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Usability and Acessibility within Smartphones: identification of the characteristics of aging and its implications for the interface design of smartphones

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1 Context

Brazil is becoming a country wich population is composed of mostly elderly people. According data from [1], there are currently 24.85 million people over 60 years in Brazil, representing 12.6% of the population. The group of people aged 60 or more will be greater than the group of children under 14 years back in 2030. Currently, smartphones are used for many different tasks of day-to-day by people of different ages, among them included people 60 years or more. The US smartphone manufacturers are paying attention to this trend, but little enhancement is seen in solutions for accessibility tools on smartphones in Brazil. But what aspects of the elderly user may interfere when interacting with the smartphone? This article attempts to establish the physical and cognitive characteristics of the elderly user that can be related to design principles and aspects of the interface of smartphone so that designers pay attention to accessibility when designing the interface of operating systems for smartphones.

Certainly, in order to meet the usability factors for a digital interface, it must be appropriate for the user to owns the device. If the user has a disability, the digital device must enable the system settings that are adapted to user needs. The [2] defines accessibility as the possibilities and conditions that allows people with disabilities to use physical media, media, products and services. But [3] expands the audience to be assisted by the accessibility to mention that this should be linked not only to the need for people with physical or mental disabilities, but also to other people who have temporary special needs or permanent, and this last case includes the elderly. The objective of this research is to relate aspects of aging process with design principles and features of the literature collected smartphone interface.

2 Method

Through a literature review concerning usability on mobile devices from the smartphone type, cognition and accessibility for the elderly in hypermedia environments, it was possible to establish direct relations of the characteristics of human ageing and their aspects of the smartphone interface that may have implications for the usability. The main interface elements that allow interaction of the smartphone user and the changes of ageing are related to each other, and represent the integration of factors arising from the interaction of the elderly user with smartphones and its possible consequences. Next, it is traced the relationship of the cognitive processes of older people with the interaction with smartphones.

To facilitate the decision making for designers concerning the project of smartphone interface, as well as it evaluation, [4] developed a theoretical and practical guide that includes design principles (compiled from the literature) and other aspects such as a descriptive model, a checklist and road maps for evaluating applications and interfaces for smartphone. [4] list four categories of principles for interface projects, which were grouped into four categories: context, personalization, dialogue and design. From these categories, three principles are related to cognitive processes, thus highlighted and considered most critical when performing a task using a smartphone: **perception, attention** and **memory**. The **cognitive process – principle** relationships were commented, some have been reported based on data from a presential unsystematic observation with the elderly population.

3 Results

Considering the relationship between the main elements of smartphone interface and changes caused by aging, it was possible to generate and understand the consequences that interfere with the usability of the elderly user. As an example, the interface's icons are related to the visual sensory system and as a result there is the difficulty to perceive and interpret its application. These consequences are inferences that rose from the studies so far made regarding hypermedia interface and the characteristics of aging from the perspective of the smartphone interface.

The relationship of cognitive processes (perception, attention and memory) with design principles (context, personalization, dialogue and design) highlighted and detailed difficulties that the elderly may experience when interacting with a non-accessible interface for this audience. As an example, there is the **attention** cognitive process that is related with the **input** principle of the **dialogue** group: typing requires the elderly close attention to find the letters of the word they want to write, a task that some call to "hunting" this search may take a long time. When it appears a word of suggestion for the word that is being written, it pleases the elder users and decreases the time lost with this task. With these results it is possible to which step of the elderly cognition a certain principle will be related.

4 Conclusions

The configuration of smartphone interface that not considers the needs of the elderly public compromises the use of mobile devices for this audience. The frustration caused by possible changes due to aging when interacting with the smartphone can lead the user to give up using it. The lack of usability and accessibility solutions to smartphones in Brazil can digitally exclude the elderly from social media.

The knowledge of smartphone interface elements and the effects of aging on the physical and physiological cognitive processes - important for the interaction of the elderly user with this type of device - contributes to new prospects of research, like the construction of normative models of recommendations. Such models can be used by the designer and developer team of operating systems, including interface and navigation smartphones, helping to make it more accessible for the elderly mobile user in Brazil.

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