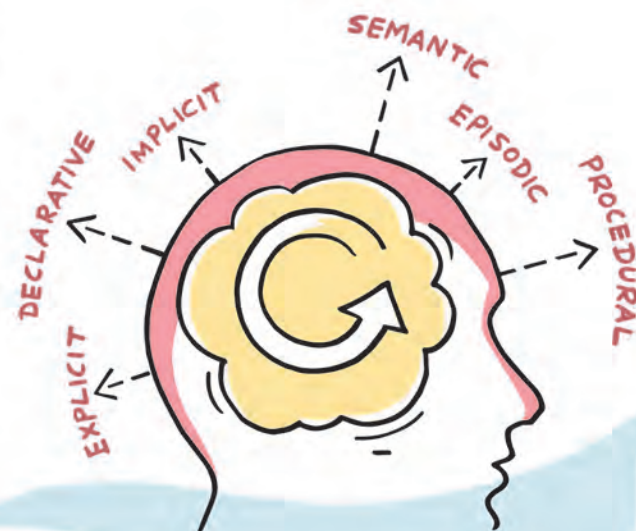
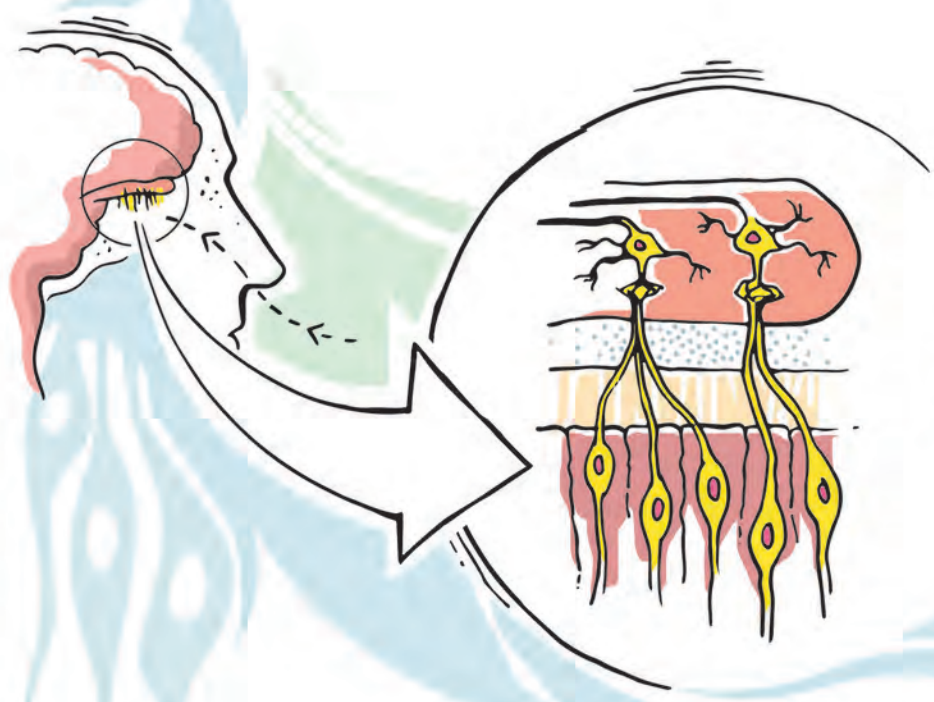


What's in a smell...?

Prof. Upinder Bhalla is a neurobiologist who set out to study how the human brain takes in information from the environment around us, stores it, and uses that information to make decisions and act accordingly. Prof. Bhalla decided to use the sense of smell in order to study this.

Smell is the 'oldest sense'. Even before they could use sight, touch or hearing, living things evolved to respond to chemicals around them. Humans for example have some 1,000 different smell receptor types which regenerate throughout a lifetime and respond to different sets of odors.

The olfactory bulb is the first part of the brain that processes smells. The sense of smell is unique because it doesn't relay information through the thalamus (which other senses do), but goes directly to the cortex from the olfactory bulb. In this circuit, the olfactory bulb has direct access to the hippocampus which is important for creating new memories for events, and to the amygdala, which is important for emotional associations.



Using rats as subjects, Bhalla's work shows that smells are detected 'in stereo'. Much like our ability to hear *in stereo*, this means that subtle gradients of odor concentration or timing can be detected by the olfactory circuitry to work out from where the smell is coming.

Prof. Bhalla's pioneering experiments and models of the brain show how neurons in the olfactory bulb respond to various odorants or smells that they receive from the environment. He has created computational models that attempt to explain how the brain processes this information.

These findings are important because they give us an understanding of the fundamental skill of being able to track odors which is important to survival – helping in finding food sources, predators, and mates. They also provide insights into the computational questions of how humans and other animals develop strategies for exploring the world.

