

# TEMPORALITY

A person wearing a VR headset, looking upwards, with a hand holding a VR controller in the background.

Memory is a particularly difficult cognitive function to study. Indeed, reproducing in the laboratory the conditions in which memory is expressed in everyday life is not easy. For many years, studies on memory have suffered from this experimental constraint, and have focused mainly on the clinical observation of memory phenomena.

In the *Memory, Cognition, and Brain Laboratory*, we use virtual reality to reproduce the conditions in which memory is expressed in everyday life in an experimental setting.

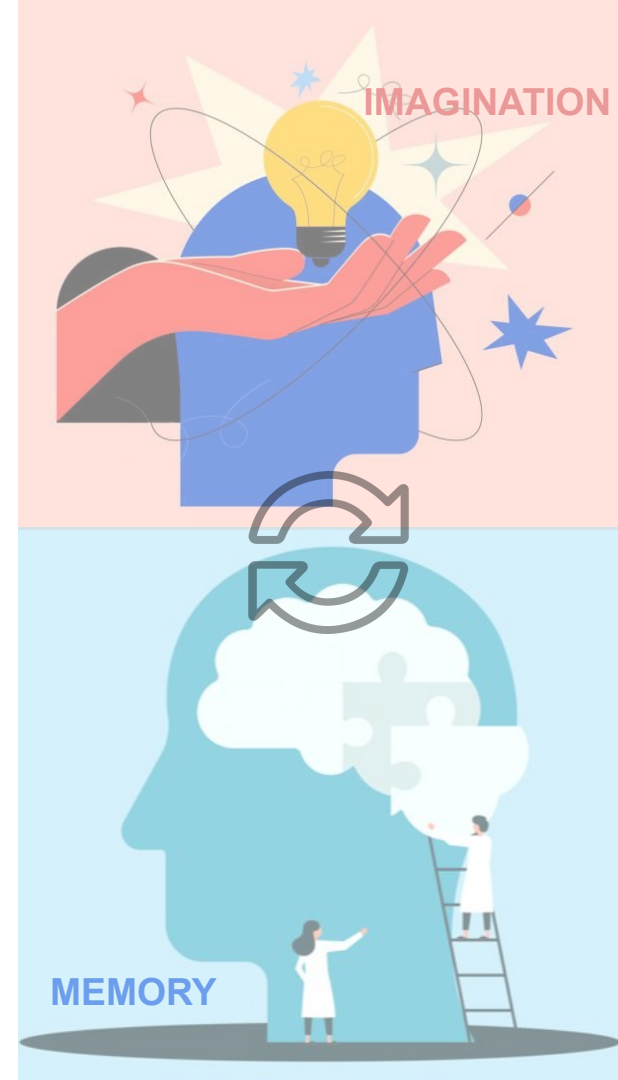
On the one hand, virtual reality allows us to control the environments in which the participants evolve, thus determining what they will memorize in advance. On the other hand, the participants can be put in original situations that could be impossible to simulate without this tool.

## MEMORY AND IMAGINATION

With Temporality, we want to study the mechanisms underlying memory and imagination as a function of the temporal distance separating us from recalled or imagined events.

Recent studies indicate that **memory and imagination are based on similarly constructed elements and use common brain networks**. In other words, we use the same mechanisms to remember the past and to project ourselves into the future (Szpunzar et al., 2007, Buckner & Carroll, 2007).

According to recent literature, (Addis et al., 2018) memory would no longer be considered the basis of imagination, but instead, **both memory and imagination would be manifestations of the same constructive simulation process**.

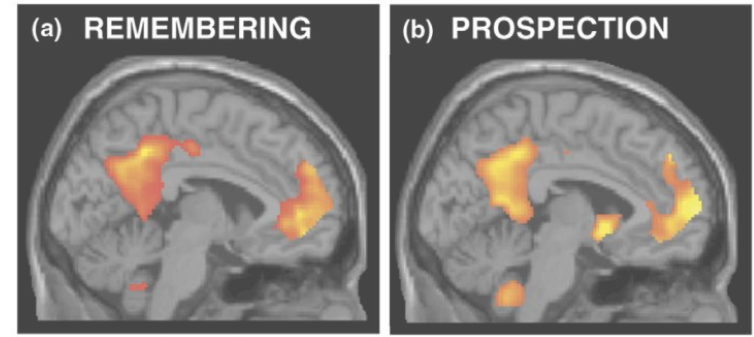


## EPISODICITY

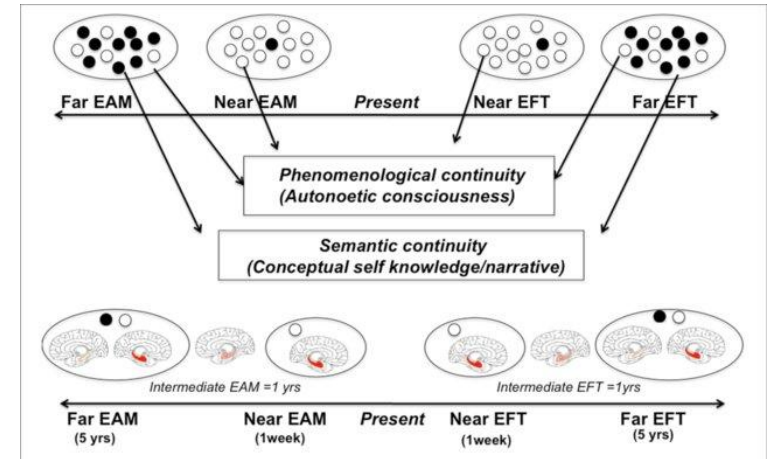
The TEDIFT model (La Corte & Piolino, 2016) postulates that **the proportion of personal semantic information increases with temporal distance**. Personal semantic representations become more prominent as self-projection moves further into the future or the past (Colas-Blanco et al, 2022).

We want to confirm that there is a difference in episodicity between past and future mental simulations after immersion in different temporalities. **We hypothesize that the episodicity score would be lower in the more distant conditions compared to the closer conditions, regardless of the past or future nature of the immersion.**

If the result are consistent, they will confirm that memory and imagination are two manifestations of the same constructive simulation process.



Buckner & Carroll, 2007.



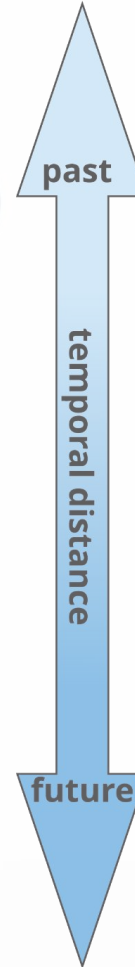
La Corte & Piolino, 2016

## Priming

A body of research shows that the priming of autobiographical items activates other episodic memories with similar content and that these memories have the potential to surface in subsequent acts of voluntary recall (Mace and Peterson, 2020).

We also **want to demonstrate that virtual reality is an effective priming tool** for reinforcing the episodicity of past and future episodic simulations.

Thanks to Temporality, we will be able to explore the effects of temporal distance by immersing participants in different past and future temporalities, more or less distant in time. We are developing a virtual “time machine” to demonstrate this common process between memory and imagination.





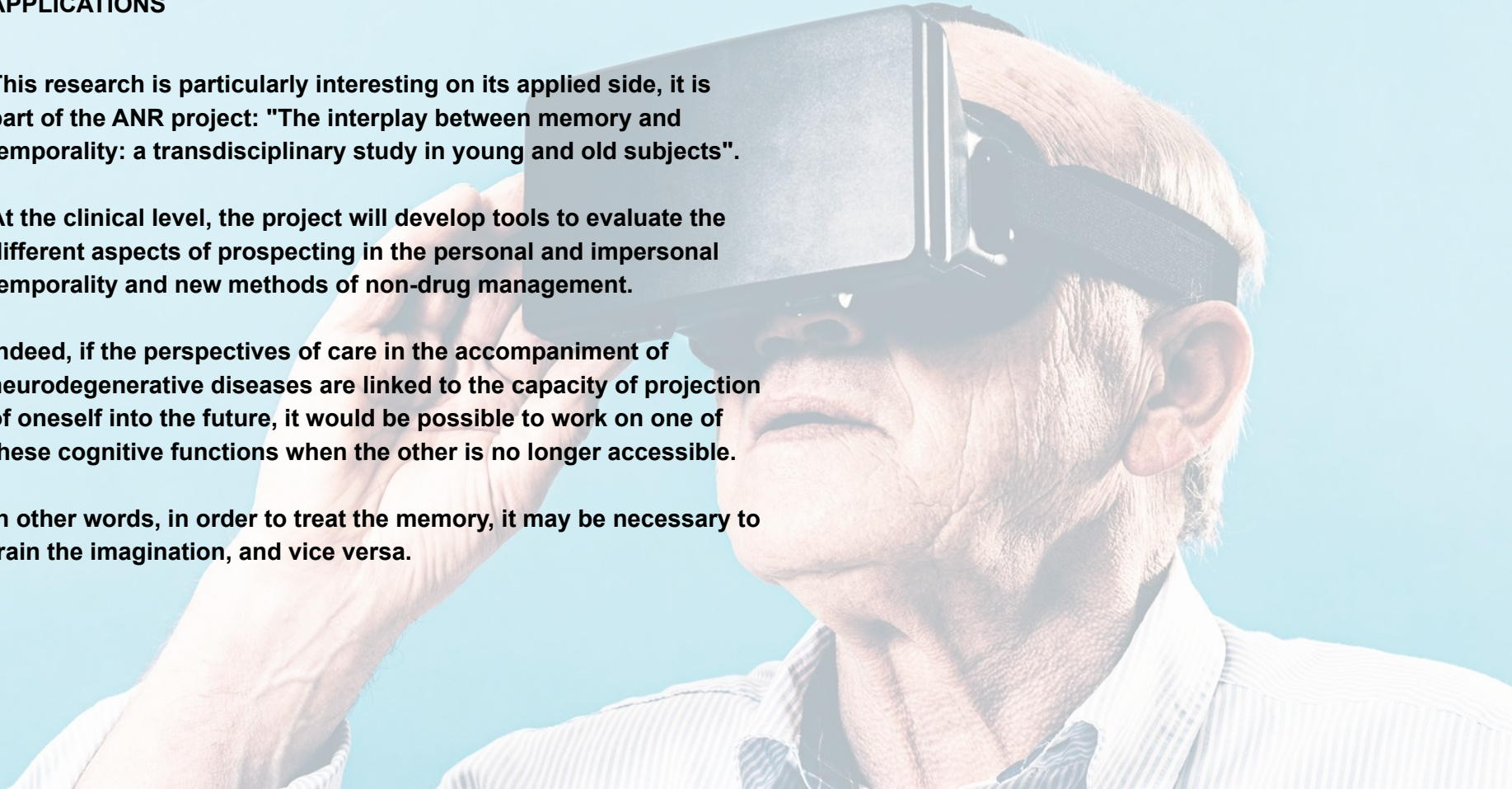
## APPLICATIONS

**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 will develop tools to evaluate the different aspects of prospecting in the personal and impersonal temporality and new methods of non-drug management.**

**Indeed, if the perspectives of care in the accompaniment of neurodegenerative diseases are linked to the capacity of projection of oneself into the future, it would be possible to work on one of these cognitive functions when the other is no longer accessible.**

**In other words, in order to treat the memory, it may be necessary to train the imagination, and vice versa.**



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