

Our nostrils share a rivalry too, study finds

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Nostrils by David Shankbone. Image: Wikimedia Commons.

Your nostrils may seem to be a happy pair, working together to pick up scents. However, a study published online on August 20th in *Current Biology* reveals that there can actually be a kind of rivalry between the two.

When the nose encounters two different scents simultaneously, the brain processes them separately through each nostril in an alternating fashion.

This finding by researchers at Rice University in Houston is the first demonstration of "perceptual rivalry" in the olfactory system. The study was published online today by the journal [Current Biology](#) and will appear in the Sept. 29 print edition.

"Our discovery opens up new avenues to explore the workings of the

olfactory system and olfactory awareness," said Denise Chen, assistant professor of psychology, who coauthored the research paper with graduate student Wen Zhou.

For the study, 12 volunteers sampled smells from two bottles containing distinctively different odors. One bottle had phenyl ethyl alcohol, which smells like a rose, and the other had n-butanol, which smells like a marker pen. The bottles were fitted with nosepieces so that volunteers could sample both scents simultaneously -- one through each nostril.

During 20 rounds of sampling, all 12 participants experienced switches between smelling predominantly the rose scent and smelling predominantly the marker scent. Some experienced more frequent and drastic switches than others, but there was no predictable pattern of the switch across the whole group of volunteers or within individuals.

Chen said this "binaral rivalry" between the nostrils resembles the rivalry that occurs between other pairs of sensory organs. When the eyes simultaneously view two different images -- one for each eye -- the two images are perceived in alternation, one at a time. And when alternating tones an octave apart are played out of phase to each ear, most people experience a single tone that goes back and forth from ear to ear.

In the laboratory setting in which each nostril simultaneously received a different [smell](#), the participants experienced an "olfactory [illusion](#)," she said. "Instead of perceiving a constant mixture of the two smells, they perceive one of the smells, followed by the other, in an alternating fashion, as if the nostrils were competing with one another. Although both smells are equally present, the brain attends to predominantly one of them at a time."

"The binaral rivalry involves adaptations at the peripheral sensory neurons and in the cortex," Chen said. "Our work sets the stage for

future studies of this phenomenon so we can learn more about the mechanisms by which we perceive smells."

In binaral rivalry, the tug-of-war between dominance and suppression of the olfactory perception exists only in the mind of the person who smells the odors, while the physical properties of the olfactory stimuli remain unchanged, Chen said. This gives humans the rare opportunity to dissociate olfactory perception and physical stimulation. As such, binaral rivalry may offer a unique window into consciousness and awareness in both healthy and ill people.

Human olfaction is a subject very much in its infancy. Chen said understanding the mechanisms with which people process olfactory information is not only important to basic science, but may also, over the long run, contribute to the assessment and cure of olfactory disorders in patients and, in particular, the elderly.

Source: Rice University ([news](#) : [web](#))

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