1aPP18. Speech, Spatial, and Qualities of Hearing Scale (SSQ): Normative data from young, normal-hearing listeners

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ABSTRACT

The Speech, Spatial, and Qualities of Hearing Scale (SSQ) was developed to assess listeners' subjective sense of listening ability and listening experience in everyday complex situations that often involve spatial hearing. The SSQ is one of the very few instruments designed to measure such quantities, and has been used extensively to assess functional hearing impairment and benefit resulting from hearing remediation strategy. Although a recent study examined the psychometric properties of the SSQ with a large sample of hearing-impaired listeners, little published data exist from normal-hearing listeners. The data that have been published suggest that even young normal-hearing listeners do not rate their subjective listening abilities at the most-proficient end of the scale in all the listening situations probed by the SSQ. The goal of this study was to examine this issue more fully, using a sample of 233 young (median age 21.2 years, 3.1-year IQR), normal-hearing listeners (pure tone thresholds ≤ 25 dB HL from 250 – 8000 Hz). Results provide normative data on each of the (self-administered) SSQ items, and describe the psychometric properties of the SSQ for a young normal-hearing population. These data are intended to aid in the interpretation of SSQ results from other populations.

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INTRODUCTION

The Speech, Spatial, and Qualities of Hearing Scale (SSQ) is a 49-item self-assessment of hearing ability/disability in a variety of complex listening situations typical of those encountered in everyday life. The SSQ has been used to evaluate the benefits of various hearing remediation strategies, from bilateral hearing aids (Noble and Gatehouse, 2006; Ahlstrom *et al.*, 2009) to bone-anchored hearing aids (Martin *et al.*, 2010), to cochlear implants (Tyler *et al.*, 2009), and shortened versions of the SSQ have been developed for clinical screening applications (Demeester *et al.*, 2012; Noble *et al.*, 2013). Although the psychometric properties of the SSQ for a large sample (n = 1220) of hearing-impaired listeners have been reported (Akeroyd *et al.*, 2014), there has not been comparable work for normal hearing listeners. As a result, important bases for comparison of SSQ results are not available. Two previous studies have reported item-level results from the SSQ for samples of young, normal hearing listeners (Banh *et al.*, 2012; Demeester *et al.*, 2012), but because the samples were relatively small for both studies (n = 48, and n = 103), the ability to generalize these results to the population of normal hearing listeners may be limited. The goal of this study is to provide improved normative data for the SSQ, using a larger sample of young, normal-hearing listeners.

METHODS

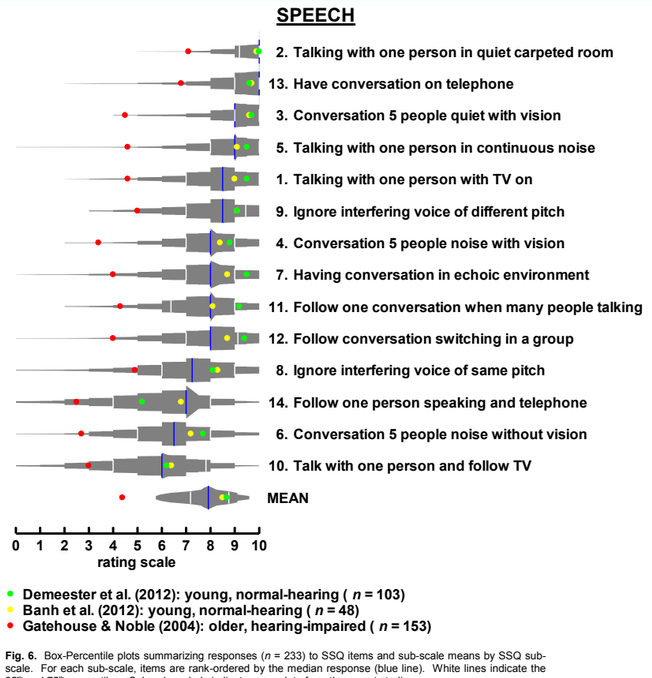
Subjects

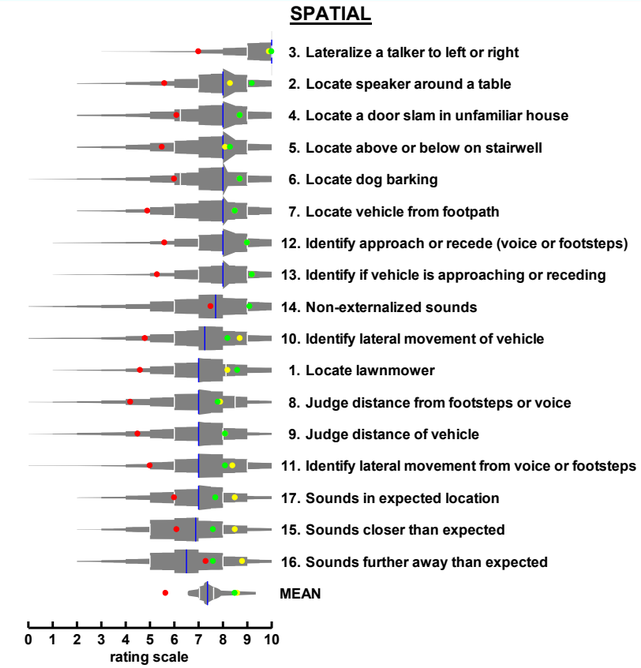
Two hundred thirty-three subjects (176 Female, 57 Male) participated in the study. The subjects were generally young, and all had normal hearing. The distribution of subject ages is shown in Fig. 1. Average pure-tone air-conductive thresholds are shown in Fig. 2. Figures 3 and 4 display distributions of pure-tone averages (PTAs) for the left and right ears respectively. The distribution of unsigned differences in PTAs between left and right ears is shown in Fig. 5. Subjects received course credit for their participation in the study. All procedures involving human subjects in this study were approved by the University of Louisville Institutional Review Board.

Materials

Each subject completed the 49-item SSQ for unaided listening (Gatehouse and Noble, 2004) via self report in written form.

RESULTS





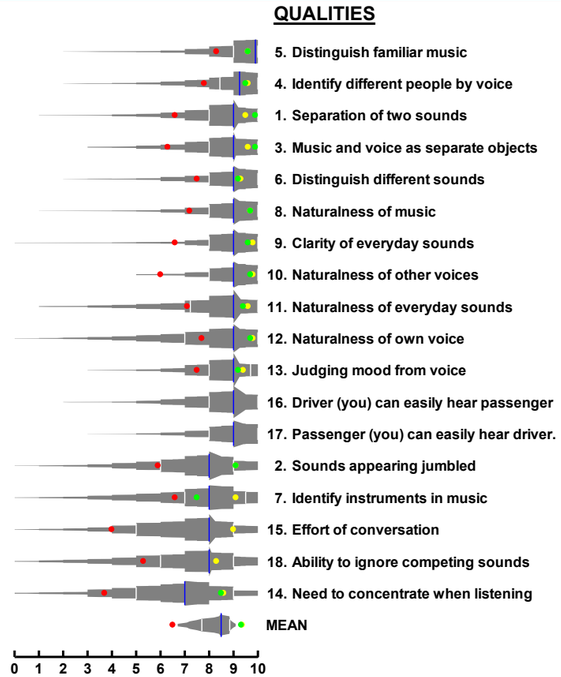


Fig. 6. Box-Percentile plots summarizing responses (n = 233) to SSQ items and sub-scale means by SSQ sub-scale. For each sub-scale, items are rank-ordered by the median response (blue line). White lines indicate the 25th and 75th percentiles. Colored symbols indicate mean data from three past studies.

Item results for the three SSQ sub-scales are displayed in Fig. 6, along with mean results for each sub-scale. Results are shown using Box-Percentile plots, which provide compact graphical representations of the actual distributions of the responses (Esty and Banfield, 2003). For each Box-Percentile plot, the thickness of the irregular "box" at a given SSQ scale value is proportional to the percentile of response at that scale value, up to the 50th percentile. Above the 50th percentile, the thickness is proportional to 100 minus the percentile. Mean results from three other comparisons studies are also displayed in Fig. 6.

We wish to thank Sarah Sprague and Michael Chapman for their assistance in data collection for this study.

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CONCLUSIONS

- Using the SSQ, many young, normal-hearing listeners do not rate their listening abilities at the top of the ability scale. Substantial rating variability is also observed.
- Generally good agreement with previous SSQ studies (Banh *et al.*, 2012; Demeester *et al.*, 2012) using young, normally-hearing listeners is noted.
- SSQ results from a hearing-impaired population (Gatehouse and Noble, 2004) generally fall in the lowest quartile of the data from normal-hearing listeners.
- Together, these results suggest that the present dataset has normative value.

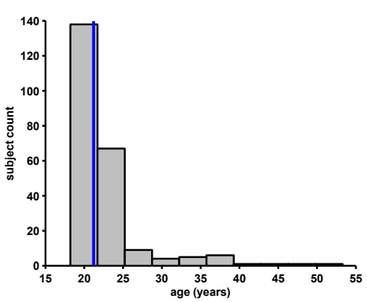

Fig. 1. Distribution of participant age in years (n = 233). The blue line indicates the median age.

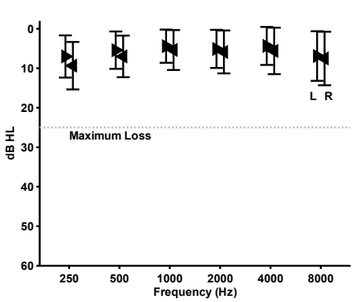

Fig. 2. Mean pure-tone air-conductive thresholds (bars indicate ± 1 standard deviation) for left (L) and right (R) ears. Thresholds were ≤ 25 dB HL from 250 – 8000 Hz for all subjects in the study.

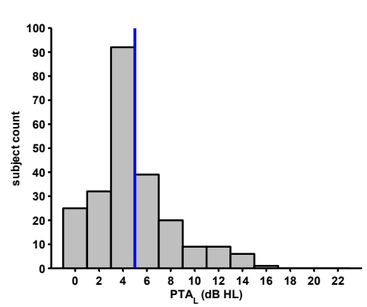

Fig. 3. Distribution of pure-tone averages (PTAs) for the left ears of all participants in the study. PTA was defined as the mean of the air-conductive thresholds at 500, 1000, and 2000 Hz. The blue line indicates the median PTA.

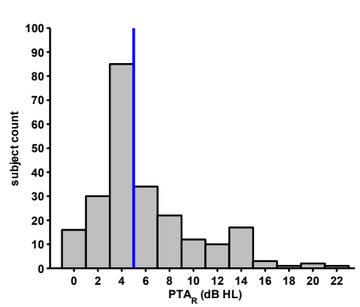

Fig. 4. Same as Fig. 3, but for the right ear.

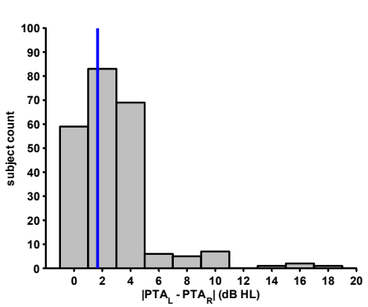

Fig. 5. Distribution of unsigned differences in PTA between the left and right ears. The blue line indicates the median.

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