NEUROSCIENCE AND BEHAVIOUR

Imagining our better selves

How can we promote sustainable behaviours and reduce unsustainable ones? A new study explores potential neural mechanisms underlying thoughts about farsighted future actions.

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Forecasts of increasingly frequent extreme weather events make the threat of climate change more tangible, and are testimony of the need for more environmentally conscious actions. However, how can we forecast, and change, our own actions? In an intriguing new study in *Nature Sustainability*, Brevers et al.[1] explore the neural basis underlying thoughts about the feasibility of sustainable and unsustainable future behaviours. They report evidence for distinct neural mechanisms supporting the prospect of behaviour change, depending on whether we envisage doing more of a sustainable action (for example, using reusable cups) or less of a detrimental one (for example, using fewer disposable cups). The authors suggest that these thoughts are based on a core brain system that allows us to use memories of the past to simulate a possible future (Fig. 1).

Over the last decade, there has been a surge of research into our ability to think about the future. This ability seems to have much in common with our capacity to remember past events. For example, lesions to a brain structure called the hippocampus have long been known to render people amnesic[2]. It emerged that these lesions also severely impair the ability to imagine prospective events[2]. More broadly, neuroimaging has shown that remembering the past and imagining the future share a common core network of brain regions that extends well beyond the hippocampus[3]. Such commonalities have been taken to suggest that we imagine prospective events by flexibly recombining elements of disparate memories.

Brevers et al. had participants think about either increasing sustainable or reducing unsustainable behaviours while their brain activity was measured using functional magnetic resonance imaging. Both tasks required participants to consider the future. However, the authors observed that they relied, to some extent, on different brain structures.

Thinking about increasing sustainable acts was associated with stronger activation of key core-network structures. These include the hippocampus, which is crucial for the mental construction of coherent events[2], and the ventromedial prefrontal cortex. This latter region augments future imaginings by providing knowledge that is relevant for the respective event. In this study, it was more strongly engaged when participants deemed a sustainable behaviour as more feasible. Accordingly, the authors suggest that thinking about sustainable behaviours includes a prospective simulation of pertinent situations.

In contrast, picturing a reduction in unsustainable behaviours was associated with stronger activation in the right dorsolateral prefrontal cortex (rdlPFC). This region is typically engaged when we try to exert control over our thoughts and actions. For example, it has been suggested that it supports the suppression of unwelcome past events by stopping critical memory processes in the hippocampus[4]. Reminiscent of this pattern, Brevers et al. reported that the rdlPFC may have exerted a negative influence on hippocampal activity when participants considered reducing unsustainable behaviour.

The authors thus posit that the participants suppressed memories of unsustainable acts during such considerations. This is an intriguing interpretation. However, it is an open question how the hippocampus, in this suppressed state, could support thoughts about future events. Rather than picturing forthcoming situations in which individuals actually refrain from specific detrimental actions, they may have not thought about any concrete situation.

Indeed, participants in the study had quite some leeway with regards to how they reflected on the feasibility of modifying behaviours. Prospection comes in many forms[5], from coarse and abstract thoughts of future states of affairs to very specific and detailed imaginings of possible episodes. A more precise characterization of the kind of thoughts and processes engaged during this task would also help strengthen the interpretation of the neural data.

For example, the authors largely take the pattern of brain activity to infer that the participants suppressed memories while they considered changing their unsustainable behaviours. Such reverse inferences (from observed brain activity to cognitive processes) are inherently ambiguous — a given brain region often supports vastly different processes[6]. Further work may thus build on these results by contrasting qualitatively different kinds of future thought[5], and by requiring participants to suppress memories of past unsustainable acts[4].

Notably, participants found it more feasible to increase sustainable acts than to decrease unsustainable ones. However, it remains unclear whether thinking about possible future scenarios had actually influenced these judgements — they may have just felt this way before the experiment. Nevertheless, some evidence suggests that people tend to deem events as more plausible when they have previously imagined them[7].

Such future thoughts also help form more farsighted intentions. For example, they nudge people to forego smaller

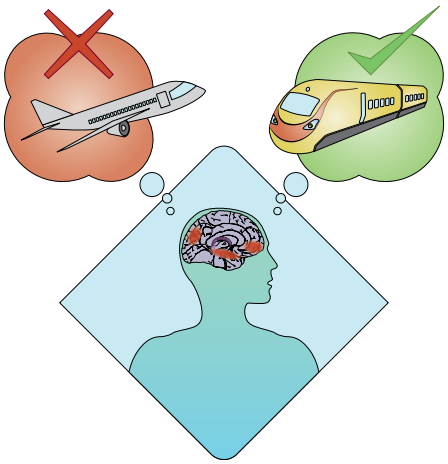

Fig. 1 | The neural system that allows us to revisit the past also enables us to imagine the future. Brevers et al.[1] suggest that it is fundamentally involved in considering future modifications of our behaviour.

immediate monetary gains in favour of larger rewards that they could receive at a later time point[8,9]. Notably, there is some initial evidence that this also holds for commitments to sustainable behaviours that often inherently entail such temporal trade-offs[10], for example between the immediate convenience of a shorter plane journey versus the protracted detrimental effects of air travel. Importantly, people also seem to be more likely to follow their intentions if they have previously imagined themselves taking that action (for example, getting on a train)[11].

This pioneering work by Brevers et al. provides an exciting pattern of results that opens up important avenues for research at the interface between future thinking, its neural basis, and possible behaviour modifications. It points at important processes that may support our adjustment towards more sustainable habits as we hastily try to mitigate the unfolding environmental crises. ❐

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Competing interests

The authors declare no competing interests.