

Sniffing out danger

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Each human nose encounters hundreds of thousands of scents in its daily travels perched front and center on our face. Some of these smells are nearly identical, so how do we learn to tell the critical ones apart?

Something bad has to happen. Then the nose becomes a very quick learner.

New research from Northwestern University's Feinberg School of Medicine shows a single negative experience linked to an odor rapidly teaches us to identify that odor and discriminate it from similar ones.

"It's evolutionary," said Wen Li, lead author of the study and a postdoctoral fellow at the Cognitive Neurology and Alzheimer's Disease Center at the Feinberg School. "This helps us to have a very sensitive ability to detect something that is important to our survival from an ocean of environmental information. It warns us that it's dangerous and we have to pay attention to it."

The study will be published March 28 in the journal *Science*.

In the study, subjects were exposed to a pair of grassy smells which were nearly identical in their chemical makeup and perceptually indistinguishable. The subjects received an electrical shock when they were exposed to one scent, but not when they were exposed to the other similar one.

After being shocked, the subjects learned to discriminate between the

two similar smells. This illustrates the tremendous power of the human sense of smell to learn from emotional experience. Odors that once were impossible to tell apart became easy to identify when followed by an aversive event.

Li and her colleagues also found specific changes in how odor information is stored in "primitive" olfactory regions of the brain, enhancing perceptual sensitivity for smells that have a high biological relevance.

Source: Northwestern University

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