

Effect of noise on the performance of young adults in verbal working memory tasks: pupillometry as a measure of cognitive effort

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Concentrating to perform listening tasks in a noisy environment requires to re-allocate mental resources to overcome the interference of noise. This process and the resulting fatigue, i.e., listening effort, can be detrimental to cognitive performance.

Research has shown that eye pupil dilation and high blink rates can be considered psychophysiological markers of cognitive effort, making pupillometry a practical and reliable method for evaluating cognitive load.

In this study, we tested the effects of unintelligible noise (multitalker babble noise) on university students' performance of the Digit Span (DS) Test. The participants performed the DS test (Forward and Backward) under two different acoustic conditions: quiet and noise (noise administered through headphones at an intensity of 65 dB A). Task order was counterbalanced between participants.

The Digit Span Test assesses verbal working memory by recalling a series of auditory digits presented through headphones, in the same order (forward subtest) and in reverse order (backward subtest).

Participants wore a portable eye-tracker (Pupil Labs) to record their pupil diameter during performance in both acoustic conditions. Additionally, the number of ocular blinks was assessed.

Participants' performance on the digit span tasks in quiet and noise was thus complemented by an assessment of the changes in pupil diameter and number of blinks compared to a baseline, aiming to evaluate the effect of noise on their listening and cognitive effort.

Furthermore, each participant was asked to complete a self-report questionnaire to assess their perceived cognitive effort during the task. Results will be discussed in light of existing literature.

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