OUR BRAIN:
AN ILLUSIONIST WHICH GIVES A TASTE TO SMELLS!

On December 8th 2020, Charlotte Sinding received an INRAE "laurier" award. This gives us the opportunity to highlight her research work which was recently published in Neuroscience!

We often confuse taste and smell since we talk about the "taste" of a food when we actually mean its smell. There is a biological reason buried deep in our brains behind this mix-up. To understand more about the brain mechanisms involved in processing taste and smell, Charlotte Sinding and her colleagues equipped volunteers with an electroencephalography cap. The brain activity was measured when the volunteers tasted three pea soups in a random order. The first soup had a normal salt content, the second had reduced salt content (-25%) while the third had a reduced salt content but was added with an aroma of beef broth.

Tasting all three soups led to a first cerebral activation at 150 milliseconds linked to processing the salt concentration in the food, and then to a second activation linked to conscious processing of the intensity of the salt. The two soups with no beef broth aroma produced an equivalent late activation peak (at 640 ms) while the aromatized soup produced a late signal at 660 ms. This 20 ms delay is of some significance given that our brains' neurons respond in a few milliseconds. It reflects longer processing of information which is probably caused by the processing of smell as a taste signal.

The olfactory information "beef broth" is thought to activate a memory associating this smell with a salty taste (beef broth is generally perceived in salty foods), which in turn may stimulate the brain areas involved in processing salty taste information. In other words, eating a food with a beef broth smell gives us the "illusion" of a saltier taste than is actually the case. On a fundamental level, this discovery shows that the recent theory that locates interactions between taste and smell at the very early level of the olfactory and gustatory cortex is actually quite improbable. Instead, these interactions are more likely to take place in high-level cerebral areas linked to cognitive and memory processing.

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To know more

Sinding C, Thibault H, Hummel T, Thomas-Danguin T, (2021). Odor-induced saltiness enhancement: insight into the brain chronometry of flavor. Neuroscience. 452 (2021) 126–137.

Key-words

Perception; food; neuroscience; aroma; taste; integrative mechanisms