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Temporality: Study of the Effect of Temporal Distance on the Episodicity of Mental Simulations Following Priming in Virtual Reality

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Introduction

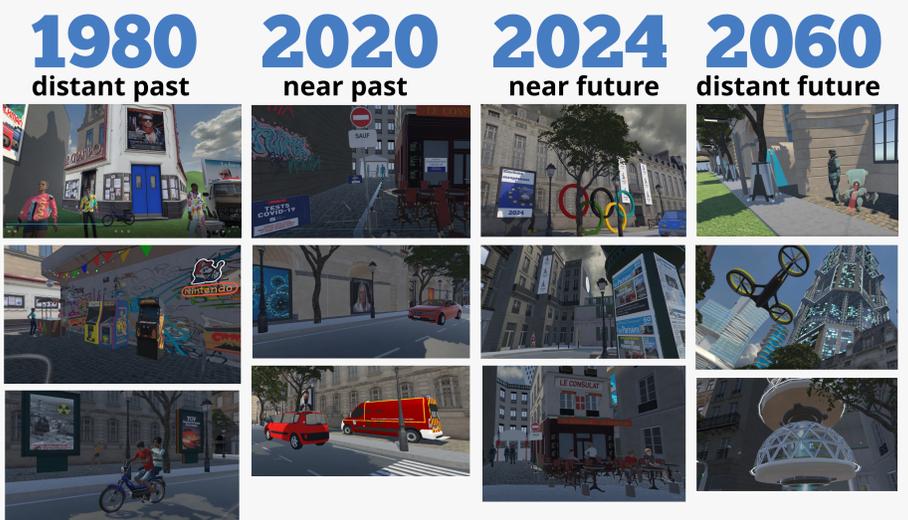
The "constructive episodic simulation" hypothesis (Schacter & Addis, 2007a, 2007b) proposes that episodic memory and episodic future thinking rely on similar mechanisms, and some studies indicate a common brain network (Szpunar, 2007). Recent research suggests that they are both manifestations of the same constructive simulation process (Addis et al., 2018). In line with this symmetrical function of memory and self-projection, the TEDIFT model (La Corte & Piolino, 2016) indicates that personal semantic information increases with temporal distance, becoming more prominent as self-projection moves further into the future or past. The aim of the present study is to investigate differences in episodicity between past and future mental simulations as a function of temporal distance using immersive virtual reality.

A virtual reality tool was developed to initiate mental projections into the past or future. In the first study, participants are primed for their episodic simulations with a virtual immersion in a past or future temporality. Four environments were created, titled "Near Past" (2020), "Distant Past" (1980), "Near Future" (2024), and "Distant Future" (2060), providing an itinerary through a city inspired by Paris. The study employs an within participant design, comparing episodicity scores (TEMPau, Piolino et al., 2000, 2003a, 2003b, 2006, 2009) in distant versus closer temporal conditions, regardless of the past or future nature of the immersion. In a second study, a "neutral" condition is presented to ensure a valid comparison between primed and unprimed conditions. The episodicity of autobiographical simulations will be compared within participants, following immersion in a specific temporality or in a neutral environment.

We hypothesize that the episodicity score will be lower in the more distant conditions than in the closer conditions, regardless of the past or future nature of the immersion. It is also hypothesized that the episodicity in each temporality condition will be stronger than in the neutral condition. This study has potential implications for understanding the neural mechanisms underlying episodic memory and episodic future thinking, as well as their functional role in self-projection.

Materials

The four universes share a similar visual style and structure, with almost identical buildings, while the differences in time periods are conveyed through details and specific scenes. Throughout the journey, public advertising signs display various events that have occurred in the past or could potentially occur in the future. The device incorporates sound, visual, contextual elements, and animations, as well as radio broadcasts, projections, and even holograms in the distant future.



Expected Results

Experience 1

episodicity of mental simulations :

distant past < near past
distant future < near future
distant future = distant past
near future = near past

Experience 2

episodicity of mental simulations :

distant past > neutral
distant future > neutral
near past > neutral
near future > neutral

Future Works

This research is particularly interesting on its applied side, it is part of the ANR project: "The interplay between memory and temporality: a transdisciplinary study in young and old subjects".

At the clinical level, the project could help to develop tools to evaluate the different aspects of memory and imagination, and new methods of non-drug management. Indeed, the perspectives of care in the accompaniment of neurodegenerative diseases are linked to the capacity of projection of oneself into the past and the future, and such a tool would make possible to work on one of these cognitive functions.

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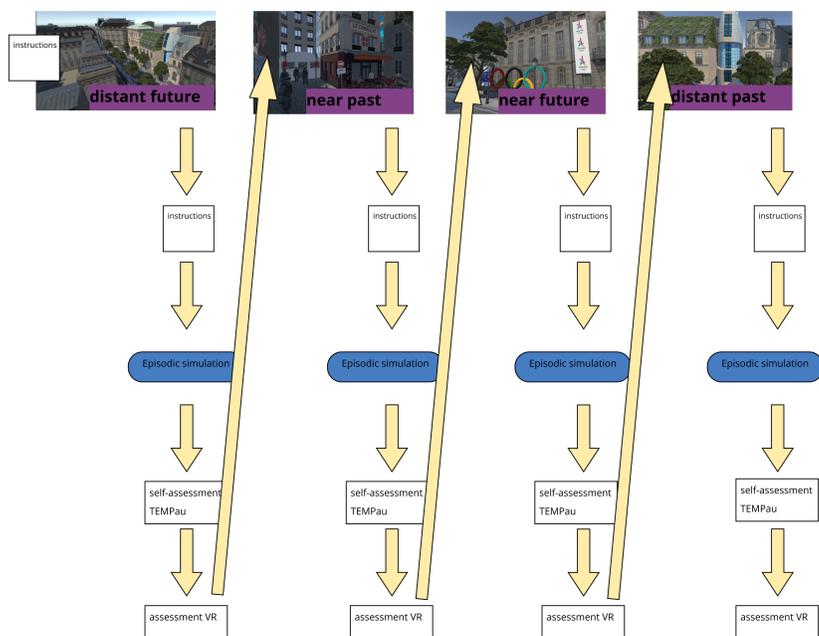
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Method

Experience 1 (within participants)

for each participant (within):



Experience 2 (within/between participants)

for each condition (within):

one condition per participant (between):

