Brain Geography Topic:

Hearing, Smelling, Tasting

The following areas are shown to give a complete picture for where the senses are located in the brain.

Sound coming from the ears enters the brain in the green area to the left. Also note that this figure shows the areas where vision and touch are processed in the brain, so with the figures below you see where all 5 senses are processed in the brain.

Although the auditory area appears close to the motor and touch areas in the picture, it is actually very distant because of the deep fold that separates them. However, this area is conveniently located next to Wernicke’s speech area, used for language understanding, which should make sense. Also, it’s on the temporal lobe, which is the area associated with object recognition, and although most people consider recognizing objects as purely visual, sound can also play a vital role.

Smell areas are shown as green in this figure. What is interesting about this area is that although most smells we can identify are a vast combination of smell receptor patterns, this system is specifically designed to be able to find these patterns. It is also located beside and connected to some very primitive areas of the brain, in part because it is a very old sense, in evolutionary time - it is known that smell is the sense with the simplest ties to emotion for example.

Taste, as we typically experience it, is often considered a combination of smell and taste. For example, things appear to taste differently depending on whether or not you plug your nose. There are however taste receptors on the tongue which are unambiguous and not mixed with smell – those typically are salty, sour, sweet, bitter, and oddly enough one called umami.
Brain Geography Activity:

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Why is it so convenient that the area of language understanding is right next to the area where sound enters the brain (in green)? Specifically, why wouldn’t you expect the language understanding to be closer to, say, the visual input area (in orange) – you read and write language don’t you?

When you stimulate the part of people’s brain to the lower left of the part of the brain shown in green to the left, sometimes they describe hearing “jingles” or catchy tunes. Interestingly, areas nearby are associated with visual object detection, like faces, for example. What’s the connection? Why might you expect these two types of things to occur in roughly the same part of the brain?

For the most part, you’re born with all the neurons you’ll ever use, with two known exceptions. First, the area of your brain associated with factual memory appears to generate new neurons every day of your life – some say this is so you are better able to incorporate new facts into memory as you age. The other exception, oddly enough is the olfactory bulb… some of the earliest neurons in processing your sense of smell. Some say this is also to be able to learn new smells over time… how reasonable do you find that explanation?

The “postcentral gyrus” in the figure to the left is the area of the brain related to the sense of touch and actually extends from the top of the head to the part next to the label. As these areas connected with the black line are used in taste perception, would you expect the top of the head to be more likely used in processing touch in the feet and legs, or the mouth and tongue?