

Do scents affect people's moods or work performance?

Rachel S. Herz, an assistant professor of psychology at Brown University, provides the following explanation:

The simple answer is yes, but the reasons may not be what you expect. Odors do affect people's mood, work performance and behavior in a variety of ways but it isn't because odors work on us like a drug, instead we work on them through our experiences with them. That is, in order for an odor to elicit any sort of response in you, you have to first learn to associate it with some event. This explanation for how odors affect us is based on what is known as associative learning, the process by which one event or item comes to be linked to another because of an individual's past experiences. The linked event is then able to elicit a conditioned response for the original situation. In olfaction, the process can be understood as follows: a novel odor is experienced in the context of an unconditioned stimulus, such as surgical procedure in a hospital, which elicits an unconditioned emotional response, such as anxiety. The odor then becomes a conditioned stimulus for that hospital experience and acquires the ability to elicit the conditioned response of anxiety when encountered in the future. This mechanism explains both how odors come to be liked or disliked, as well as how they can elicit emotions and moods.

We know that the neurological substrates of olfaction are especially geared for associative learning and emotional processing. The olfactory bulbs are part of the limbic system and directly connect with limbic structures that process emotion (the amygdala) and associative learning (the hippocampus). No other sensory system has this type of intimate link with the neural areas of emotion and associative learning, therefore there is a strong neurological basis for why odors trigger emotional connections.

Both studies with children and cross-cultural research provide strong evidence that responses to odors are learned via associative mechanisms. A number of studies have shown that odor learning begins before birth, when flavor compounds from the maternal diet get incorporated into amniotic fluid and are ingested by the developing fetus. In studies where mothers consumption for distinctive smelling substances such as garlic, alcohol or cigarette smoke were monitored during pregnancy, it was found that their infants preferred these smells compared to infants who had not been exposed to these scents.

These early learned preferences also influence food and flavor preferences in later childhood and even adulthood. [Note that flavor is produced primarily by odor; taste contributes only the sensations of salt, sour, sweet, bitter and savory.] Feeding, in addition to providing nutrition, is an opportunity for close physical contact and emotional bonding between mother and child. Thus, the role of emotion is clearly evident in associative learning in a food context. Other examples where infants experience cuddling in conjunction with incidental odors like perfume have shown that these incidental scents then become better liked.

Although the majority of odor responses are acquired during childhood, because of the novelty and salience of so many experiences, any time a new smell is encountered associative learning mechanisms can determine odor perception. Anecdotes of liking or disliking scents because of their connection to significant others and idiosyncratic cuisine preferences are typical examples of how associative learning and emotional context influences odor perception. Important in this regard are cross-cultural findings that clearly show that one's man's meat is another man's poison. In the mid-60s in Britain, adult respondents were asked to rate a battery of common odors. A similar study was conducted in the United States in the late 1970s. Included in both was the smell of wintergreen, which was given one of the lowest pleasantness ratings in the British study. In the US study, in contrast, it received the highest pleasantness rating. History can explain this difference. In Britain, the smell of wintergreen is associated with medicine and, particularly for the participants in the 1966 study, with analgesics that were popular during WWII (a time that these individuals would not remember fondly). Conversely, in the US, the smell of wintergreen is exclusively a candy mint smell and one that has very positive connotations. There is also no empirical cross-cultural data that indicates any consensus for odor evaluations to offensive scents. Indeed, in a recent study undertaken by the US military to create a "stink bomb," it was impossible to find an odor (including US army issue latrine scent) that was unanimously considered unpleasant across various ethnic groups. So it isn't just neutral or moderate odors that vary by culture, what we think stinks does too.

In order to test the notion that responses to odors are learned as a function of the emotional context in which they are first perceived directly, we conducted a study in which a novel odor was paired with either a positive or negative emotional experience. We found that after the pairing procedure, ratings given to the test odor varied in accord with the paired emotion; making the odor then perceived as either good or bad, depending upon what paired experience the participant had. One case when olfactory sensory attributes may have an unlearned impact is when odors are irritating (for example, ammonia) and thus discomfort is felt at the same time as odor sensation occurs, which happens when an odor stimulates the trigeminal nerve in addition to eliciting olfactory sensation. Many odors elicit trigeminal stimulation to varying degrees and the subjective distinction between pure odor and trigeminal irritation is not possible to make. These cases explain why you may have had the experience of being immediately repelled by a certain scent. The context in which an odor is encountered can also have a big influence. So if you aren't expecting a certain smell in a particular situation you might have a much more negative reaction to it than you otherwise would.

For instance, if you think that you are reaching for your wine glass when in reality you sip from your water glass by mistake; you've never had wine from such a bad year!

So now you understand how associative learning produces our odor preferences, but as I stated at the outset it also explains how odors influence our moods and even our behaviors. A number of studies have shown that the odors people like make them feel good, whereas odors people dislike make them feel bad. These mood responses have also been reported physiologically. For example, skin conductance, heart-rate and eye-blink rates in response to various liked or disliked scents coincide with the mood the person is experiencing. Downstream from how odors influence our moods is the way that moods influence how we think (cognition) and how we act (behavior). In terms of cognition, mood has been shown to influence creativity with the typical finding that people in a positive mood exhibit higher levels of creativity than individuals in a bad mood. Odors can also produce the same effects. When people were exposed to an odor they liked creative problem solving was better than it was when they were exposed to an unpleasant odor condition.

Taking this one step further is the way in which mood influences on thinking are translated into observable behavior. A growing body of literature shows that positive mood is linked to an increase in productivity, performance and the tendency to help others, while negative mood reduces prosocial behavior. Notably, prosocial behavior and productivity are also enhanced in the presence of pleasant ambient odors. For example, people exposed to the smells of baking cookies or roasting coffee were more inclined to help a stranger than people not exposed to an odor manipulation. People who worked in the presence of a pleasant smelling air freshener also reported higher self-efficacy, set higher goals and were more likely to employ efficient work strategies than participants who worked in a no-odor condition. Pleasant ambient odors have also been found to enhance vigilance during a tedious task and improve performance on anagram and word completion tests. Conversely, the presence of a malodor reduced participants' subjective judgments and lowered their tolerance for frustration. Participants in these studies also reported concordant mood changes. Thus, the observed behavioral responses are due to the effect that the ambient odors has on people's mood.

So there you have it, odors influence mood, work performance, and many other forms of behavior via their learned associations and particularly their learned emotional associations. The next time you smell a scent that you like, see if you can figure out where you first experienced it and then also reflect to yourself whether you feel any mood change and if that mood makes you want to do anything in particular.

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