

## **Influence of the number and sound level of noise events and task engagement on perceived loudness and annoyance**

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### **ABSTRACT**

Exposure to noise causes annoyance and interferes with cognition. However, it is not clear what role intermittency plays or how that relates to task engagement. The experience of loudness and annoyance to single or multiple sounds may depend upon either the peak sound level, or an integration of the sounds. This study compares perceived loudness, annoyance and ability to perform a cognitive task when exposed to aircraft noise. In this study, participants were exposed to recordings of aircraft noise, presented either as a single 15-second overflight at a sound-level of 80 dB  $L_{eq}A_{15seconds}$  or four 15-second overflights at 60 dB  $L_{eq}A_{15seconds}$ , reflecting the notion that a doubling in perceived loudness is equivalent to an increase of 10 dB, thus four stimuli at 60 dB might be expected to seem as loud as a single stimulus at 80 dB. Participants were also required to perform an engaging mental arithmetic task during some sessions. Participants rated their perception of loudness and annoyance, and physiological markers of stress were recorded. Overall, the single 80-dB stimulus was perceived as louder and more annoying than the four 60-dB flights. The difference in loudness and annoyance diminished when performing the task. Noise did not influence task performance. Physiological markers reflected task engagement and the single high-sound-level stimulus was more stressful. Future research may explore systematically the relationship between the number and sound level of overflights and the reactions they induce, while also considering the quality and source of the sound, and the task engagement of listeners.

Keywords (3-6): Noise, Annoyance, Task, Heart rate, Blood volume pulse, Skin conductance