



## OPEN ACCESS

EDITED AND REVIEWED BY  
Robert J. Zatorre,  
McGill University, Canada

\*CORRESPONDENCE  
Erol J. Ozmeral  
✉ eozmeral@usf.edu

RECEIVED 17 November 2023  
ACCEPTED 01 December 2023  
PUBLISHED 20 December 2023

## CITATION

Ozmeral EJ and Higgins NC (2023) Editorial:  
Understanding the role of head and body  
movement when navigating a complex auditory  
scene. *Front. Neurosci.* 17:1340393.  
doi: 10.3389/fnins.2023.1340393

## COPYRIGHT

© 2023 Ozmeral and Higgins. This is an  
open-access article distributed under the terms  
of the [Creative Commons Attribution License  
\(CC BY\)](https://creativecommons.org/licenses/by/4.0/). The use, distribution or reproduction  
in other forums is permitted, provided the  
original author(s) and the copyright owner(s)  
are credited and that the original publication in  
this journal is cited, in accordance with  
accepted academic practice. No use,  
distribution or reproduction is permitted which  
does not comply with these terms.

# Editorial: Understanding the role of head and body movement when navigating a complex auditory scene

Erol J. Ozmeral\* and Nathan C. Higgins

Department of Communication Sciences and Disorders, University of South Florida, Tampa, FL, United States

## KEYWORDS

spatial hearing, hearing impairment, head movement, auditory scene analysis, eye gaze, audiovisual (AV) feedback

## Editorial on the Research Topic

### [Understanding the role of head and body movement when navigating a complex auditory scene](#)

In complex listening situations, speech understanding can be highly challenging due to multiple sound sources from multiple locations, background noise, and reverberation. Changes in head and body position while further complicating the acoustic environment, can also provide additional cues to understanding or directing a conversation. For example, recognizable head and eye gestures can convey listener understanding prior to a talker completing a sentence or for a talker to emphasize a point. Such body and head movements also play a major role in the peripheral acoustic cues available to the listener, such as the binaural and spectral changes critical to sound source localization and segregation. Despite our comprehensive understanding of many of these peripheral cues in isolation, traditional laboratory settings often seek to control for or eliminate the influences of head, body, and eye movements during experiments on auditory perception and speech communication.

The scope of this Research Topic was intended to broadly capture the impact that head, body, and eye movements have on everyday communication, sound perception, and navigation. This collection of research was seen as fundamental to understanding speech communication and auditory perception as it exists outside the laboratory, and accumulating knowledge will advance innovation and development in assistive hearing devices, virtual reality, and other clinical and consumer technology sectors that integrate across multiple sensory domains to provide ecologically centered user experiences. The present Research Topic with four articles provides an introduction to the many interactions that exist between sensory modalities: one study focuses on the visual coherence that improves speech listening (Yuan et al.); one study focuses on how audition can influence fine-motor skills (Guo et al.); one study explores the role of micro head movements in solving front-back confusions (McLachlan et al.); and finally, the Research Topic includes a review on the state-of-the-field as it relates to hearing and head movements (Higgins et al.).

The review article *Head movement and its relation to hearing* by Higgins et al. sets the stage for much of the Research Topic by providing a broad overview of the state-of-the-field. The authors begin by describing the physical parameters involved with natural movements, and then we get an introduction to the latest developments in communication and hearing technology that are affected by head and body movement.

Guo et al. in a paper titled *Effects of auditory feedback on fine motor output and the corticomuscular coherence during a unilateral finger pinch task*, provides a valuable perspective by showing how the relationship between body motion and hearing is a two-way street. In their study, the authors use behavioral and physiological methods to test whether auditory feedback can modulate fine motor skills. Their study confirms that not only do participants perform better on the task with auditory feedback, but there is also an observed modulatory effect in cortex that is associated with auditory feedback, perhaps opening the door to more effective rehabilitation and training strategies for persons with movement disorders.

In Yuan et al.'s article *The impact of temporally coherent visual cues on speech perception in complex auditory environments*, a simple but effective visual cue is used to mimic the potential lip movements that aide our perception of speech in complex acoustic scenes. For intermediate signal-to-noise ratios, the authors report an observed benefit of coherent visual stimuli when listeners are asked to transcribe masked speech.

Finally, in *Dynamic spectral cues do not affect human sound localization during small head movements* by McLachlan et al., the authors report on a localization study in which small head rotations in the yaw rotation axis provide substantial benefit in solving front-back confusions, but otherwise see no benefit from movement in other axes (e.g., pitch) regardless of available spectral cues.

Together, the present Research Topic illustrates how our understanding of the auditory system can be swayed by interactions with other sensory modalities (e.g., vision, motor, etc.). As we navigate in complex acoustic scenes, our ability to segregate auditory objects relies not only on the saliency of source features but also on our relative position in the world to that source. Do we have visual feedback to better comprehend speech? Do we have auditory feedback to better perform motor tasks?

These are a sample of the questions that seek to explore the multisensory integration provides the foundation to interpreting the world around us, and are fundamental to future therapeutic and technological innovations.

## Author contributions

EO: Writing—original draft, Writing—review & editing. NH: Writing—review & editing.

## Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.