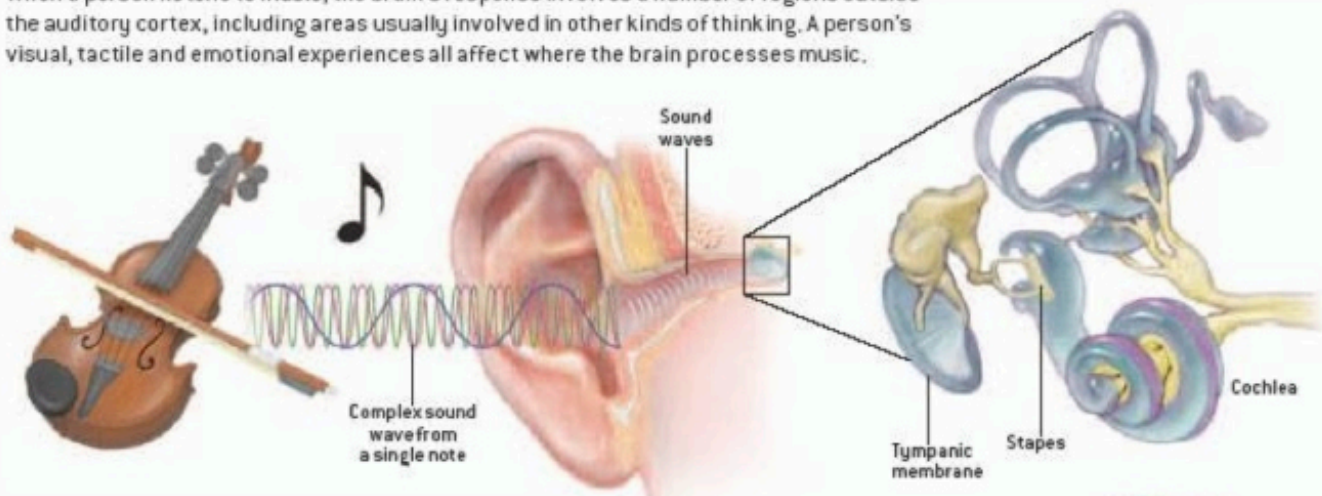


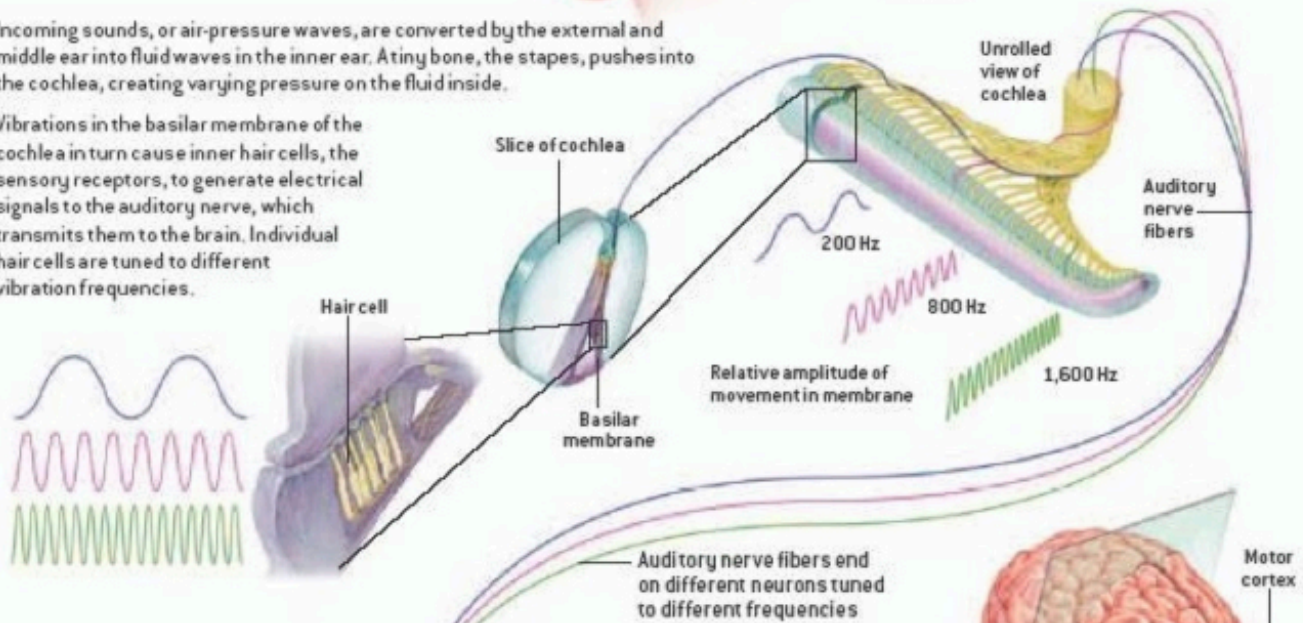
## Singing in the Brain

When a person listens to music, the brain's response involves a number of regions outside the auditory cortex, including areas usually involved in other kinds of thinking. A person's visual, tactile and emotional experiences all affect where the brain processes music.

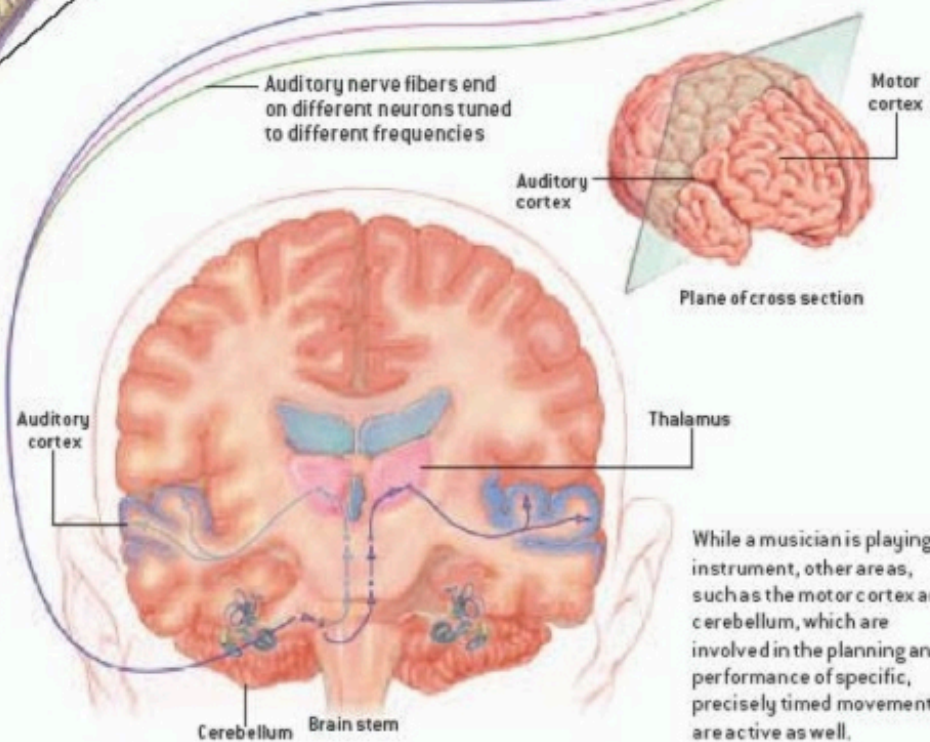


Incoming sounds, or air-pressure waves, are converted by the external and middle ear into fluid waves in the inner ear. A tiny bone, the stapes, pushes into the cochlea, creating varying pressure on the fluid inside.

Vibrations in the basilar membrane of the cochlea in turn cause inner hair cells, the sensory receptors, to generate electrical signals to the auditory nerve, which transmits them to the brain. Individual hair cells are tuned to different vibration frequencies.



The brain processes music both hierarchically and in a distributed manner. Within the overall auditory cortex, the primary auditory cortex, which receives inputs from the ear and lower auditory system via the thalamus, is involved in early stages of music perception, such as pitch (a tone's frequency) and contour (the pattern of changes in pitch), which is the basis for melody. The primary auditory cortex is "retuned" by experience so that more cells become maximally responsive to important sounds and musical tones. This learning-induced retuning affects further cortical processing in areas such as secondary auditory cortical fields and related so-called auditory association regions, which are thought to process more complex music patterns of harmony, melody and rhythm.



While a musician is playing an instrument, other areas, such as the motor cortex and cerebellum, which are involved in the planning and performance of specific, precisely timed movements, are active as well.