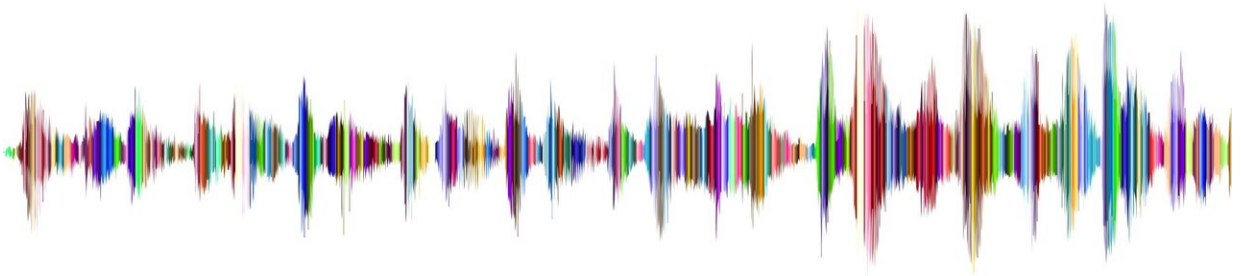


Phantom noises and hypersensitivity to sound: Tech to the rescue?

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Imagine it's night, you're lying in bed, all is quiet. But you keep hearing what sounds like whistling, or buzzing, or sizzling. Or your partner is washing the dishes beside you and you find the clanking of the plates unbearable.

In the first case, you probably have tinnitus; in the second, hyperacusis. Sylvie Hébert, a professor in Université de Montréal's School of Speech

Therapy and Audiology, is researching the two common [hearing](#) problems at the Tinnitus and Hyperacusis Research Laboratory, affiliated with the International Laboratory for Brain, Music and Sound Research (BRAMS).

Prof. Hébert and her team are conducting basic and [clinical research](#) on hearing problems and developing instruments to more accurately characterize hearing and hearing pathologies. They have been using new technologies in their research for several years.

Smart earplugs to alleviate tinnitus?

Two lines of research are currently being pursued with support from the Natural Sciences and Engineering Research Council of Canada (NSERC).

One investigates [stress and noise as triggers or aggravating factors for tinnitus](#). With Jérémie Voix of the École de technologie supérieure and Alain Vinet from UdeM's Department of Pharmacology and Physiology, Hébert is using smart earplugs to measure the effect of stress and noise on tinnitus. The project has received an AUDACE grant from the Fonds de recherche du Québec Société et culture (FRQSC)

"Jérémie Voix has developed earplugs with an external and an internal microphone," Hébert explains. "The external mic picks up ambient noise and the internal mic detects the heartbeat in the ear. At this point, we're validating the earplugs using clinical grade equipment. We put a Holter heart monitor on participants and then subject them to stress or intense noise. In a later stage, we will look at whether those factors aggravate tinnitus."

Hébert and doctoral student Bérangère Villatte hope the device can eventually be used in real-life situations. "We could use smart

technology to provide subjects with appropriate solutions in real time. For example, if a person with tinnitus were suddenly exposed to noise and the earplug detected an increase in heartbeat, we could send a masking sound or soothing music."

Can your face predict hyperacusis?

Less well known than tinnitus, hyperacusis is defined as an abnormal intolerance to common ambient sounds, despite normal or near-normal hearing. Sylvie Hébert is investigating whether facial expressions could be used as predictors for relief or recovery from the condition. "We know that certain sounds provoke a reaction in humans: we tense up, grimace, look disgusted, etc. We're looking into whether there are specific reactions that can be correlated with the intensity or the nature of the sound."

For this study, Hébert and doctoral student Charlotte Bigras plan to use cameras and AI algorithms to determine whether certain muscles or areas of the face are involved in certain sound-related emotions or intensities.

"Perhaps we will be able to link certain types of reactions to specific sounds, and then use these reactions as treatment criteria, i.e. to predict whether a treatment can give relief or even cure hyperacusis."

This approach has never been attempted in audiology but has been used in psychology with patients being followed for depression. It has proven possible to predict, on the basis of facial expressions, whether a therapy would be effective.

Sylvie Hébert is also the author of a book on tinnitus published in March 2020, [Acouphènes : les reconnaître et les oublier](#), which covers the risk factors and problems commonly associated with tinnitus and related

hearing disorders, describes techniques and possible solutions, and offers hope to all who suffer—not in silence, but in the constant buzzing.

Provided by University of Montreal

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