A music teacher's blog of educational reflections, philosophy, and research.

MONDAY, JANUARY 2, 2012

Ear Canal Resonance Follow-Up

In my previous post about ugly sounds, I made a note about what I thought to be missing information regarding Reuter and Oehler's research:

> I lament that there doesn't seem to be a complete, published paper by Reuter et al., at least not yet (but I couldn't wait any longer). I have no way to draw further information from their raw data or even determine how they decided what frequency range qualified as that which the ear is most sensitive to — I assumed they cited some other work, but in my search of all of their cited work, nothing seems to present such research. They presented their work in a 15 minute session at a meeting of the Acoustical Society of America in San Diego on November third.

I emailed Dr. Reuter and he responded promptly with a succinct reminder of my musical acoustics education *(edited for clarity)*:

> From a mechanical perspective the outer ear canal works like a tube, which is open at the one end (pinna) and closed at the other end (eardrum). Tubes like this can also be found in musical instruments like organs (the so-called "gedackt" register) and clarinets. One of the main characteristics of these tubes is that their transmission is especially strong at 1/4 wavelength. If you think about the speed of sound (340 m/s) and the length of our ear canal (about 27 mm), then you can calculate the ear canal resonance frequency with the equation f = c/lamba (frequency = speed of sound / wavelength): x = 340m/s / 0,027 m *4 = 3148 Hz as resonance peak.

(Note that the wavelength used is 4 times the given ear canal length, hence the quadruplet.)

He also included page-specific citations for this and for some further psychoacoustic research. While it seems like this is a fairly well-established fact, I still hope he cites the experiments that confirm the range of resonance peaking discussed.

In other news *(edited for clarity)*:

> Michael Oehler and I are carrying out further experiments about chalkboard sounds.... The whole study will be published in the middle of the coming year I suppose.

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PedagogicLuc @pzmyers Me: music teacher who just found a friend-colleague chem teacher is an AiG fan. Talk focused on "repeatable" science. Ugh #halp
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PedagogicLuc @hemantmehta To clarify, I guess anyone's work, like @khanacademy's, can be misused. I hope this brings @vihartvihart's genius to more ppl.
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Don't let me forget to look for that. Also, I could write about how tube-like instruments produce their sound if that part of Reuter's email made you wonder — if you're interested, let me know in the comments.

Posted by Luc Duval at 9:18 PM

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