the identity and position of other objects ("local objects", e.g. a toothbrush). To investigate if this hierarchy is reflected in the mental representations of objects, we collected pairwise similarity judgments for triplets of everyday object pictures, as well as for their corresponding German written words, using an odd-one-out task. Then, we estimated behavioral effects of different predictors reflecting three levels of the hierarchy: scene, phrase, and object type ("anchor" or "local"). Results show that similarity judgments are stronger for object pairs that appear in the same as opposed to a different scene. In addition, object pairs that belong to the same spatial cluster ("phrase") are judged to be more similar than objects from different clusters within the same scene. Finally, object pairs that have the same status in the scenes (i.e., they are both anchors or both local objects) are perceived as more similar than pairs of different status. When comparing these effects between stimulus modalities (pictures vs. words), we found even stronger effect of scene level of the hierarchy for pictures compared to words, and vice versa for the phrase level effect. Overall, we found a similar and significant impact of scene hierarchy on the organization of abstract mental representation of objects, independent of stimulus modality.

Highly automated yet highly controlled: A case study of HAVs' on-board operators' workplaces across three real-world laboratories

Andreas Schrank, Carmen Kettwich, Silvio Heß, & Michael Oehl
German Aerospace Center

Highly automated vehicles (HAVs) bear the potential to make mobility safer, eco-friendlier, and more inclusive. Across Germany, a plethora of real-world laboratories with HAVs providing novel mobility solutions in real-world settings has been implemented recently. Due to technological and legal restraints, a steward is required on board of the HAV in all of them. This on-board operator's task is overseeing driving operations and intervening if necessary, i.e., when the automation's capability does not suffice to maintain safe driving operations. Three major HAV projects are presented as case studies with a focus on the on-board operators' workplaces, their tasks, scenarios they are exposed to, and interactions with the driving automation to resolve these scenarios. After analyzing the projects' communalities and idiosyncrasies, structured interviews with on-board operators were conducted. The interviews focused on the operators' working environments, their tasks, and scenarios they were exposed to. Additionally, observations of HAV operations in the shuttles they supervise were carried out. The observations examined situations in which operators intervened, their frequency, and the ratio of automated versus manual driving periods. Results showed a highly similar task structure of on-board operators across the three investigated projects despite considerable differences regarding the HAVs' capabilities of automation, frequency of manual interventions, and the operational contexts. In addition, the set-ups of workplaces vary substantially, particularly regarding the transparency of the automation's decision-making process and ways to interact with the automation. Implications for psychologically grounded workplace design and further research will be discussed.