The nostalgic brain gives you the power to live

We are all familiar with feelings of nostalgia that we all experience often. Nostalgia reminds us of better times and helps us feel less lonely when we are facing adversities. It also helps us identify positive aspects of our past, which we would like to recreate in the future. Nostalgic experiences are also known to have immunological effects, such as decreasing the levels of peripheral proinflammatory cytokines, including the tumor necrosis factor-A, and interferon-C. Nostalgia can even make us more charitable, creative and optimistic. Therefore, nostalgia can clearly play a role in psychological and physiological resilience, as well as in the development of social bonding. However, the neural mechanisms of nostalgia have not been clarified to date. Professor Yoshiaki Kikuchi of Tokyo Metropolitan University and his research group have recently used functional magnetic resonance imaging (fMRI) and reported that brain areas involved in both memory and reward coordinate to create a feeling that ultimately leaves us more hopeful and revitalized, because our minds fill with a longing for the past.

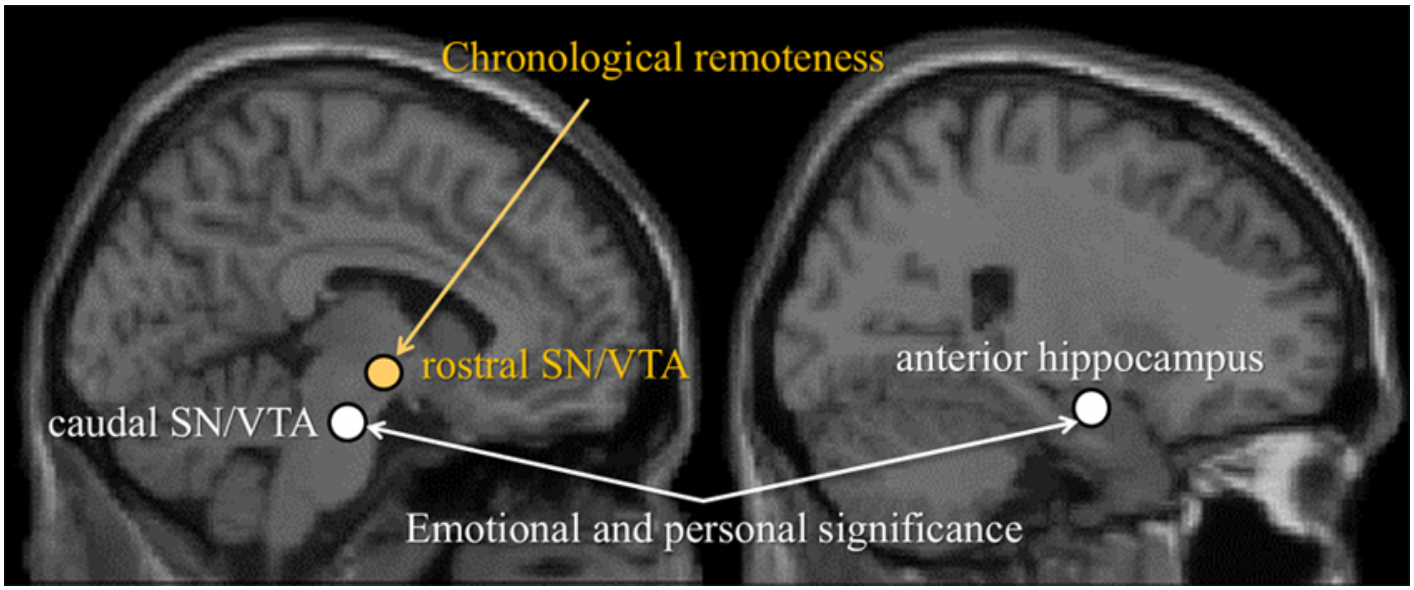

Fig. 1. Two aspects of “nostalgia” and brain regions that are correlated with them.

Professor Kikuchi’s research suggests that nostalgia is not merely positive, but has a mixed emotional profile, of happiness accompanied by sentimentality, and that chronological remoteness, as well as emotional and personal significance are major factors constituting nostalgia. In addition, they linked patterns of activity involving the hippocampus and caudal part of the substantia nigra/ventral tegmental area (SN/VTA) to the dimensions of nostalgia related to emotions and personal significance of memories. Activity in the rostral part of the SN/VTA was linked to remoteness of a memory (the same regions have also been implicated in detecting novelty).

Therefore the retrieval of remote, or long-forgotten memories might seem like a novel experience compared to memories from the recent past). Moreover, Professor Kikuchi's team found that there was a significant co-activation between the hippocampus and the ventral striatum: the more nostalgic a person felt, the stronger was the co-activation.

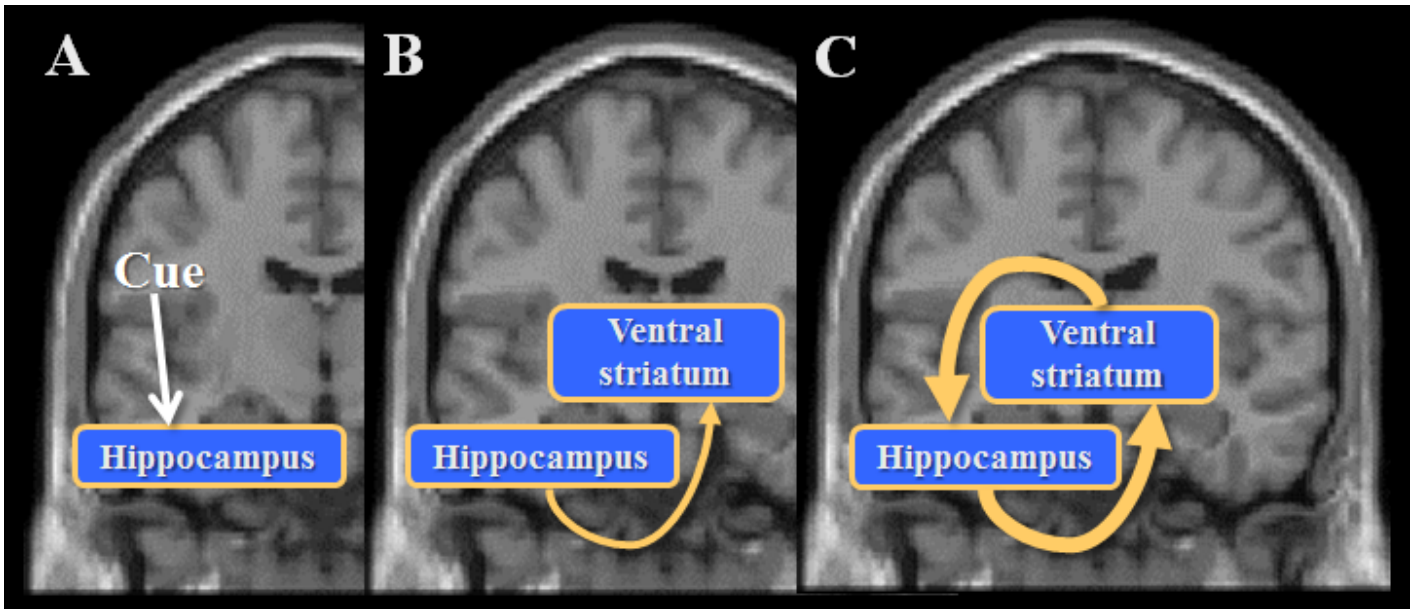

Fig. 2. Memory and reward systems coproduce nostalgic experiences
A) When a cue is input into the hippocampus, its associative memory is automatically retrieved from the memory system.
B) The retrieved memory facilitates its associated reward-value processing in the ventral striatum.
C) The hippocampus and the ventral striatum coproduce the nostalgic experience accompanied by warm feelings.

These findings suggest that memories and the reward systems coproduce our nostalgic experiences. Dr. Kikuchi has also speculated on how these areas might be involved in bolstering people's resilience through nostalgia during difficult times. As people are feeling nostalgic, the association between the memory they are dwelling on and its rewarding value might be reinforced. So when people later recall these memories, the accompanying nostalgia feels even more rewarding. According to Dr. Kikuchi, nostalgic experiences produce resilience for overcoming adversity and strongly support the motivation for living. This is accomplished by our exquisite and adaptive brain system, in which our own memories can stimulate its own reward system. Moreover, memories can be overwritten so as to be more positive, each time when we experience nostalgia through the dopaminergic actions on the hippocampal memory encoding processes.

Publication

Memory and reward systems coproduce 'nostalgic' experiences in the brain.
Oba K, Noriuchi M, Atomi T, Moriguchi Y, Kikuchi Y
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