

Your mouth helps you smell tasty foods

February 13 2019, by Lawrence Goodman



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Why do certain foods smell good to us?

New research by psychology professor Don Katz and his lab suggests it has a lot more to do with what happens in our mouths than commonly thought.

It turns out that we don't inhale the scent of food and decide we like its

[smell](#). First, we have to eat it.

Katz's research appeared in the January 7 edition of the journal *Current Biology*.

What is smell?

Smell consists of two components. The first is well known. It involves inhaling a scent through your nose. Scientists call this orthonasal olfaction.

But there's another way we smell called retronasal olfaction. As you chew or drink, the food or liquid releases odors in your mouth. These odors go up your throat to the nose where they're processed by receptor cells on the roof of the nasal cavity—the same region that processes smells entering the nostrils.

Most of us never notice retronasal olfaction, but it's as critical to our smell system as orthonasal olfaction.

Katz's experiments

Katz and his colleagues exposed [rats](#) to two smells, one nutty and pleasing to the animals, the other neutral. One set of rats received the smells through the nose only.

The other set received them retronasally. This was achieved by injecting nutty and plain smelling liquid into their mouth, bypassing the nose.

Katz's team next placed the rodents in a small chamber with a nose poke filled with that same nutty smell. If the animals had developed a preference for the smell, they would go to the nose poke.

The rats who experienced the odor retronasally did just that. But the orthonasal group weren't drawn to the nose poke. The researchers had to let the animals smell the nutty scent two more times orthonasally before it became an ingrained smell preference and they headed to the nose poke.

In other words, the rats learned to prefer the nutty smell faster when it was administered through the mouth, retronasally, than the nose, orthonasally.

The results suggest to Katz that the retronasal smell system is dominant over the orthonasal one in determining which foods smell good to us. We first like the retronasal smells of a food then this conditions the orthonasal system to like the smell thereafter.

According to Katz, this makes sense from an evolutionary perspective. It's an advantage to eat your foods before merely liking the smell you inhale through your nose. "Things that smell perfectly good might not actually be good for us," Katz said. "It's better to try them first."

How are taste and smell linked?

Traditionally, it's been thought that two separate systems handle [taste](#) and smell in the brain: Taste signals, which originate on [taste buds](#) in our tongue, go to the taste [cortex](#). Smells, both ortho- and retro-, are routed to the olfactory cortex.

Katz's research upends this long-held assumption.

As part of his research, he and his colleagues knocked out the rats' taste cortex. He expected this to only affect taste, but it also impacted smell. Turning off the taste cortex also wiped out retronasal olfaction.

This led Katz to conclude that when the rats eat, the taste cortex processes both taste and retronasal smell signals.

Mouth vs. Nose

Retronasal and taste signals may go to the same place in the brain when the rats eat, but orthonasal signals are still routed to the olfactory cortex.

This suggests that the brain is not making a distinction between taste and smell, but between the signals that originate in the mouth and those that are sniffed by the [nose](#).

Eating vs. non-eating

Katz and his lab's findings apply to when the rats were eating. He believes that in other situations where smelling is involved—sniffing a flower, for example, or sensing the presence of a predator—the brain behaves differently.

In these cases, taste and smell are handled by different regions of the brain. Taste bud signals go to the taste cortex while the two systems of smell—retro- and orthonasal—are processed together where you'd expect, in the olfactory cortex.

"Somehow the brain adjusts to what we're doing," Katz said. "When you're eating, the system is different than when you aren't. Everything depends on context."

More information: Meredith L. Blankenship et al. Retronasal Odor Perception Requires Taste Cortex, but Orthonasal Does Not, *Current Biology* (2018). [DOI: 10.1016/j.cub.2018.11.011](https://doi.org/10.1016/j.cub.2018.11.011)

Provided by Brandeis University

Citation: Your mouth helps you smell tasty foods (2019, February 13) retrieved 20 March 2024 from <https://medicalxpress.com/news/2019-02-mouth-tasty-foods.html>

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