Researchers show that speech information is more distracting for elderly drivers

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In the driving simulator, Professor Vera Demberg and her colleagues examine how speech information affects steering. Credit: Oliver Dietze

The navigation system announces a detour, radio programs are selected by voice command: for many, in-car voice control is an everyday

occurrence. Companies also have seniors in mind as customers. In research, however, it has been unclear whether complex language information distracts seniors from a second activity any more than it does younger people. Scientists from Saarbrücken have now examined this question for what may well be the most dangerous scenario, steering a vehicle.

"Controlling systems—like the navigation system in a car—by voice is very convenient. However, one must ask the question of how best to design voice controls. Especially when we are handling two tasks simultaneously, cognitive control plays a decisive role," says Vera Demberg, professor of computer science and computational linguistics at Saarland University. Among scientists, "cognitive control" denotes the ability of a person to adapt information processing and behavior from moment to moment to the respective situation.

"For driving, we therefore have to investigate what the different tasks are, and how voice control needs to be designed so as not to increase the risk of accidents, even for older drivers," explains Vera Demberg. Within the framework of the Collaborative Research Centre SFB 1102 "Information Density and Linguistic Encoding," the computer scientist, together with Jutta Kray, a psychology professor at Saarland University, as well as Katja Häuser, studied how seniors react to complicated language commands while driving. "Machine language is not quite the same as human language. Formulations and syntactic structures that are easy for the system can be difficult for humans," says Demberg.

To test this, the researchers worked with sentences that seemed familiar at first, but then took a surprising turn. The participants were given these as well as simple statements, played through speakers, and then had to signal with a yes or no response whether the sentence was linguistically correct and made sense. At the same time, they had to drive along a street in a driving simulator. Here they were shown two vertical, colored

bars, one of which was controlled by the computer. The task was to control the second bar using the steering wheel, such that the distance between the two remained as small as possible.

The test group consisted of 36 seniors, half of whom were female, with an average age of 72. The control group consisted of 34 people with an average age of 23. In a scientific article the authors conclude: "While the younger participants showed stable behavior with both simple and more complex statements, seniors directed their full attention to resolving the linguistic inconsistencies and neglected the control of the vehicle." This effect was particularly clear for seniors with low cognitive control. At the International Motor Show (IAA) in Frankfurt, the scientists are now looking for industry partners to make use of these results in the corresponding systems, so as to avoid complicated formulations in voice-controlled systems. Vera Demberg also points out that these findings are not only important for driving. "We also need to take them into account when developing systems that are meant to help seniors with household tasks," explains the Saarland University professor.

They will be presenting their results at the International Motor Show (IAA) in Frankfurt am Main from the 14th to the 24th of September (at the Saarland stand, Hall 4.0, Stand A26).

More information: Age differences in language comprehension during driving: Recovery from prediction errors is more effortful for older adults, Proceedings of the Annual Meeting of the Cognitive Science Society (CogSci), London, 2017.
mindmodeling.org/cogsci2017/papers/0411/index.html

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