Wassenhove[1] (1. Cognitive Neuroimaging Unit, INSERM, CEA, Université Paris-Saclay, NeuroSpin, 91191 Gif/Yvette, France (France), 2. Inria, CEA, Université Paris-Saclay, Palaiseau, France (France), 3. Institute of Psychology, The Polish Academy of Sciences, ul. Jaracza 1, 00-378 Warsaw, Poland (Poland), 4. Institut NeuroPSI - UMR9197 CNRS Université Paris-Saclay (France))

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

[20301-06-03]

Mentally shifting in time induces a shift in the amplitude of evoked responses

*Anna Maria Augustine Wagelmans[1], Virginie van Wassenhove[1] (1. Cognitive Neuroimaging Unit, INSERM, CEA, Université Paris-Saclay, NeuroSpin (France))

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

[20301-06-04]

Mental Time Travel Impairments in Neurodegenerative Diseases

*Valentina La Corte[1,2], Pascale Piolino[1,2] (1. Memory, Brain and Cognition lab,UR 7536, University Paris Cité (France), 2. Institut Universitaire de France (France))

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

[20301-06-05]

Level of Detail in Near and Far Future Imagined Events

*Ori Levit[1], Guy Grinfeld[1], Cheryl Wakslak[2], Yaacov Trope[3], Nira Liberman[1] (1. School of Psychological Science, Tel Aviv University (Israel), 2. Department of Management and Organization, University of Southern California, Los Angeles, California (United States of America), 3. Department of Psychology, New York University, New York (United States of America))

10:15 AM - 10:30 AM JST | 1:15 AM - 1:30 AM UTC

[20301-06-06]

Perceptual decision making of nonequilibrium fluctuations

*Aybüke Durmaz[1], Yonathan Sarmiento[1,2], Gianfranco Fortunato[1], Debraj Das[2], Mathew Ernst Diamond[1], Domenica Bueti[1], Édgar Roldán[2] (1. Sissa (International School for Advanced Studies) (Italy), 2. ICTP (The Abdus Salam International Centre for Theoretical Physics) (Italy))

Investigating the effect of emotion on the temporal resolution of visual processing in viewing flickering LED.

*Makoto Ichikawa[1], Misa Kobayashi[2]

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We investigated how emotional responses with different degrees of valence and arousal evoked by viewing a photograph of various facial expressions affects temporal resolution of the visual processing. In Experiment 1, we measured the critical flicker-fusion frequency (CFF) as an index of temporal resolution of visual processing. We used the method of constant stimuli to measure CFF. We presented facial photographs with different expressions (anger, sad, or neutral) in an upright or an inverted orientation. Then, we presented flickering LED with seven different temporal frequencies of LED flicker, and the stimuli in which the duration of on and off of LED was 5ms (100 Hz) as catch stimuli. In each trial, participants reported whether they found the LED flickered or consistent by pressing keys. We found that CFF was smaller for the angry face than for the neutral face only with the upright presentation. In Experiment 2, we measured the detection rate of LED flicker with different ISI (20 or 100ms) between the facial photographs with different expressions (fear, sad, or neutral) and flicker of LED. We prepared four temporal frequency conditions for the LED flashing (15, 17, 19 ms conditions of the on-off of the flashing, and no flickered-consistent condition). Participants reported whether they found the LED flickered or consistent by pressing keys. Results showed that the detection rate for fearful face was significantly higher than the detection rate of the neutral face, and that the detection rate correlated with rating for arousal positively, and with rating for valence negatively only at short ISI. These results suggest that emotion evoked by viewing pictures may elevate the temporal resolution of the visual processing which was measure as CFF only with the upright presentation, and that this effect would decay within short period.

Keywords: critical flicker-fusion frequency, arousal, valence, facial expression, method of constant stimuli

Alpha power indexes working memory load for durations

*Sophie Herbst[1], Izem Mangione[1], Charbel-Raphael Segerie[2], Richard Höchenberger[2], Tadeusz Kononowicz[4,1,3], Alexandre Gramfort[2], Virginie van Wassenhove[1]

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Seminal models of explicit duration perception include a working memory component, serving the comparison between just encoded durations and durations stored in long-term memory. Yet, neither time perception models, nor time memory models provide clear predictions as to the representation of duration in memory. Previously, we have been able to show based on a novel n-item delayed reproduction task, that the precision of duration recall decreases with the number of items to be remembered in sequence, but not with the duration of the sequence (Herbst et al., 2025). This suggests that durations are maintained as discrete items, rather than a continuous temporal code. Here, we investigated the neural signatures of a sequence of durations (n-item sequence) held in working memory. We recorded human participants using magnetoencephalography (MEG) while they performed the n-item delayed reproduction task, which required to encode a sequence of durations, maintain it, and then reproduce it. The number of items in a sequence (one or three) and the duration of the sequence were varied orthogonally. Our results show that during working memory maintenance, the number of durations, but not the duration of the sequence, affected recall precision and could be decoded from alpha and beta oscillatory activity. Parieto-occipital alpha power showed a direct link with the precision of temporal reproduction. Our results extend the earlier behavioral findings suggesting that durations are itemized in working memory and that their number, not their duration, modulates recall precision. Crucially, we establish that alpha power reflects a universal signature of working memory load and mediates recall precision, even for abstract information such as duration.

Keywords: duration perception, working memory, alpha oscillations, beta oscillations, duration reproduction

Mentally shifting in time induces a shift in the amplitude of evoked responses

*Anna Maria Augustine Wagelmans[1], Virginie van Wassenhove[1]

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Through mental time travel (MTT), humans can explore past events or possible futures. One hypothesis is that MTT builds on flexible temporal cognitive maps of events' position in time (Gauthier & van Wassenhove, 2016). Previous studies have shown the implication of the hippocampal-entorhinal system for MTT (Gauthier et al., 2019; 2020), where the sequential firing of neuronal assemblies on shifting phases of theta oscillations codes for spatial position and distance (Dragoi & Buzsáki, 2006). Yet, the computation of temporal distances remains to be characterized. In a novel paradigm (N = 63), participants mentally projected themselves to different dates in the past or future. They were shown historical events, and had to report whether the event would happen before or after, with respect to their temporal position. We found that the further away in time participants imagined themselves to be, the slower their reaction times. This parametric shift shows that distance computations can be captured during MTT at a behavioural level, and grounds the hypothesis of a similar shift in neural responses. Herein, we adapted this task to magnetoencephalography (N = 31). We show that the amplitude of neural responses evoked by mentally projecting in time increased compared to being in the present, but did not shift along temporal distance. This suggests that the evoked response captures the operation of mentally projecting oneself in time, but not the underlying distance computations. Source reconstruction based on anatomical scans is ongoing to identify the regions contributing to this increase in evoked activity, with a primary focus on the hippocampus.

Keywords: mental time travel, cognitive map, MEG, hippocampus

Mental Time Travel Impairments in Neurodegenerative Diseases

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In recent decades, research on memory processes has expanded to include the mechanisms involved in envisioning future events, within the broader framework of mental time travel (MTT). *Prospection* refers to a broad and complex set of cognitive processes that enable individuals to anticipate, plan for, and mentally simulate future experiences.This study focuses on a specific form of episodic prospection known as episodic future thinking (EFT)—the capacity to project oneself forward in time to pre-experience personal future events.Previous studies have documented impairments in EFT among individuals with neurodegenerative diseases such as Alzheimer’ s disease (AD) and semantic dementia (SD), often related to long-term memory deficits. However, the neurocognitive mechanisms underlying these deficits remain poorly understood—particularly regarding the role of temporal distance.The aims of the present study were:
(i) to investigate MTT capacities across different temporal distances in AD and SD patients;
(ii) to disentangle the relationship between EFT and long-term memory deficits in these neurodegenerative profiles.Our results show that AD patients exhibited significant impairments in EFT for near-future events, while their performance for distant-future scenarios was relatively preserved. Additionally, they demonstrated deficits in past event recollection regardless of temporal distance. In contrast, SD patients showed an opposite pattern: preserved EFT for near and intermediate future events, but impaired performance for distant ones. Regarding the past dimension, SD patients showed deficits specifically for remote events.These findings contribute to a more nuanced understanding of how episodic and semantic memory impairments differentially affect past and future-oriented cognition in neurodegenerative conditions. The results carry both theoretical significance and potential clinical applications.

Keywords: mental time travel, memory, neurodegenrative diseases, personal temporality, episodic future thinking

Level of Detail in Near and Far Future Imagined Events

*Ori Levit[1], Guy Grinfeld[1], Cheryl Wakslak[2], Yaacov Trope[3], Nira Liberman[1]

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How does psychological distance influence the level of detail in our mental representations of future imagined events? According to Construal Level Theory (CLT), there are four psychological distance dimensions: events can feel distant in time (temporal), space (spatial), social relationship (social), or probability (hypothetical). Yet we lack direct measures of how these distances affect the level of detail in mental representations. We bridged this gap by adapting Reality Monitoring Theory's Memory Characteristics Questionnaire to measure the level of detail in future imagined scenarios. Across six studies (N=1,749), we demonstrated that psychological distance, including the temporal dimension, systematically reduces the level of detail in mental imagery. Study 1 found that more psychologically distant imagined scenarios were rated as significantly less detailed (r = -.16, p = .005). Studies 2-3 manipulated hypotheticality, showing that probable future meetings were imagined with greater detail than improbable future meetings (d = 0.47, p < .001). Study 4 examined the same idea in spatial distance (d = 0.20, p = .007), and Study 5 examined social distance (d = 0.31, p = .01). Study 6 specifically examined temporal distance: older adults closer to retirement age imagined their future retirement with greater detail than younger adults (r = .23, p < .001), and this increased temporal detail mediated the relationship between temporal closeness and actual retirement savings behavior (indirect effect: b = 0.06, 95% CI [0.01, 0.03]). These findings demonstrate that psychological distance systematically affects the level of detail in future mental representations. For timing research, this reveals how temporal distance affects mental representation: feeling temporally closer to events increases mental detail, which influences real-world planning behavior

Keywords: Psychological Distance, Temporal Distance, Mental Imagery, Future thinking, Construal level

Perceptual decision making of nonequilibrium fluctuations

*Aybüke Durmaz[1], Yonathan Sarmiento[1,2], Gianfranco Fortunato[1], Debraj Das[2], Mathew Ernst Diamond[1], Domenica Bueti[1], Édgar Roldán[2]

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A pedestrian deciding when to cross a busy street must consider not only the average traffic flow but also the fluctuations in the movement of individual cars. Similarly, the perceptual system must handle both local fluctuations in individual elements and the global patterns that emerge from their interactions. To investigate how the brain makes efficient decisions in such nonequilibrium systems—where evidence changes over time—we conducted three experiments with sixty-seven human participants who judged the direction of a particle exhibiting drifted Brownian motion. The entropy production rate extracted from the particle’ s trajectory served as a measure of noise dynamics.

We found that mean decision time was inversely proportional to the entropy production rate, establishing an analytical approach to predict the amount of time required to extract the signal given stimulus parameters. Moreover, participants required more time than predicted, indicating suboptimal decision times. An evidence integration approach, equipped with a memory time constant, resulted in tighter fits, indicating that participants adjusted their integration time window to stimulus dissipation, favoring the global trajectory of the stimulus over local fluctuations when the stimuli exhibited higher entropy production.

Furthermore, comparisons between blocked and intermixed conditions revealed that environmental stability was directly linked with decision optimality as well as the flexibility in adjusting integration time window. Complementary approaches indicated that decision optimality was linked to (I) memory load, (II) the recency effect, and (III) the ability to detect meaningful statistical cues in the evidence.

Overall, our work shows that providing a detailed model of the physical properties of the stimuli allows for a better characterization of the variables influencing perceptual decision-making, and refines our understanding of the temporal dynamics of efficient evidence integration.

Keywords: perceptual decision making, nonequilibrium systems, decision optimality, evidence integration, stimulus statistics, integration time window