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Data Article

Data on the auditory duration mismatch negativity for different sound pressure levels and visual perceptual loads



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ABSTRACT

The data presented in this article are related to our research article entitled “Effects of sound pressure level and visual perceptual load on the auditory mismatch negativity” (M. Szychowska, R. Eklund, M.E. Nilsson, S. Wiens, 2016) [1]. The duration MMN was recorded at three sound pressure levels (SPLs) during two levels of visual perceptual load. In an oddball paradigm (standard=75 ms, deviant=30 ms, within-subjects design), participants were presented with tones at 56, 66, or 76 dB SPL (between-subjects design). At the same time, participants focused on a letter-detection task (find X in a circle of six letters). In separate blocks, perceptual load was either low (the six letters were the same) or high (the six letters differed). In the first data collection, tones had only 76 dB SPL [2]. In a follow-up data collection with exactly the same procedure, tones had 56 and 66 dB SPL [1]. Here, we report the procedure, the recording of electroencephalography (EEG) and its preprocessing in terms of event-related potentials (ERPs), the preprocessing of behavioral data, as well as the grand mean ERPs in figures. For each participant, the reported ERP data include mean amplitudes for standards, deviants, and the difference wave (MMN) at Fz (with tip of nose as a reference), separately for the combinations of SPL and load. Reported behavioral data

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include the signal-detection measure d' as an index of detection performance.

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Specifications Table

Subject area	Cognitive Neuroscience
More specific sub- ject area	Mismatch Negativity (MMN)
Type of data	Datasheet (.csv), figures
How data was acquired	Electroencephalography (EEG), event related potentials (ERPs), d' from hit rates and false alarms.
Data format	Preprocessed
Experimental factors	Three SPL groups (56, 66, and 76 dB SPL) – between subjects; Two perceptual loads (letter detection task: find X in a circle of 6 letters; low load: all the letters are the same; high load: all the letters are different) – within subjects.
Experimental features	Participants ($N=83$) were presented with a letter detection task that varied in perceptual load (low or high, alternating between blocks). Simultaneously, participants were presented with the tones in an oddball paradigm. For each participant, tones were complex tones with $f_0=500$ Hz presented at 56, 66, or 76 dB SPL ($n=30, 28,$ and $25,$ respectively). Tones differed in duration: standard was 75 ms, deviant was 30 ms. Participants were asked to ignore the tones.
Data source location	Stockholm, Sweden
Data accessibility	Data are provided with this article

Value of the data

- Large sample sized study on MMN and perceptual load.
- Useful for meta-analysis on effects of SPL or visual perceptual load on MMN.
- Useful for meta-analysis on effects of auditory distractors on behavioral measures.

1. Data

The attached dataset ([Supplementary Table 1](#)) includes demographic information for each participants, the dates and times of data collection, mean ERP amplitudes, and behavioral data. The ERP data consist of mean amplitudes for standard, deviant, and their difference (deviant minus standard, i.e., MMN), recorded at Fz with the tip of the nose as a reference, separately for each Sound Pressure Level (SPL) and visual perceptual load. For the behavioral data, we include the signal-detection measure d' .

2. Experimental design, materials and methods

Participants were 93 students (mean age=25.94, $SD=5.83$, 52 women) from local universities in Stockholm, Sweden. None of the participants reported hearing problems. Data collection occurred in two waves. The first group of 28 participants was presented with the sounds at 76 dB SPL [2]. Shortly

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