Effects of Body Position and Vision on Speech Understanding

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Abstract. Twenty-four young adults with normal hearing, vision and balance completed the BKN-SIN Test under four conditions: Sitting versus standing with eyes open versus blindfolded. Subjects’ SNR-50 scores did not differ significantly among conditions; however, subjects rated listening as significantly easier when sitting with eyes closed than standing with eyes open. This normative research is the first of several inter-modality studies at our laboratory addressing effects of body position and balance on speech understanding.

Introduction

The most common hearing tests used by audiologists are pure-tone threshold testing (which measures how softly a person hears a tone) and speech recognition testing (which measures how accurately a person understands speech at a soft or loud level in quiet or noise.) Most hearing tests are done with a client sitting in a sound booth while listening through earphones or loudspeakers. Sitting is mainly for the client’s comfort, so the client does not fatigue and can devote more attention to listening. Likewise, some clients close their eyes during hearing testing, presumably to concentrate better by blocking visual distractions in the sound booth. In other words, sitting in a quiet room is supposed to improve the reliability and accuracy of hearing test results. Sitting (with eyes open or closed) during hearing tests, however, does not reflect the range of positions people assume in during everyday listening. People often stand, for example, while they listen and converse. Listening to speech while standing up, however, often may require people to focus on maintaining balance which may cause them to become tired quicker and, thereby, decrease their understanding of what they hear. Moreover, because vision can improve balance, people rarely converse when standing with their eyes closed. No researchers, to our knowledge, however, have systematically compared how well people understand speech when they are sitting versus standing, with their eyes opened or closed. Therefore, the purpose of this study is to determine combined effects of body position (sitting versus standing) and vision (eyes opened versus eyes covered) on understanding speech.

Method

Participants were 24 adults between the ages of 18 to 35. They spoke English as their first language; were not an audiologist or in an audiology program; had normal hearing, vision, and balance; were not taking medication that could influence hearing, vision, or balance; and had not consumed alcohol in the last eight hours. Participants completed a brief questionnaire followed by a basic screening of hearing, vision, and balance. During objective measurements, participants meeting selection criteria then repeated back simple sentences from the BKN test which were heard in a background of noise. These lists were presented under four conditions: with participants sitting with their eyes open or eyes blindfolded or standing with their eyes open or eyes blindfolded. After completing all conditions, subjective measurements of how participants ranked the difficulty of listening under the four conditions relative to one another.

Results

Friedman’s Test indicated no significant differences (p > 0.05) in objective rankings of speech understanding in noise scores among the four conditions (see Figure 1). Conversely, another Friedman’s Test indicated that participants subjectively ranked listening while standing with eyes open as significantly more difficult (p < 0.05) than listening while sitting with eyes closed (see Figure 2).
Conclusions

Results suggest that when a person takes a routine hearing test, there may be no objective difference in speech understanding in noise when sitting or standing with eyes opened or eyes closed. However, a person may prefer to sit with eyes closed during the test, presumably, because listening is more comfortable. One reason there may not have been objective differences in speech understanding between conditions is because the tasks might not have been difficult enough. Accordingly, we are now conducting a follow-up study with participants standing with eyes opened or eyes closed doing a more difficult balance task.

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