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BASICS

The Nose, an Emotional Time Machine

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Here is a fun and easy experiment that Rachel Herz of Brown University suggests you try at home, but only if you promise to eat your vegetables first, floss afterward, and are not at risk of a diabetic coma. Buy a bag of assorted jelly beans of sufficiently high quality to qualify, however oxymoronically, as “gourmet.” Then, sample all the flavors in the bag systematically until you are sure you appreciate just how distinctive each one is, because expertise is important and you may never get another excuse this good.

Now for the meat of our matter: pinch your nostrils shut and do the sampling routine again. Notice the differences? That’s right — now there are none. Every bean still tastes sweet, but absent a sense of smell you might as well be eating sugared pencil erasers. And if in midchew you unbind your nose, what then? At once the candy’s candid charms return, and you can tell your orange sherbet from a buttered popcorn.

We’ve all heard about the mysterious powers of smell and its importance in love, friendship and food. Yet a simple game like What’s My Bean, and our consistent surprise at the impact of shutting down our smell circuits, shows that we don’t really grasp just how deep the nose goes. At the International Symposium on Olfaction and Taste held in San Francisco late last month, Dr. Herz and other researchers discussed the many ways our sense of smell stands alone. Olfaction is an ancient sense, the key by which our earliest forebears learned to approach or slink off. Yet the right aroma can evoke such vivid, whole body sensations that we feel life’s permanent newness, the grounding of now.

On the one hand, said Jay A. Gottfried of Northwestern University, olfaction is our slow sense, for it depends on messages carried not at the speed of light or of sound, but at the far statelier pace of a bypassing breeze, a pocket of air enriched with the sort of small, volatile molecules that our nasal-based odor receptors can read. Yet olfaction is our quickest sense. Whereas new signals detected by our eyes and our ears must first be assimilated by a structural way station called the thalamus before reaching the brain’s interpretive regions, odiferous messages barrel along dedicated pathways straight from the nose and right into the brain’s olfactory cortex, for instant processing.

Importantly, the olfactory cortex is embedded within the brain’s limbic system and amygdala, where emotions are born and emotional memories stored. That’s why smells, feelings and memories become so easily and intimately entangled, and why the simple act of washing dishes recently made Dr. Herz’s cousin break down and cry. “The smell of the dish soap reminded her of her grandmother,” said Dr. Herz, author of “The Scent of Desire.”

Many mammals are clearly nosier than we. Consider that our olfactory epithelium, the yellowish mass of mucous membrane located some three inches up from our nostrils, holds about 20 million smell receptors designed to detect odor molecules delivered either frontally, when we, say, sniff a rose, or via the rear, the

volatile aromas that come up through the back of the mouth and give each jelly bean meaning. The nasal membranes of a bloodhound, by contrast, sustain an olfactory army 220 million receptors strong.

Yet for all the meagerness of our hardware, we humans can become better nosehounds with startling ease. In one experiment, Dr. Gottfried said, subjects exposed to a single floral scent for just three and a half minutes markedly improved their ability to discriminate among whole families of flower odors. In another, participants soon learned to distinguish normally undetectable differences between one herbal smell and its mirror-image molecular twin if they were given mild electric shocks every time they guessed wrong.

Moreover, numerous studies have shown that smell memory is long and resilient, and that the earliest odor associations we make often stick. “With a phone number, if you get a new one, a week later you may have forgotten the old one,” Dr. Herz said. “With smells, it’s the other way around. The first association is better than the second.”

In another presentation, Maria Larsson, an associate professor of psychology at Stockholm University, described the power of smell to serve as an almost magical time machine, with potential for treating dementia, depression, the grim fog of age. Johan Willander and others in her lab have sought to give firm empirical foundation to the old Proustian hypothesis, the idea that smells and aromas, like the famed taste of a madeleine dipped in tea, can help disinter the past.

Studying groups of Swedes whose average age was 75, the researchers offered three different sets of the same 20 memory cues — the cue as a word, as a picture and as a smell. The scientists found that while the word and visual cues elicited associations largely from subjects’ adolescence and young adulthood, the smell cues evoked thoughts of early childhood, under the age of 10.

And despite the comparative antiquity of such memories, Dr. Larsson said, people described them in exceptionally rich and emotional terms, and they were much likelier to report the sudden sensation of being brought back in time. They smelled cardamom, and there they were in the kitchen, flour dust flying as they helped Mama and Nana roll out the holiday buns. The scent of tar, and they’re back at the dock with Dad, tarring the bottom of the family boat in anticipation of long summer sails.

Dr. Larsson attributes the youthfulness of smell memories to the fact that our olfaction is the first of our senses to mature and only later cedes cognitive primacy to vision and words, while the cortical link between olfaction and emotion ensures that those early sensations keep their bloom all life long.