**The combined predictive value of multiple cognitive abilities for speech-in-noise perception by older adults**

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There is a broad consensus that cognition is important for speech-in-noise (SiN) perception, but its exact role remains to be understood. Even for the simplest case where the relationship between cognition and SiN performance is tested for different cognitive components in isolation, it is not clear exactly which cognitive components contribute in any given listening situation. Moreover, it is at least possible that a combination of cognitive abilities may provide a truer description of cognitive contributions. For example, compensatory mechanisms may lead to listening being accomplished in different ways: listeners with relatively poor abilities in one relevant cognitive domain may compensate with relative strength in another. Alternatively, cognitive abilities may interfere with one another – for example, a large vocabulary combined with good working memory may be deleterious if listeners are storing phonetically similar competitor words instead of the target.

In this study, 50 older adults (ages = 61-86, mean = 70; age-normal hearing) performed tasks designed to assess a range of cognitive abilities (simple/complex working memory, verbal knowledge, reading comprehension, inhibition). They also performed three SiN tasks (isolated words, and final words in low-and high-predictability sentences), presented in speech-modulated noise at two signal-to-noise ratios. Individual measures of hearing (PTA 0.25-8kHz) were obtained. A series of multiple regression models were fitted to assess the contribution of the tested cognitive abilities to SiN perception, alone and in interaction, for each listening condition and while accounting for PTA.

Results showed interactions between cognitive task scores in their ability to predict SiN performance, but only at the lower (more challenging) signal-to-noise ratio. Many of these interactions followed a pattern that was consistent with a compensatory mechanism: if participants had relatively poor scores in one cognitive task, then increasingly high scores in another cognitive task were associated with improved SiN perception. We also found some evidence for interference, where increasingly high scores on a cognitive task were associated with poorer SiN perception if participants were already performing well on another cognitive task.

These findings reveal a complex picture of the relationships between intelligibility and cognition, which may help us understand some of the inconsistencies in the literature regarding cognitive contributions to SiN perception. In particular, they suggest that: 1) more than one cognitive ability predicts SiN performance; 2) these cognitive abilities may interact to predict SiN performance; and 3) these interactions are not always advantageous to SiN listening.

Supported by BBSRC grant BB/K021508/1.

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