How can Virtual Reality be used to study the personal and collective future?

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ABSTRACT

This paper explores the potential of Virtual Reality (VR) as a novel tool for investigating personal and collective future thinking. Building on recent psychological research, particularly in the context of the COVID-19 pandemic, the author highlights how collective future thinking has emerged as a significant area of study. Traditional survey methods, while informative, limit causal inference and ecological validity. VR offers a promising alternative by enabling immersive, manipulable environments that simulate diverse future scenarios. The author outlines new directions in research using VR to examine how individuals perceive personal versus collective futures within varied simulated UK environments. This approach aims to deepen understanding of the cognitive mechanisms underlying future thinking and its societal implications, including how immersive VR experiences might influence beliefs, intentions, and behaviors.

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In this short paper, I aim to give a broad outline of my scientific background, my interest in collective future thinking, and some key issues I hope to address using virtual reality environments. In straying from the typical academic format of a research article, my hope is that I can expand on my experience of discovery and exploration, as well as

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directing the reader to relevant research, which I hope will open this research to new eyes and fresh perspectives.

My Journey into "Future Thinking"

To start this article with some personal background, my journey into future thinking research started at a Master's degree at the University of Leeds (UK) with Professors Martin Conway and Chris Moulin. My thesis drew solely from data from one individual — an ex-Police Officer who, subsequent to a stroke, imagined unlikely and implausible futures, like owning a garden on the moon and owning Mount Kilimanjaro (see Cole et al., 2014). My PhD at Leeds was a follow-up to this, exploring more diverse factors such as the role of age, executive function, imagination, and amnesia (severe memory loss) in the ability to imagine the future (e.g., Cole et al., 2016a). In my post-doctoral position at the Centre on Autobiographical Memory in Aarhus, Denmark, my research on future thinking examined the extent to which future thinking occurs spontaneously — when the future "pops in our heads, unannounced" (Cole et al., 2016b). In short, the study of future thinking has dominated my research since my very first postgraduate research. I've researched it for the past 20 years, and it's likely I'll be examining this fascinating topic for another 20, perhaps. But based on psychological research, it is clear that no one ever knows how to predict one's own future.

However, I'd like to take this opportunity to explain how me and others have recently taken what we know about imagining the personal future to understand how people imagine a *collective* future. There are key differences between the two, the former involving the self to a greater degree. But are there psychological characteristics of personal future thinking that we can apply to collective futures? Can we use this information to create different ways of "seeing" our collective future? In my past research, I recently used my knowledge of the imagined personal future (mentioned above) to explore cognitive effects of the COVID-19 pandemic. Now, I have turned my attention to exploring how virtual reality can be applied to ask and understand new questions in future thought — especially concerning how Virtual Reality can inform our collective and personal future thoughts.

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Wider Psychological Literature on Future Thinking Research

Whereas in the 2000s, researchers were trying to establish the topic of future thinking as a valid and fruitful area of empirical study, now it has penetrated into various sub-fields such as health, neuropsychology, mental health and goal pursuit. This is reflected in the number of senior researchers who specialise in future thinking, as well as the many talented young PhD students who have started their research journey in this area. There is now a wealth of scholarly articles, reviews and books on the topic, one of my favourites being "Seeing the Future", which incorporates a multi-approach appraisal on the topic, with varied (sometimes diametrically opposed!) theoretical stances (Michaelian et al., 2016). This activity has stabilised future thinking as a key topic in psychology.

Enter COVID-19: From the personal-to-collective

With any popular topic, taken up across various labs globally, it can become a challenge to find the "new way", a new way of *seeing* the topic or a new way to *measure* it. For many researchers (including me), the COVID-19 pandemic provided fertile ground for such a new way. In the midst of a global pandemic, a large group of researchers came together from 15 countries to study global and national past and future thinking.

Our data made it clear that although key differences in national experiences (morbidity rates, movement restrictions) affected aspects of our future thoughts, there was a surprising unity in how people "saw the future" — proof, of sorts, that physically isolated people could ironically have a collective sense of what the future would look like. And first evidence perhaps that collective futures could be based on national or even global themes. This work was built on an emerging definition being used to define collective future thinking; "*the act of imagining an event that has yet to transpire on behalf of, or by, a group."* (Szpunar & Szpunar, 2016, p. 378), and links to broader theoretical work on how the COVID-19 pandemic affected many aspects of our cognition, including time perception (Pawlak, & Sahraie, 2023).

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And so, the researchers involved in this project (termed Remembering COVID-19 [https://osf.io/m46nq/]; which has so far produced three articles: Cole et al. (2023); Lanciano et al. (2024); and Öner et al. (2023) were inspired to re-examine collective future thinking in more depth and breadth — such as the ability of COVID-19 to form "flashbulb memories" (as did 9-11 in 2001) and the spontaneous nature of many past and future events experienced in the pandemic. Importantly, several other projects of collective future thinking had started to emerge during and shortly after the pandemic (e.g., Migueles Seco & Aizpurua Sanz, 2023; Topçu & Hirst, 2024). Interesting results also emerged concerning the emotional tone of collective futures, suggesting a dystopian pattern for the collective and an optimistic pattern for the personal future (Liu & Szpunar, 2023). People seem to have a tendency to imagine a positive outlook for themselves in the context of a negative or worsening outlook for their country.

However, many studies — including ours — were based on data from online surveys. Surveys substantially restrict the kind of questions we can ask about collective future thinking because they are only a single snapshot of one point in time (McClure et al., 2025). Cause and effect cannot be examined with this method. Could we start to bring people into the lab to describe what they thought about their collective future? Could we examine cognitive processes and exert more control over key variables? Clearly, this is possible because researchers had done this when investigating personal future thinking in the years of its emergence as an area for scientific discovery.

My journey into Virtual Reality, and connections with Paris

In 2024, when visiting a research lab in Liege, Belgium, I received an email from a well-known researcher in memory and future thinking research. This was somewhat surprising because in academia, one rarely receives invites to research stays. Often, such invites are often illusory, mistaken, fake or involve expertly concealed costs! The invite was thankfully very genuine and was an invite to join Professor Pascale Piolino and her team in her Memory, Brain and Cognition lab (Le Laboratoire Mémoire, Cerveau & Cognition LMC^2^) at Université Paris Cité (UPC). The invite was to explore future thinking with Virtual Reality.

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To initiate early discussions, we successfully obtained funding from Université Paris Cité's International scientific program for a two-week research visit, which I started in January 2025. This sparked the idea to combine the lab's ongoing work on Virtual Reality with the emerging concept of collective future thinking: *Could we build virtual environments representing different collective futures?* However, it became clear that creating new virtual environments and reviewing the literature would require substantial time. Thankfully, the one-month writing residency program from the Institute for Advanced Studies, Paris (L'Institut d'Études Avancées de Paris) -from which this article has arisen - offered a unique and incredibly useful opportunity to present early ideas to a multi-disciplinary group, develop a first empirical project on virtual reality and collective future thinking, and delve much deeper into the literature on both VR and collective future thought, and how the former may be used to study the latter.

What "gains" have been achieved by using Virtual Reality in the study of human *Memory*?

Whereas traditional memory research used non-meaningful stimuli (e.g., three-letter non-words like GAD), recent work has used images from the real world to increase the ecological validity of to-be-learnt stimuli. For example, images from wearable cameras have been used to stimulate and improve memories (Mair et al., 2017) and to investigate their cognitive processes (Lenormand et al., 2024a; St. Jacques et al., 2011). Whereas isolated cues such as images, sounds or smells may be used to investigate memories and future thoughts, virtual reality offers a first-person environment in which people can become immersed in and "experience". Although the person in VR is conscious of the simulated nature of the VR world, environments can be created to mimic familiar environments which can be moved through voluntarily, with various integrated and synchronized multi-sensory layers (e.g., sounds of voices and cars, 3D-visuals of close and distant objects, see Lenormand et al., 2024b). These environments offer a unique advantage over isolated cues, as people can explore virtual rooms, spaces and objects from a first-person perspective, "walking through and within" the virtual world. This realistic-simulated environment can be used to test models of memory. For example, Parisians moving through virtual streets with familiar Parisian objects to examine memory processes associated with carrying out future actions (prospective memory,

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Lecouvey et al., 2017), or people experiencing Paris in the 1980s to examine how this affects certain qualities of personal memory (Lesur et al., 2025).

In memory research, hypotheses about memory processes can be tested in life like virtual environments in which participants encode and later retrieve information from the environment. It is assumed that due to the similarity between the way memory works in real and virtual scenarios, VR paradigms can be used as a valid method to further explore and understand human memory. VR has even been used as a reliable tool for memory assessment, providing more ecological validity than typical paper-and-pencil assessment tasks (Plancher & Piolino, 2017).

What can Virtual Reality offer in studying Future Thinking?

Where VR may offer more benefits than its ability to recreate the past is its ability to simulate not only the familiar but the *predicted*, *expected* or even *unexpected*. VR can be used to vividly represent different possible scenarios that people may not have considered — and to examine their effect on how people imagine the future. This is what we will be doing in our study of VR to examine personal and collective future thinking. By creating different "versions" of a UK collective future, and asking people to walk through the environments virtually, we expect differences in how people perceive their own and their collective future. The flexibility of VR allows us to show people *different versions* of the future, and this can be systematically and reliably manipulated between different groups of participants. This represents the start of a new avenue of research, that can grow to investigate cognitive aspects of personal and collective futures and how they may interact — are the ways we perceive our personal future truly dissociable from our imagined collective futures?

Conclusions

This new application of virtual reality is interesting in part because one key function of the human ability to imagine is to simulate different plans and choose the optimal one for goal attainment (Suddendorf & Corballis, 2007). VR could provide a realistic environment for humans to "play out" possible realities and think about their effects on

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how people live their lives. The first-person perspective may add an experiential quality that does not exist with isolated stimuli and static visual cues. Perhaps VR can be used to see if the type of future one is immersed in will affect the quality or quantity of future thoughts — whether collective or personal. There may also be important societal benefits: If we can change the way people see the future, this may have effects on perceptions, intentions, beliefs and possibly even behaviours — the often immovable holy grail of psychological outcomes.

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Bibliography

Chaumon, M., Rioux, P.-A., Herbst, S. K., Spiousas, I., Kübel, S. L., Gallego Hiroyasu, E. M., & Wassenhove, V. (2022). The Blursday database as a resource to study subjective temporalities during COVID-19. *Nature Human Behaviour*, *6*(11), 1587–1599. https://doi.org/10.1038/s41562-022-01419-2

Clayton McClure, H., Shevchenko, J., & Cole, S. N. (n.d.). New directions in mental time travel research: Understanding the ways future thinking can be applied to real-world challenges. In M. E. Haj, M. Irish, & S. Janssen (Eds.), *Handbook of Autobiographical Memory: From Basic to Applied Perspectives*. Elsevier.

Cole, S. N., Fotopoulou, A., Oddy, M., & Moulin, C. J. (2014). Implausible future events in a confabulating patient with an anterior communicating artery aneurysm. *Neurocase*, *20*(2), 208–224.

Cole, S. N., Morrison, C. M., Barak, O., Pauly-Takacs, K., & Conway, M. A. (2016). Amnesia and future thinking: Exploring the role of memory in the quantity and quality of episodic future thoughts. *British Journal of Clinical Psychology*, *55*(2), 206–224.

Cole, S. N., Staugaard, S. R., & Berntsen, D. (2016). Inducing involuntary and voluntary mental time travel using a laboratory paradigm. *Memory & Cognition*, *44*, 376–389.

Cole, S. N., Markostamou, I., Watson, L. A., Barzykowski, K., Ergen, İ., Taylor, A., & Öner, S. (2023). Spontaneous past and future thinking about the COVID-19 pandemic across 14 countries: Effects of individual and country-level COVID-19 impact indicators. *Journal of Applied Research in Memory and Cognition*, *12*(4), 502.

Jacques, P. L., Conway, M. A., Lowder, M. W., & Cabeza, R. (2011). Watching my mind unfold versus yours: An fMRI study using a novel camera technology to examine neural differences in self-projection of self versus other perspectives. *Journal of Cognitive Neuroscience*, *23*(6), 1275–1284. https://doi.org/10.1162/jocn.2010.21518

Lanciano, T., Alfeo, F., Curci, A., Marin, C., D'Uggento, A. M., Decarolis, D., Öner, S., Anthony, K., Barzykowski, K., Bascón, M., Benavides, A., Cabildo, A., Mata-Benítez, M. L., Ergen, İ., Filip, K., Gofman, A., Janssen, S. M. J., Kai-Bin, Z., Markostamou, I., … Zheng, J. (2024). The flashbulb-like nature of memory for the first COVID-19 case and the impact of the emergency. A cross-national survey. *Memory (Hove, England*, *32*(2), 264–282. https://doi.org/10.1080/09658211.2024.2310554

Lecouvey, G., Gonneaud, J., Piolino, P., Madeleine, S., Orriols, E., Fleury, P., & Desgranges, B. (2017). Is binding decline the main source of the ageing effect on prospective memory? A ride in a virtual town. *Socioaffective Neuroscience & Psychology*, *7*(1). https://doi.org/10.1080/20009011.2017.1304610

Lenormand, D., Fauvel, B., & Piolino, P. (2024). The formation of episodic autobiographical memory is predicted by mental imagery, self-reference, and anticipated details. *Frontiers in Psychology*, *15*, 1355343. https://doi.org/10.3389/fpsyg.2024.1355343

Cole, S. N. (2025). How can Virtual Reality be used to study the personal and collective future? In *Proceedings of the Paris Institute for Advanced Study* (Vol. 21). https://doi.org/10.5281/zenodo.15833948
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Lenormand, D., Mentec, I., Gaston-Bellegarde, A., Orriols, E., & Piolino, P. (2024). Decoding episodic autobiographical memory in naturalistic virtual reality. *Scientific Reports*, *14*(1), 25639. https://doi.org/10.1038/s41598-024-76944-3

Lesur, B., Corte, V., Gaston-bellegarde, A., Colás-blanco, I., & Piolino, P. (2025). The Times They Are A-Changin': Exploring Episodic Simulations Across Temporal Distances with Virtual Reality. *Manuscript Under Review*.

Liu, J. H., & Szpunar, K. K. (2023). Structure and dynamics of personal and national event cognition. *Journal of Applied Research in Memory and Cognition*, *12*(1), 1–15. https://doi.org/10.1037/mac0000094

Mair, A., Poirier, M., & Conway, M. A. (2017). Supporting older and younger adults' memory for recent everyday events: A prospective sampling study using SenseCam. *Consciousness and Cognition: An International Journal*, *49*, 190–202. https://doi.org/10.1016/j.concog.2017.02.008

Michaelian, K., Klein, S. B., & Szpunar, K. (2016). *K* (Eds), Ed.). Oxford University Press. https://doi.org/10.1093/acprof:oso/9780190241537.001.0001

Migueles Seco, M., & Aizpurua Sanz, A. (2023). *Mental journey to the future and memory for future thoughts during the covid-19 pandemic lockdown. Applied Cognitive Psychology* [Advance online publication.]. https://doi.org/10.1002/acp.4152

Öner, S., Watson, L. A., Adıgüzel, Z., Ergen, İ., Bilgin, E., Curci, A., & Uner, O. (2023). Collective remembering and future forecasting during the COVID-19 pandemic: How the impact of COVID-19 affected the themes and phenomenology of global and national memories across 15 countries. *Memory & Cognition*, *51*(3), 729–751.

Pawlak, D. A., & Sahraie, A. (2023). Lost time: Perception of events timeline affected by the COVID pandemic. *Plos One*, *18*(5), 0278250.

Plancher, G., & Piolino, P. (2017). Virtual reality for assessment of episodic memory in normal and pathological aging. In R. L. Kane & T. D. Parson (Eds.), *The role of technology in clinical neuropsychology* (pp. 237-260 ,). UK: Oxford University Press.

Suddendorf, T., & Corballis, M. C. (2007). The evolution of foresight: What is mental time travel, and is it unique to humans? *The Behavioral and Brain Sciences*, *30*(3), 299–351. https://doi.org/10.1017/S0140525X07001975

Szpunar, P. M., & Szpunar, K. K. (2016). Collective future thought: Concept, function, and implications for collective memory studies. *Memory Studies*, *9*(4), 376–389.

Topçu, M. N., & Hirst, W. (2024). When the personal and the collective intersects: Memory, future thinking, and perceived agency during the COVID-19 pandemic. *Journal of Experimental Psychology. General*, *153*(9), 2258–2278. https://doi.org/10.1037/xge0001624

Cole, S. N. (2025). How can Virtual Reality be used to study the personal and collective future? In *Proceedings of the Paris Institute for Advanced Study* (Vol. 21). https://doi.org/10.5281/zenodo.15833948
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