

31 Dec 2015

Responses to Sarah Blunt's questions in advance of an interview for BBC Radio 4.

*What do you hear?*

We hear a sound coming from a loudspeaker. It sounds voice-like and can have singer-like tone qualities.

Ex. 1 [singing.wav](#)

"Gold standard" synthesized singing.

Ex. 2 [demoConstant.wav](#)

Same synthesizer process as Ex. 1 but producing only a constant tone.

Ex. 3 [demoPortamento.wav](#)

Two notes with vibrato.

*What do you listen to?*

We listen to fluctuations of brainwaves. And we listen for patterns or lack of patterns in it.

Ex. 4 [seizure.wav](#)

Seizures are loud, strong and rhythmic.

Ex. 5 [normal.wav](#)

Normal activity is generally softer, sporadic, not patterned rhythmically.

*What do you make of what you hear?*

We're hearing brainwave fluctuations directly with the brain stethoscope. Like with a cardiac stethoscope we are "tuned in" to the state of the organ.

*What can you do with this information?*

We can distinguish seizure from non-seizure state and follow the progression of a seizure.

*(It would be great to get some recordings from you as well to illustrate the interview of brain states before, during and after a seizure.)*

Ex. 6 [normalToSeizure.wav](#)

Seizure onset.

Ex. 7 [seizureToPostIctal.wav](#)

Abrupt seizure halt and "flat line" silence followed by post-ictal phase.

Ex. 8 [postIctalToNormal.wav](#)

Post-ictal spikes to more normal quieter state after seizure.

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A little bit of word play regarding "Listening" and "Hearing" as it applies to sonification.

At least in English, it seems simple to say that we "listen to" and we "hear with". What we listen to can be either sound in general, or a type of sound like music, speech or wind sound, or objects like a voice, voices, orchestra or wind. We "listen for" changes in these sources. When we listen, our ears are engaged and sometimes we use sound devices like microphones, hydrophones or stethoscopes to hear further into media. These are the things that we hear with. They are used to hear sounds or objects which we listen to and behaviors we listen for.

It's fascinating the extent to which we can say we "hear something" when we listen. For example, we hear something in our mind when we imagine a sound (oddly, English lacks a word for "aural imagination"). A circular takeaway is that "listening" is a focusing of attention and produces hearing of something (or nothing). And hearing something is itself capable of provoking listening.

More poetically, we can also say we hear with our heart or our mind. We don't hear with them in the usual sense of registering an external sound. Hearing with our heart is akin to feeling (sometimes labeled as type 'B' listening), while with our mind (but not our mind's ear) it's about understanding or explaining phenomena in a more intelligible way (labeled Type 'A'). The "mind's ear" is reserved for the aforementioned mental proscenium on which we experience mental imagery and recall.

These distinctions are relevant to sonification, a world wherein we "listen to" data. We "hear with" the electronics of the brain stethoscope. The "something" which we hear is a voice-like sound coming from a loudspeaker. What we listen for are changes in the state of the organ.