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Why the Sound of Fingernails on a Chalkboard Irks You Shape of the Human Ear May Amplify Some of the Most Irritating Sounds

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Nov. 4, 2011 -- The mere thought of fingernails scratching a chalkboard can be enough to set some people on edge.

Now, a new study may help explain why.

Researchers say the shape of the human [ear](#) may amplify certain aspects of the sound of fingernails or chalk scraping on a chalkboard to make it even more annoying to the listener.

In addition, people's perceptions about these irritating sounds may increase [stress](#) levels and how they rate the sound.

For example, listeners rated the sounds as more pleasant if they were told they were hearing selections of contemporary music rather than fingernails on a chalkboard.

High Pitches Amplified by Ear Canal

The study shows that fingernails scratching a chalkboard produces sounds at the peak of human hearing, in the frequency range between 2000 and 4000 hertz.

Researchers say the human ear is especially sensitive to sounds within this high-pitch range. One reason is that the anatomy of the ear canal amplifies sounds at these frequencies, making them literally louder to our ears.

When researchers removed pitch information in this range from recordings of fingernails scratching a chalkboard and played them to people, they rated the sounds as more pleasant.

Researcher Michael Oehler, professor of media and music management at the University of Cologne in Germany, says they thought frequencies in the top range of human hearing would play a major role in the unpleasantness of the sounds.

"But we did not know the exact range," Oehler says in a news release. "The influence of pitch information was greater than we thought."

Researchers presented the results of their study this week at the annual meeting of the Acoustical Society of America in San Diego.

Some Sounds Have a Bad Rap

The study also suggests that peoples' perception of sound plays a role in how irritating it is.

Half of the participants were told they were listening to the sound of fingernails or bits of chalk on a chalkboard, and the other half was told they were listening to contemporary music.

The listeners were asked to rate the pleasantness or unpleasantness of the sounds. Meanwhile, researchers measured their stress responses, like [blood pressure](#), [heart rate](#), and sweat.

People who knew they were listening to fingernails on a chalkboard rated the sound as more unpleasant and had a stronger stress response, in particular sweating, than those who thought they were listening to music.

These findings were presented at a medical conference. They should be considered preliminary as they have not yet undergone the "peer review" process, in which outside experts scrutinize the data prior to publication in a medical journal.

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162nd Meeting of the Acoustical Society of America, Oct. 31- Nov. 4, 2011, San Diego.

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