F. Sergi, D. Accoto, D. Campolo, E. Guglielmelli. Vibrotactile interfaces help elderly people use technological appliances. Gerontechnology 2008; 7(2):207. The improvements in the field of industrial design, obtained with respect to User Centered Design (UCD) principles[1], positively impacts the usability of domestic appliances. Nevertheless, the number of technological devices designed without taking into account UCD principles is still considerable. Moreover, there are several examples where the complexity of the appliance makes it difficult to produce a user friendly interface. In such cases, users may experience difficulties in using technological products. This is particularly true for elderly people. Physiological and Human Factors Engineering studies give evidence about tactile communication appealing properties related to response speed and reduced cognitive load[2,3]. Multiple Resource Theory gives a useful model which predicts human performance in multitask environments, stressing the importance of distributing information inputs through various sensory channels[4]. In this paper we present the preliminary results of an ongoing study aimed at evaluating the feasibility of employing vibrotactile interfaces to effectively assist the elderly to use technological products. The proposed interface consists of a localization system (Polhemus Liberty by Polhemus Inc.) and a stimulation unit made up of vibrotactile stimulators, whose vibrations guide a defined sequence of movements such as pushing buttons in a correct sequence. The vibrating units include DC motors with an eccentric mass connected to their shaft. Stimulators were dimensioned in order to maximize tactile sensitivity and spatial resolution, according to the forearm skin bio-mechanical models and mechanoreceptors frequency response and receptive field size[5-12]. The Intellikey (Inclusive Technology Ltd, UK) reconfigurable interface was used during the experimental session. The interface is a keyboard of which the number of active buttons can be freely programmed. Tasks, consisting in sequentially pushing a sequence of buttons, were performed by subjects, who were verbally instructed about the sequence to follow. Random tasks with increased complexity were planned and executed both with the use of the vibrotactile feedback and with no external hint. For each complexity degree, a comparison was made in terms of average number of errors and time to accomplish the task. The paper reports an in-depth analysis of the guidance performance of the system, highlighting how the vibrotactile feedback positively impacts the ease of use of complex interfaces of a wide range of appliances and other popular high-tech devices.

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