

Nasty noises: Why do we recoil at unpleasant sounds?

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Courtesy of Newcastle University
and World Science staff

MOST UNPLEASANT SOUNDS

Rating 74 sounds in a new study, people found the most unpleasant to be as follows (click on links for samples):

1. [Knife on a bottle](#)
2. [Fork on a glass](#)
3. [Chalk on a blackboard](#)
4. [Ruler on a bottle](#)
5. [Nails on a blackboard](#)
6. Female scream
7. Anglegrinder (power tool)
8. Brakes on a cycle squealing
9. Baby crying
10. Electric drill

LEAST UNPLEASANT SOUNDS

1. Applause
2. Baby laughing
3. Thunder
4. Water flowing

In a study published Oct. 10 in *The Journal of Neuroscience*, scientists report an interaction between the region of the brain that processes sound, the auditory cortex, and the amygdala, active in the processing of negative emotions.

When we hear an unpleasant noise, the researchers said, the amygdala modulates the auditory cortex response, heightening its activity and provoking a negative reaction.

"It appears there is something very primitive kicking in," said Sukhbinder Kumar, a co-author of the report, from Newcastle University in the U.K. "It's a possible distress signal from the amygdala to the auditory cortex."

The researchers used a scanning method known as functional magnetic resonance imaging to examine how 13 volunteers responded to a range of sounds. Listening to the noises while inside a brain scanner, they rated the sounds from most unpleasant—the sound of knife scraping against a bottle—to pleasing: bubbling water.

Researchers then studied the brain response to each type of sound.

They found that the activity of the amygdala and the auditory cortex varied in direct relation to the ratings given by the subjects. The emotional brain structure, the amygdala, in effect takes charge and modulates the activity of the auditory region so that our perception of a disturbing sound, such as a knife scraping on a bottle, is heightened, the scientists explained.

An analysis also found that anything in the frequency range of around 2,000 to 5,000 Hz (vibrations per second) was considered unpleasant. “This is the frequency range where our ears are most sensitive. Although there’s still much debate as to why our ears are most sensitive in this range, it does include sounds of screams, which we find intrinsically unpleasant,” said Kumar.

A better understanding of the brain’s reaction to noise could help our understanding of medical conditions where people have a decreased sound tolerance such as hyperacusis, misophonia (literally a “hatred of sound”) and autism when there is sensitivity to noise, scientists added.

“This might be a new inroad into emotional disorders and disorders like tinnitus and migraine in which there seems to be heightened perception of the unpleasant aspects of sounds,” said Tim Griffiths of Newcastle, who led the study.