


SciGuy
A science blog with Eric Berger

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Why fingernails scratching on a chalkboard is so annoying

Why is the sound of fingernails being scratched across a chalkboard so annoying?

Researchers have previously speculated it may trigger some reaction in the recesses of our bodies — a [vestigial reflex](#) — because the sound resembles that of a primate's warning call.

But now German and Austrian scientists have presented new findings that suggest something else is at work, and it has to do with the shape of our ear canals.

In work presented yesterday at the Acoustical Society of America conference in San Diego ([see abstract](#)) Christoph Reuter and Michael Oehler described how they picked two sounds: scratching fingernails on a chalkboard, and chalk being dragged across a slate. They then broke people into two groups.

They told one group the sounds were contemporary music, and the other group they told the truth. The former group rated the sounds as less annoying, suggesting a psychological component.

Using various heart rate and skin resistance measurements the scientists also studied the effects of the sounds on the bodies of the listeners. The listeners had clear reactions, such as sweating and blood pressure rises, to the annoying sounds.

The scientists believe this is because the frequency of these two sounds, between 2,000 and 4,000 hertz, strikes at the region of the human ear considered most sensitive because of the anatomy of the ear canal.



Please don't. (Sharon Drummond/Flickr.com)

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Eric Berger

Eric Berger is the Houston Chronicle's space, weather and science reporter. He covers everything from nanometers to parsecs. You can follow him on twitter at [@chronsciuguy](#).

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38 Responses to *Why fingernails scratching on a chalkboard is so annoying*

Mike says:

November 4, 2011 at 7:48 am

I think the ear canal explanation makes more sense than the primate call. The primate call theory is a theory that can never be proven. The ear canal theory actually has scientific evidence to back it up.

Interesting article.

Reply

bkbirge says:

November 4, 2011 at 2:50 pm

Could be both. The frequencies that the ear canal is optimized for are the frequencies at which speech is most intelligible to us. It looks like we've evolved to be able to hear each other better.

Miguel says:

November 4, 2011 at 7:58 am

Dragging any kind of metal against concrete (e.g. a bucket from a front end loader or using a shovel to clean your driveway) produces the same annoying effect.

Reply

OshJay says:

November 4, 2011 at 9:08 am

Styrofoam on cardboard and using a sharpie to write on (most)paper or cardboard. These sounds are so bad, they usually paralyse me. It is physically painful. Even thinking about them can cause my body to shake and shiver, as well my hair standing up on end.

The fact that the thought can cause a similar reaction as actually hearing them makes me think it is also just as psychological as it is the physical ear design.

kross says:

November 4, 2011 at 8:07 am

I was wondering is there anything else that can send chills up your spine the way fingers on a chalkboard does? I also don't like fingers rubbing across an inflated balloon.

Reply

Lou says:

November 4, 2011 at 8:20 am

You forgot about 3rd group... deaf people. You need to figure out why it doesn't bother them at all.

Reply

Joshua says:

November 4, 2011 at 8:47 am

Lou, that comment is sheer genius. I wish I could have stated the stupidity of this study with such brevity. Well played, sir.

JohnD says:

November 4, 2011 at 8:31 am

It is nice to see someone finally following up on [Halpern's work](#).

Reply

CarlNB says:

November 4, 2011 at 8:33 am

The ear canal theory does not really explain anything. No one doubts that our hearing mechanism does different things for different frequencies. But the question remains—Why are these different things either irritating or soothing? Why are musical sounds soothing and beautiful while finger-nails-on-chalk-board sounds are not just “not-soothing” but very disturbing? When we understand this we will also understand why sunsets are soothing while rainy days are depressing. And even why geckos are cute and spiders are horrible. These things are all built into who we are.

Reply

BpK_TeXaN says:

November 4, 2011 at 3:45 pm

WTF are you talkin' about... i mean if you wanted to pretend and sound smart you could have picked a better word choice than “mechanism”, i mean really did you think you had to overstate the fact your talking about an ear...Cmon' Man! then the rest of your post was just as lacking..." Why geckos are cute" as opposed to spiders, wow you must be such a deep thinker...best to just keep these thoughts to yourself, as should I, but as we can see, both of us lack a lil' self control on these matters...

Joe says:

November 4, 2011 at 8:45 am

In “Jaws”, Quint had that down to an art! I still get chills thinking about that scene in the movie!

Reply

Bill in Houston says:

November 4, 2011 at 9:11 am

I liked the version in Psych's *The Head, the Tail, the Whole Damn Episode* better.

Brazos says:

November 4, 2011 at 9:11 am

Joe – you beat me to it!!!

me says:

November 4, 2011 at 8:47 am

I like the monkey explanation better...BUT, I read quick...did they experiment with 'pleasant' sounds at the frequency (or is that question a humorless non sequitur.)

Reply

Joshua says:

November 4, 2011 at 8:48 am

How much taxpayer money was spent to tell me I don't like pain?

Reply

Cowboy says:

November 4, 2011 at 8:48 am

They also found out it makes the same irritating screeching as the Faux Scientists' mantra of "feels like" temperatures.

Reply

Bill in Houston says:

November 4, 2011 at 9:19 am

That sound reminded me of Cowboy's postings.

StanleyS says:

November 4, 2011 at 11:36 am

Cowboy, we missed your weekly FSI report on Monday's weekly weather! Where were you?

Jim says:

November 4, 2011 at 9:45 am

I believe there is an evolutionary basis for this. Probably more important than:

My boyfriend's back and you're gonna be in trouble

(Hey-la-day-la my boyfriend's back)

It was more likely the sound associated with

"That lion has Uncle Elmer by the leg

and it's dragging him out of the cave!"

But there we are getting into "ancestral memory."

Not one of the top things on dissertation subjects.

Reply

J D Richardson says:

November 4, 2011 at 10:33 am

Yes. It's pretty much the same reaction I have when I read of such conjecture being fed to us as actual deep-thought research.

Reply

StanleyS says:

November 4, 2011 at 11:31 am

I don't believe either the "primate warning call" hypothesis or the ear canal theory, evidence or no evidence. (JohnD: that comment leaves me open to legitimate criticism. Fire away.)

Here's another experiment that should be done: test a group of people with 1) the sound of fingernails on slate, and 2) synthetic music with the same *dominant frequency* as fingernails-on-slate, but with a mix of *harmonious* secondary frequencies rather than all of the *clashing* secondary frequencies present in fingernails-on-slate.

And here's a possible third hypothesis: scraping one's own fingernails across a chalkboard *feels* really really bad, because it sends unpleasant shivers through your fingernail roots, up your arms, and down the sides of your torso. Perhaps the mere sound of another person doing the scraping is annoying simply because it reminds us of how it would *feel* to be doing the scraping oneself.

Reply

John says:

November 4, 2011 at 12:37 pm

Do the nerves send bad shivers up the arm into the torso because it hurts? Or does the brain send that shiver DOWN the arm because it sounds bad, therefore it must hurt?

So much we don't know about our own brains...

JohnD says:

November 6, 2011 at 10:37 am

The only criticism would be if no evidence will convince you, how does that make you any different from the primitive primate discussed in the article? As for your second experiment, it has been done. Read the linked articles to see the results.

NoWhining says:

November 4, 2011 at 12:14 pm

I think of it as a 'bad' ear nerve tickle.

Reply

Ann says:

November 4, 2011 at 2:28 pm

I guess I'm weird because these things don't really bother me.

Reply

me says:

November 4, 2011 at 2:35 pm

absent the Rh factor, huh?

Bill in Houston says:

November 4, 2011 at 2:34 pm

According to Professor J. Hurrumphington Dinkle, Head of Ear Noise at the University of Krakatoa (East of Java), fingernails on a blackboard is annoying because "it sounds like Yoko Ono."

Reply

Ridge says:

November 4, 2011 at 2:39 pm

How about it's just a hideous sound.

Reply

onevois says:

November 4, 2011 at 3:20 pm

Interesting. So you're saying my mother-in-laws speaks in the 2,000 and 4,000 Hz frequency?

Reply

BpK_TeXaN says:

November 4, 2011 at 3:56 pm

Not sure the correlation is there, but i thought this was Hilarious!!

BpK_TeXaN says:

November 4, 2011 at 3:54 pm

This is what counts as "research" or "work", i guess i shouldn't be so surprised but to see so many folks comment on this like they are given some life altering news or revelation of how the ear hears and the brain process' that sound is laughable....don't ya'll have better things to work on..(i don't, but you might)

Reply

StanleyS says:

November 4, 2011 at 4:59 pm

Keep in mind that today is Friday. The people who have alternate Fridays off have to find *something* to do!

texdjd says:

November 4, 2011 at 4:18 pm

Why? Cause it sounds just like Obummer flappin his jaws.

Reply

db64 says:

November 4, 2011 at 4:37 pm

The European Union has money to pay for "research" like this? Then the EU has more money to fly the scientists from Europe to San Diego to present their findings? And some people wonder why their country is in debt!

Reply

StanleyS says:

November 4, 2011 at 5:01 pm

I don't dispute your basic idea. But nevertheless, we should be aware that, judging from Eric's description, this research was probably done on a *really* small budget.

lonesome polecat says:

November 4, 2011 at 6:03 pm

I believe a lot of our reactions to sounds date back to the nine months we heard our mother's heartbeat right in our ears. Did you ever notice that small children seem to like music with a strong, solid beat? It certainly takes time to develop a taste for asynchronous music.

Reply

craig says:

November 6, 2011 at 12:18 pm

For the same reason that a lot of modern pop music is also annoying, it's discordant chaos.

Reply

craig says:

November 6, 2011 at 5:14 pm

Harking back to another recent SciGuy blog topic I would prefer that my Gastroenterologist listen to Mozart rather than fingernails on a chalk board when performing a colonoscopy on me.

Reply