Postdoc position (full time, 3 years): Audio-visual perception of vehicles while navigating in traffic, Johannes Gutenberg-Universität Mainz

Institute of Psychology
Section Experimental Psychology

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A postdoctoral scientist position is available at the Institute of Psychology, Universität Mainz, in the research project "*Audio-visual perception of vehicles while navigating in traffic: Design, evaluation, and research application of multimodal virtual environment technologies*", principle investigator Prof. Dr. Daniel Oberfeld-Twistel. The project is funded by Deutsche Forschungsgemeinschaft and is part of the priority programme AUDICTIVE (http://www.spp2236-audictive.de). The aim of the project is to deepen our understanding of the role of auditory and audiovisual perception in traffic safety. Pedestrians navigating in traffic must avoid to collide with vehicles. In such a situation, our sense of hearing provides important information in addition to available visual information. For example, we can auditorily detect a vehicle approaching us from behind and thus outside our field of view. While there is a large body of literature on time-to-collision (TTC) estimation and street-crossing decisions based on *visual information*, there are still significant gaps in our knowledge about collision avoidance based on **auditory information**, when visual information is additionally available or not.

In behavioral experiments using experimental methods established in our prior work (e.g., DeLucia, Preddy, & Oberfeld, 2016; Keshavarz *et al.*, 2018), we will investigate the use of auditory information and its combination with visual information in **TTC judgments** and **street-crossing decisions**. The experiments will be conducted with a state-of-the-art **audio-visual simulation system for traffic scenarios** implemented in Daniel Oberfeld-Twistel's lab. The system provides high-fidelity acoustic simulations of approaching vehicles based on source-recordings of real vehicles and acoustic modeling (in TASCAR),

presentation of the dynamic spatial sound field using higher-order Ambisonics, and interactive visual simulations of the traffic scenario presented on a virtual-reality headset. The experiments will contribute to a broad range of open questions concerning fundamental and applied aspects of collision avoidance, such as pedestrian behavior in interaction with vehicles driving at constant speed or accelerating, or potential risks posed by the different acoustic characteristics of electric vehicles. We will develop observer models of audio-visual TTC-estimation and street-crossing decisions and conduct perceptual and behavioral evaluations of different auralization methods.
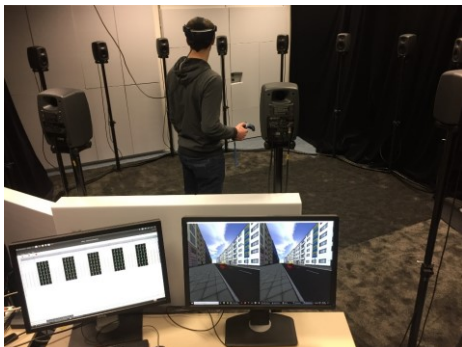
The successful candidate will work collaboratively and independently on research, with Daniel Oberfeld-Twistel and his group. We are looking for a person motivated to make major contributions to the research strategy. Audio-visual psychophysics and modeling combined with virtual reality to address the real-world issue of pedestrian safety is an innovative approach and will need methodological thinking and additional development. The project is conducted in collaboration with the group of Prof. Ercan Altinsoy (Acoustics and Haptics, TU Dresden), who will work on refined acoustic simulations of traffic scenarios, and thus provides excellent opportunities for interdisciplinary collaboration.

Responsibilities

- Further development of the research strategy in collaboration with the group members
- Conception, design, and programming of behavioral experiments
- Supervision of the experiments, acoustic and visual calibration of the simulation system
- Development and implementation of data analysis strategies
- Analysis of the behavioral responses, auditory and visual cues, psychoacoustic indices, and eye- and head-movement data collected during the experiments
- Publication of the results in peer-reviewed journals, presentations at national and international conferences
- Research data management, project documentation

Minimum qualifications

- Ph.D. in an area related to the topics of the project (e.g., experimental psychology, acoustics, hearing science, cognitive science, human factors, physics, engineering)
- Experience in at least two of the following areas: auditory or visual psychophysics, acoustic measurements and computation of psychoacoustic indices, audio signal processing, virtual acoustics, visual virtual reality, eye tracking, human behavior in traffic (time-to-collision, street crossing, driving simulation), statistical modeling
- Good programming skills (ideally in Matlab, Python, WorldViz Vizard, or Unity)
- Strong data-analytic skills
- Excellent verbal and written communication skills in English. German language skills are appreciated but not mandatory.

Gains:

- We offer an attractive research environment with excellent technological facilities.
- You will conduct innovative research in an interdisciplinary team, with regular project meetings in Mainz and Dresden, and larger meetings in the context of the AUDICTIVE priority programme. Researchers from the US, France, and Sweden are involved in the project, opening many opportunities for international networking.
- Mainz is a vibrant city with one of Germany's largest universities, beautifully located on river Rhine in the Rhine-Main Metropolitan Region, which offers an excellent infrastructure. Mainz is a Great Wine Capital, surrounded by Germany's largest wine-producing area with a mild climate.

This is a fully funded 100% position (39 work hours/week), paid on the German TV-L E13 scale for the public sector. The position is fixed-term and is initially available for 36 months. An extension by up to 3 years will be possible if additional funding becomes available. The ideal starting date is in September or October 2021. Gross salary is approx. 58,000 €/year, net salary approx. 34,000 €/year (after taxes, social security, health insurance).

The Johannes Gutenberg-University endeavours to increase the proportion of women in scientific staff and therefore asks women to apply. Severely handicapped persons with the same aptitude will be given preference.

For further information please contact Daniel Oberfeld-Twistel (oberfeld@uni-mainz.de). There is also an opportunity to meet in person at the DAGA 2021 acoustics conference in Vienna (August 15th to 18th, 2021), upon prior arrangement.

We look forward to receiving your application (in English or German) including a letter of motivation, CV, copies of relevant certificates, list of publications, and contact information for two references. Please send your application in electronic form (as a single PDF file) to Prof. Dr. Daniel Oberfeld-Twistel (oberfeld@uni-mainz.de). Applications will be accepted until the position is filled. The first round of evaluation will start on August 23rd, 2021.