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Algorithmic modelling of the disturbance impact of background sounds

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Mentally demanding tasks very rarely take place during silence. However background sound can reduce cognitive performance, even if it is irrelevant to the task and is intended to be ignored. This so-called Irrelevant Sound Effect (ISE) has been verified in a multitude of behavioral experiments for verbal short-term memory performance.
Although a multitude of cognitive psychological experiments have explored the ISE, no psychoacoustically based instrumental procedure existed to predict its occurrence. This poses problems in an applied context: In office environments, for example, the potential beneficial – or less advantageous – effects of noise abatement on cognitive performance could not be calculated before their realization.
The talk presents an algorithm which models performance data in ISE experiments on the basis of instrumental measurements of the hearing sensation fluctuation strength. It was verified with a database consisting of about 50 background sounds and corresponding performance data that have been collected in cognitive psychological experiments at the KU Eichstätt-Ingolstadt. The algorithm is able to reproduce the performance results in about 90 % of cases within the interquartile ranges. It will be discussed within the scope of cognitive short-term memory models, which claim to explain the ISE and with respect to practical implications.