

Smelly Science



What do elephants, turkey vultures, and silk moths have in common? These organisms are among the best on the planet at detecting odors over long distances! Who knew "good smellers" came in such different shapes and sizes?

Being able to sense chemical signals in the environment is a huge advantage in the wild. A strong sense of smell can help an animal find food—like a turkey vulture following the scent of carrion—or locate a mate from miles away, like a male silk moth following a trail of pheromones. (To be clear, moths don't have noses. They "smell" with their feathery, super-sensitive antennae!)

How exactly do we smell stuff? Let's say you go out to eat, and you smell a dish that makes you think of home. 🍴 Molecules are drifting from the food through the air of the restaurant. When they enter your nose, they encounter your olfactory sensory neurons at the top of your nasal cavity.

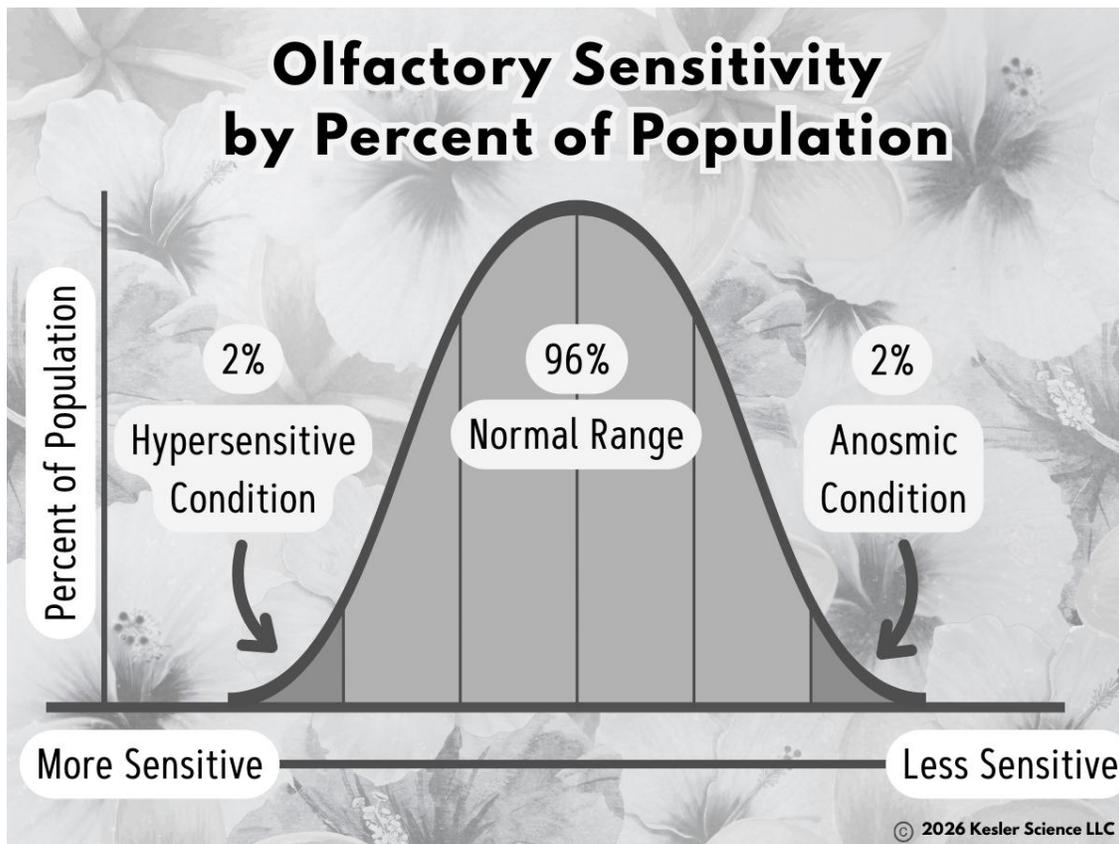
Humans have about 400 different receptor types in their olfactory neurons, but each receptor type can respond to many different molecules.

That means your brain interprets scents as a pattern created by a mix of receptor signals. Scientists estimate that a human can differentiate *a trillion* different odors!

Of course, not all scents are fun experiences. For example, a skunk's spray contains powerful sulfur-based chemicals called **thiols**—the same kind of molecules that make rotten eggs smell so awful. Another example is a type of canned fish! Several airlines have banned passengers from bringing the notorious Swedish canned fish delicacy *surstromming* on planes.

You might be wondering - what is the *worst* scent that exists? That distinction (or di-**stink**-tion?? 😬) might go to a synthetic chemical called *U.S. Standard Bathroom Malodor*. I'm sure you can figure out what this potent fragrance smells like. Besides being a main ingredient in stink bombs, Standard Bathroom Malodor is used to test air fresheners and deodorizers.

Are some people more sensitive to odors than others? Yes! There are a number of genetic markers associated with a strong sense of smell, and people with a strong nose are said to have "hyperosmia."



1. Take a look at the bell curve above to see how smelling ability is distributed among a typical population. What is the independent variable (x-axis) in this graph? Where would a person who can smell a very faint scent fall on this axis?

2. The y-axis shows the percentage of the population who fit the description on the x-axis. The curve of the graph is much higher in the middle. What does this mean about the population?

3. What percent of people in the graph have an "anosmic condition"? Looking at the graph, what do you guess this term means?

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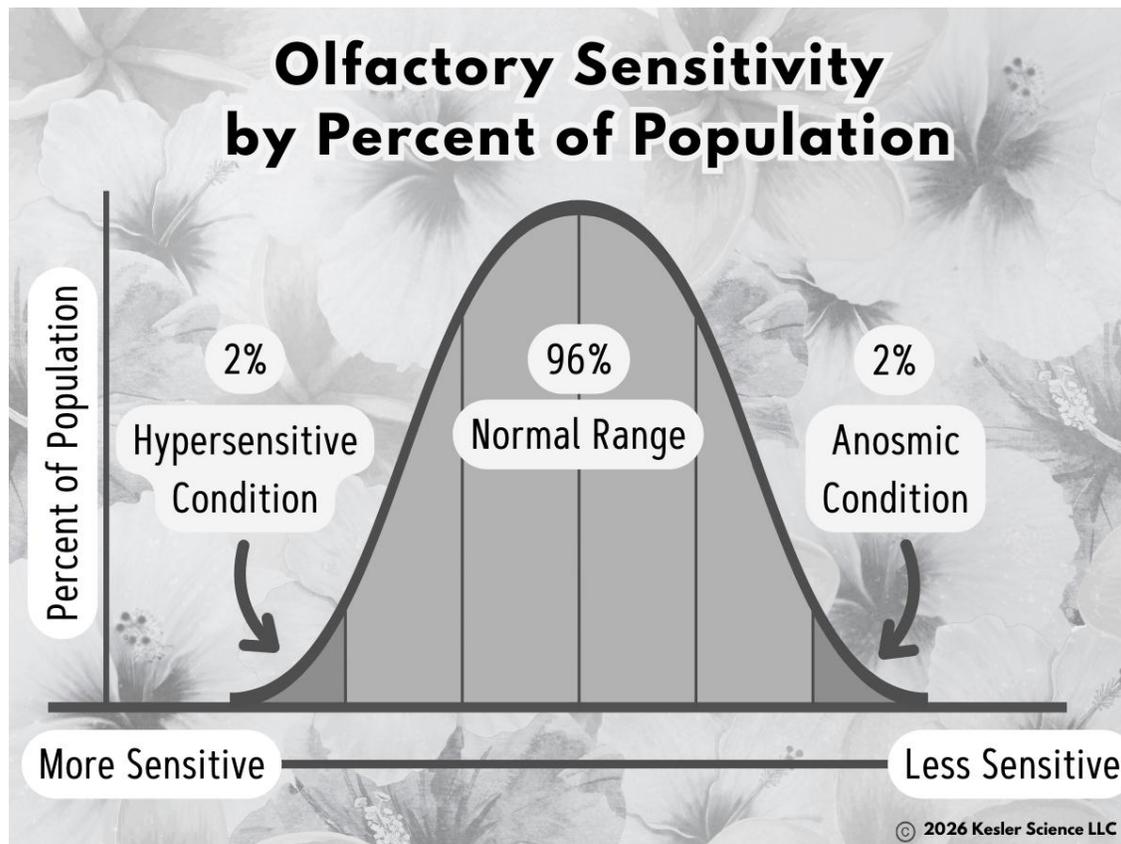
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The independent variable is "sensitivity." The sensitivity decreases from left to right, so someone who is very sensitive would be on the left.

2. The y-axis shows the percentage of the population who fit the description on the x-axis. The curve of the graph is much higher in the middle. What does this mean about the population?

Most people in the population can smell scents that have a medium strength.

3. What percent of people in the graph have an "anosmic condition"? Looking at the graph, what do you guess this term means?

About 2% of the population included in the graph have an anosmic condition. People with an anosmic condition cannot smell scents unless they are very, very strong.