How the smell of food can enable 'time travel'

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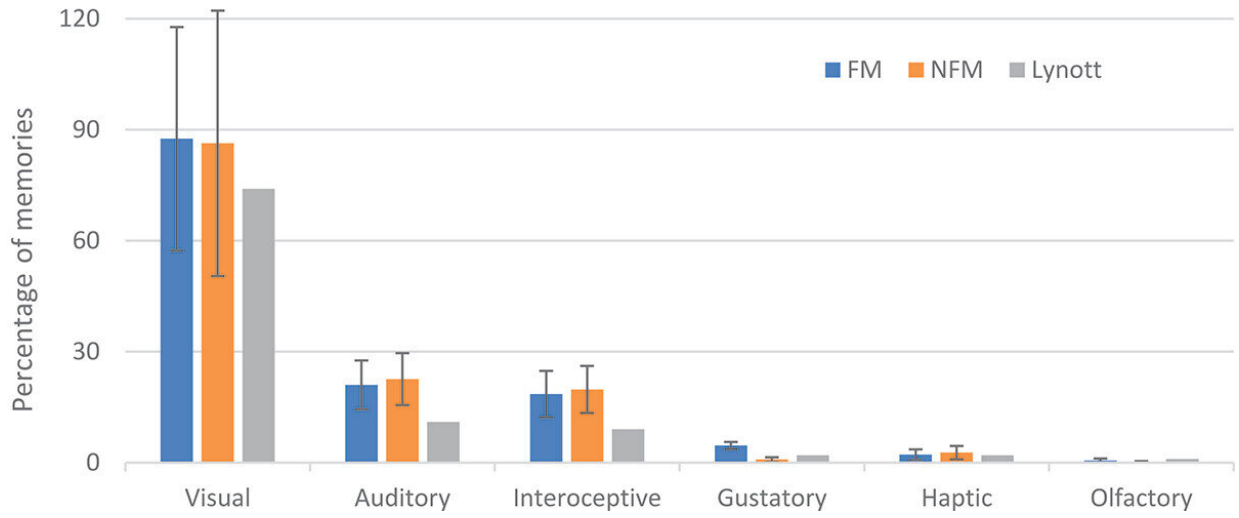

Percentages for Food Memories (FM) and Non Food memories (NFM), and corpus scores for dominant perceptual terms: visual, audio, interoceptive, gustatory, haptic, according to Lancaster Sensorimotor Norms (Lynott et al., 2020). Credit: *Human–Computer Interaction* (2022). DOI: 10.1080/07370024.2022.2107518

Older people exposed to food flavors from their youth were able to "time travel" back to the past with an enhanced memory of the event.

The research, published in *Human Computer Interaction* was led by Professor Corina Sas of Lancaster University, Dr. Tom Gayler, formerly of Lancaster University and Vaiva Kalnikaité of Dovetailed Ltd. Their work explored the feasibility of 3D printed flavor-based cues for the

recall of memories in old age.

Working with 12 older adults, they collected 72 memories, half involving food and half not involving food, each recalled twice. This ranged from barbecued mackerel at a golden wedding to eating strawberries in the hospital after giving birth.

For food memory, the researchers worked with the participants to create bespoke flavor-based cues for each one. The 3D printed flavor-based cues are small, gel-like, edible balls, modeling the original food, which are easier to swallow with more intense flavors, without requiring all the ingredients and preparation.

Professor Sas says that their "outcomes indicated that personalized 3D printed flavor-based cues have rich sensorial and emotional qualities supporting strong recollective retrieval, especially when they distinctively match the food in the original experience and prompt emotionally positive self-defining memories."

All the participants were able to provide rich sensory accounts when prompted by flavor- based cues, with most of the details not being present in the earlier free recall.

Remembering a Green Thai curry dinner in Cambodia, one participant said, "We went into the kitchen area, which was very basic and preparing all sorts of types of green vegetables, which I have no idea what they were, sitting on the floor. And then we would help cook them, stir fry them, and then we would help dish them up…"

But after being exposed to the 3D printed flavor-based cue of the Green Thai curry, the participant gave a more detailed memory of "the chopping noises of cutting up the vegetables, me sitting on the floor cross legged with my friend, chatting together. And then when we went

out, put stuff on the tables, the rest of the group coming out and we sit on long tables outside, the front of the school, so it's outside in the open air to eat."

A striking outcome was the large number of memories cued by flavors that were recalled with strong feelings of being brought back in time.

One participant said, "The roast beef and horseradish cue took me back 25 years in one bound . . .I could place myself at the table in the room . . .I ate that, and that actually provoked out of all the memories, quite a strong reaction actually. Just suddenly I was back."

Interestingly, the mere act of eating the cue was seen as a bodily re-enactment of the original event: "It just kind of triggers a few more sensations. Perhaps when you're tasting it, you imagine yourself there."

The researchers say their research has particular relevance for dementia. Participants talked about the importance of food memories based on their own experiences of caring for the loved ones.

One participant whose mother has Alzheimer's said that "as soon as she smelled and tasted the food, she would say something like, 'Oh, this is like old fashioned food. This takes me back'. She felt that it was something that she had had a long time ago."

Another participant suggested a scrapbook of food memories to trigger recollections of past events in people with dementia.

Professor Sas says that "the 3D printed flavors cued recollective retrieval, eliciting sensorially rich and strong positive emotional experiences that participants deeply enjoyed."

Dr. Gayler says that "working alongside people to create flavor-based

cues highlighted how powerful but under used this connection is. Our design approach helped bridge this gap and showed the potential for future applications to create rich, multi-sensory memory aides."

Dr. Vaiva Kalnikaitė says that they "finally have technology that can help re-construct memories using the flavor and scent of different foods in very compact shapes. These are the strongest cues to help us remember."

More information: Tom Gayler et al, "It took me back 25 years in one bound": self-generated flavor-based cues for self-defining memories in later life, *Human–Computer Interaction* (2022). DOI: 10.1080/07370024.2022.2107518

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