Symposium | Healthy and Pathological Aging

Fri. Oct 17, 2025 5:15 PM - 6:45 PM JST | Fri. Oct 17, 2025 8:15 AM - 9:45 AM UTC Venue 1(Room 1)

[S3] Symposium 3: Towards a comprehensive understanding of time processing changes in healthy and pathological aging

Chair:Thomas Hinault(INSERM)

Time processing, the ability to process and memorize temporal information, is essential for cognitive functioning and supports the seamless execution of many of life's daily tasks. While cognitive aging is typically associated with changes in attention and memory, mounting evidence indicates distinct alterations in time processing in older age. These changes in time processing are exacerbated in pathological aging, including neurodegenerative conditions such as Alzheimer's disease and semantic dementia.
Research exploring interindividual differences in time processing with advancing age, and their underlying neural substrates, are crucial to inform our understanding of trajectories of healthy aging, as well as to improve the early detection of neurodegenerative disorders. Moreover, understanding the cognitive mechanisms driving age-related changes in time processing has the potential to improve our capacity to intervene and support older individuals to live well. In turn, investigating healthy and pathological aging trajectories can inform current neurocognitive models of time processing.
To address these questions, this symposium brings together a panel of diverse speakers from three different countries who will discuss recent developments in the cognitive neuroscience of time processing. Our objective is to provide a comprehensive overview of the neurocognitive mechanisms underpinning altered time processing in healthy and pathological aging, and to promote multidisciplinary collaboration to inspire new directions for future research.

5:15 PM - 5:30 PM JST | 8:15 AM - 8:30 AM UTC

[S3-01]

Towards a comprehensive understanding of time processing changes in healthy and pathological aging

*Thomas Thierry Hinault[1] (1. U1077 Inserm (France))

5:30 PM - 5:45 PM JST | 8:30 AM - 8:45 AM UTC

[S3-02]

Aging effects on the neural bases of temporal processing

*Thomas Thierry Hinault[1] (1. U1077 Inserm (France))

5:45 PM - 6:00 PM JST | 8:45 AM - 9:00 AM UTC

[S3-03]

Electrophysiological signature of explicit and implicit timing in young and older adults

*Giovanna Mioni[1], Fiorella del Popolo Cristaldi[1], Luigi Micillo[1], Nicola Cellini[1] (1. Department of General Psychology, University of Padova (Italy))

6:00 PM - 6:15 PM JST | 9:00 AM - 9:15 AM UTC

[S3-04]

Time processing in prodromal stages of Alzheimer's Disease

*Alice Teghil[1] (1. Sapienza University of Rome (Italy))

6:15 PM - 6:30 PM JST | 9:15 AM - 9:30 AM UTC

[S3-05]

Temporal processing disturbances in the dementias – from mechanisms to management

*Muireann Irish[1] (1. The University of Sydney (Australia))

Towards a comprehensive understanding of time processing changes in healthy and pathological aging

*Thomas Thierry Hinault[1]

1. U1077 Inserm

Time processing, the ability to process and memorize temporal information, is essential for cognitive functioning and supports the seamless execution of many of life’s daily tasks. While cognitive aging is typically associated with changes in attention and memory, mounting evidence indicates distinct alterations in time processing in older age. These changes in time processing are exacerbated in pathological aging, including neurodegenerative conditions such as Alzheimer’s disease and semantic dementia.
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Keywords: Cognitive Aging, Alzheimer’s disease, Mental time travel, Duration Processing, EEG

Aging effects on the neural bases of temporal processing

*Thomas Thierry Hinault[1]

1. U1077 Inserm

While behavioral studies have been conducted to specify age-related changes of time perception and the temporal structuration of memory content, the neural bases underlying these changes remain unknown. The TIMES project is currently investigating age-related changes in the neural mechanisms underlying temporal processing using simultaneous electroencephalography and functional magnetic resonance imaging (EEG-fMRI), in healthy young (20-35 years) and healthy older participants (60-75 years). In this talk, I will present preliminary results showing that individual levels of fronto-parietal theta-gamma synchrony are associated with the activity of the striatum and fronto-striatal functional connectivity couplings. These fronto-parietal theta-gamma couplings show a greater variability as a function of decreased striatal activity in older adults. By applying multiscale modelling to investigate network dynamics association with temporal processing, new insights can be obtained on both the evolution of the neural bases of temporal processing with advancing age and the heterogeneity of aging trajectories across individuals.

Keywords: aging

Electrophysiological signature of explicit and implicit timing in young and older adults

*Giovanna Mioni[1], Fiorella del Popolo Cristaldi[1], Luigi Micillo[1], Nicola Cellini[1]

1. Department of General Psychology, University of Padova

Age-related changes in temporal processing are widely reported, but it remains debated whether they result from a slowing of temporal processing or reduced cognitive functioning in older adults. This study examined electrophysiological signatures of explicit and implicit timing using EEG, focusing on CNV, N1/P2 amplitude, and beta band modulation. Young and older adults (N = 26) completed time bisection (explicit) and foreperiod (implicit) tasks. Results showed no significant CNV or N1/P2 differences between tasks in older adults. However, younger adults exhibited larger CNV amplitudes than older adults for supra-second intervals in the explicit task and for all intervals in the implicit task.
Additionally, younger participants showed greater beta desynchronization for all intervals in the implicit task. These findings suggest age-related differences in temporal processing, with younger adults displaying stronger neural engagement, particularly in implicit timing.

Keywords: aging, EEG

Time processing in prodromal stages of Alzheimer’ s Disease

*Alice Teghil[1]

1. Sapienza University of Rome

While impaired time processing is common in Alzheimer’ s Disease (AD), research on duration perception in early disease stages, such as Mild Cognitive Impairment (MCI), has yielded mixed results.
In this talk, I will present evidence that subtle alterations in duration processing may occur early in AD, as reduced performance in retrospective timing and temporal learning tasks already emerges in MCI. Differences in timing performance relative to healthy older adults are also found in Subjective Cognitive Decline (SCD), a preclinical phase of AD characterized by a self-perceived change in cognitive performance not revealed by neuropsychological tests. Recent results show that changes in duration processing in SCD are further modulated by the level of cognitive complaint, and are paralleled by time-dependent alterations in autobiographical memory. Findings shed light on factors underlying altered time perception in prodromal AD, and on the contribution of duration processing to episodic features of memory.

Keywords: Alzheimer’ s Disease

Temporal processing disturbances in the dementias –from mechanisms to management

*Muireann Irish[1]

1. The University of Sydney

Humans possess the remarkable capacity to navigate mentally through extended periods of subjective time. This capacity bestows immense flexibility in our thinking, enabling us to revisit events from the past via autobiographical memory, or to project oneself into the future via episodic foresight. There is now abundant evidence to indicate that these temporally extended voyages across past and future contexts are compromised in neurodegenerative disorders, reflecting the breakdown of large-scale brain networks implicated in memory, planning, and executive function. In this talk, I will provide an overview of mental time travel disturbances in frontotemporal dementia, semantic dementia, and Alzheimer’ s disease, paying particular attention to their respective underlying neurocognitive mechanisms. I will demonstrate how mental time travel disturbances likely represent a transdiagnostic feature of dementia, and how we can use this information to support many of the behavioural and functional impairments experienced by patients in their daily lives.

Keywords: Alzheimer’ s disease