Can a social robot reduce the cognitive load related to daily-life activities? A pilot study with healthy adults

Tuesday, September 24, 2024 11:10 AM (10 minutes)

Some populations, such as older people, struggle with the cognitive load involved in daily activities. This is related to the limits of human working memory when mental resources are simultaneously stressed by a task. In this scenario, artificial agents have been increasingly integrated in several environments by designing supportive human-robot interactions (HRI), but most of literature focused on the use of co-bots in work settings. This pilot work, therefore, intended to verify whether HRI could help with the reduction of cognitive load related to daily activities.

Twelve healthy adult participants completed order-randomized dual-task cognitive exercises at different conditions: individually, with the support of a social robot (HRI), and with the support of a human-human interaction (HHI). Both HRI and HHI conditions were designed to produce three different levels of cognitive load: low, medium, and high.

The results showed that under low cognitive load, completing the task individually led to similar accuracy compared to HRI, but importantly, the HRI condition induced a significantly lower mental demand ($Fr = 26.2$, $p < .001$) and faster execution times ($Fr = 13.2$, $p < .01$). As expected, medium and high cognitive load produced increasing levels of mistakes. The comparison between HRI and HHI indicated that under high cognitive load the HRI condition was perceived as less frustrating ($Fr = 10.2$, $p < .01$).

This suggests people may benefit from the support of social robots during daily tasks of varying cognitive load levels, but the effectiveness of such approach depends on HRI cognitive demands.

If you're submitting a poster, would you be interested in giving a blitz talk?

If you're submitting a symposium talk, what's the symposium title?

If you're submitting a symposium, or a talk that is part of a symposium, is this a junior symposium?

Primary authors: VARRASI, Simone (Dipartimento di Scienze della Formazione, Università degli Studi di Catania); Dr VAGNETTI, Roberto (Department of Sport Science, Nottingham Trent University); CAMP, Nicola (Department of Sport Science, Nottingham Trent University); Dr HOUGH, John (Department of Sport Science, Nottingham Trent University); Prof. DI NUOVO, Alessandro (Department of Computing, Sheffield Hallam University); Prof. CASTELLANO, Sabrina (Dipartimento di Scienze della Formazione, Università degli Studi di Catania); Prof. MAGISTRO, Daniele (Department of Sport Science, Nottingham Trent University)

Presenter: VARRASI, Simone (Dipartimento di Scienze della Formazione, Università degli Studi di Catania)

Session Classification: Mini-talks