Graduate School of Science and Engineering, Aoyama Gakuin University

Title: Effects of Personal Characteristics on Operability of Spoken Dialogue Car Navigation System

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Abstract

In recent years, the development of voice user interfaced systems has been actively developed thanks to the development of speech synthesis and recognition technologies. These voice-activated systems are particularly useful for car navigation systems because they are believed to reduce hazards due to distracted driving. Nevertheless, their lack of personalization makes it hard for some users to properly use them, which results in reduced operability.

In this research, we use two adaptive interfaces that make different voice guidance, even if the users' input contents are the same. The difference between the two interfaces is whether the narrowing condition is considered by a user (user initiative) or the system (system initiative). We will clarify how the difference in personal characteristics affects biomarkers and task achievement results when using these two kinds of speech dialogue interface. We use Near-Infrared Spectroscopy (NIRS) and Heart Rate Variability (HRV) as biomarkers, and task completion time and the number of utterances as task achievement results.

The result of this study shows that, when using user initiative system, the number of utterances is significantly different between a group of people more empathic (friendly) and a group less empathic (unfriendly) to operate the voice-controlled systems. Unfriendly people tend to repeat the same command in frustration when the system does not respond timely to their request, thus, the number of utterances increases. On the other hand, friendly people tend to change their command when it is not recognized by the system and the total number of their utterances is lower.

There was also a difference in the value of NIRS between those who think deeply and those think shallowly. In the former, since the value of NIRS may be increased depending on the degree of difficulty of the task, it is necessary to guide by a voice and to induce to focus the driver's attention on driving. In the latter, however, it was found that people with a shallow thinking can concentrate on driving without taking attention by using the system that system initiative.

In the future, it is necessary to investigate the relationship between personal characteristics, workload and spoken dialogue interface, taking into account the difference in workload.