

# TOWARDS THE DESIGN OF A MOBILE PHONE FOR TECHNOLOGY-AVERSE PEOPLE OF ALL AGES

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*Mobile phones are used by a growing number of people, even by those who have little affinity with digital products or who have a certain aversion against technology in general. The question is what makes up a good attunement between technical-functional possibilities of mobile phones and their accessibility. Technology-aversity, or technology-conservatism, should not be seen to coincide with getting older. It is the knowledge and experience that people have, or do not have, with mobile phones and its underlying concept which is the central issue. Immediate access and insight into menu options and a direct link between action and result are key issues in the design of mobile phones for technology averse people. Design issues for elderly involve compensations for diminishing sensory and motoric capacities. These compensations may come in addition to cognitive design interventions*

*Key words: usability, mobile phone, perception and cognition, technology-averse people*

## **1 Introduction**

Mobile phones are used by a growing number of people, even by those who have little affinity with other digital products or who have a certain aversion against technology in general. Recently, telecom providers, in association with suppliers, are releasing so called 'simple' mobile phones on the market with functionalities especially for elderly. Although these phones are specifically aiming at elderly people, they may also be used by people with an aversion against technology who hope to have found a phone that is easy to use for them.

In the design of current mobile phones for elderly, decreasing physical capacities of elderly people (e.g. loss of sight, reduced motor skills) are mostly taken up, by increasing font size and key size. Although we acknowledge the need for such improvements in the design of mobile phones, we seek to find out about aspects of people's capacities other than motoric and sensory capacities. In the present research, we chart the perceptual and cognitive capacities of technology-averse people in their understanding of how mobile phones are activated. Our research question is to what extent current 'simple' mobile phones match the perceptual, and cognitive capacities of users of all ages.

## 2 Expected and experienced usability

Usability can be assessed both before and after purchase of a product. Kurosu and Kashimura (1997) and Tractinsky (1997) studied *apparent* usability and so-called *inherent* usability. According to their definition, apparent usability regards how appealing the product is for people to buy and use it, and inherent usability regards the usability of the product after usage. The interest in both studies was whether optimising an interface on inherent usability aspects would actually pay off in terms of people preferring it. In both studies it was found that aesthetic aspects of the screen layout (apparent usability) influenced the user's preference more than inherent usability aspects.

Various routes are available for people who want to buy a mobile phone or who want to get information on usability of phones: for instance, in the store, on the internet (e.g. [www.ricability.com](http://www.ricability.com)), or via other people. Technology averse people will probably not be acquainted with internet searching possibilities. So, unless they receive the phone from other people, they may have to determine its usability on the basis of appearance of the phone and/or explanation by sales people in the store. Therefore, we focused our study on apparent usability aspects.

## 3 Method

To understand the role of perceptual and cognitive capacities users of all ages in operating mobile phones we did a literature study as well as an evaluative study on 'simple' mobile phones including their features (user interface and hardware), which are available nowadays.

For the literature study, we first looked at related studies on 'simple' mobile phones. Furthermore, we searched for perceptual and cognitive capacities of technology-averse people and elderly regarding product usage. In the study on simple mobile phones we looked at three phones: Nokia 3310, Vodafone Simply VS4, and KPN Swing 820, see Figure 1.



Figure 1: From left to right: Nokia 3310, Vodafone Simply VS4, and KPN Swing 820

The Nokia 3310 is generally considered as an easy to use phone, (Pelzer, 2006). Vodafone has introduced the Vodafone Simply line, the VS1, VS2, VS3 and VS4. Also, the KPN Swing 820 was analysed, which is aimed at users trying to avoid an abundance of features.

## 4 Perceptual and cognitive capacities in product usage

### 4.1 *Technology-averse people*

Although little literature is available on technology-averse people - who are often mistakenly indicated as 'elderly' - it can be observed in everyday life that they are not necessarily elderly. Technology aversity, or technology conservatism, should not be linked to age but seems to regard people whose perceptual and cognitive capacities do not match those capacities that are needed for usage of current mobile phones.

A problem faced by technology-averse people is the understanding of the underlying concept of devices, together with their accessibility, as is argued by Tang and Kao (2005). To give an example: bigger keys make it easier for people to hit the right key, but it does not help in understanding how mobile phone features are structured and accessed.

But what are the concepts and devices people are familiar with then? In the case of mobile phones, people may find out about the possibilities of their newly bought phone by trying out keys and learning by doing. However, people may be more reluctant to try out the features, because they believe they might do it wrong and cannot trace back the problem, or find their way back in the menu.

Arning and Ziefle (2006) showed that people with a low 'technical confidence', i.e. the confidence in one's own ability to solve technical problems, report to have significantly more usability problems than those with a high 'technical confidence'. In this study on usability of mobile handheld devices the top five usability problems are: learnability, menu-complexity, naming, font- or key size, and icon-design.

### 4.2 *Elderly*

Older adults show great interest and confidence in the utilisation of mobile handheld devices, provided that usability issues are improved (Arning and Ziefle, 2006). Use of modern domestic durable goods increasingly tends to present complex tasks, e.g. figuring out what should be done, or remembering actions to be taken. The cumulative effects of several diminishing capacities, such as loss of sight and trembling hands, when people grow older will most likely result into a situation in which the elderly person cannot meet the imposed cognitive demands presented by an environment that has been designed for the young [Freudenthal, 1999].

Basically, complex tasks are a combination of various dual (or triple or more) (cognitive) tasks that are carried out parallel, sometimes also serially. Various studies show that even if tasks are only dual, elderly people perform at a lower level than the young [Korteling, 1993]. However, when performing a mental task which they have been doing for many years, older people can outperform the young, such as experienced chess players [Charness, 1981]. It appears that maintaining experience and skills can compensate for the decline in particular cognitive capacities.

Another study (Goebel and Yoo, 2006) into usage of mobile phones by seniors showed that almost all persons struggling with the menu (2 out of 3) did not use display information for navigation. Instead, they sought for a suitable key sequence. Seniors expected younger persons to memorise the appropriate key sequences, and themselves being too old to keep this information stored.

There may be a gap in previous experiences that users of mobile phones can draw on. Elderly experienced different types of technology and different means of accessing it. At that time, technology was more expensive and sensitive to damage and it was also largely based on mechanical principles. As a result, elderly report fear of damaging current technical products in case of misuse. This prevents them from exploring technical products by trialling which is mostly done by other users. A clear direct (mechanical) link between action and result may help them to operate the mobile phone (Goebel and Yoo, 2006).

## **5 Evaluation current ‘simple’ mobile phones**

For the next part in the study, we evaluated three ‘simple’ mobile phones, Nokia 3310, Vodafone Simply VS4 and KPN Swing 820 for our analysis. We used aspects from a study on usability of keypad design of mobile phones (Pelzer, 2006). In this study aspects were identified which improve usage of the keypad through its appearance: red and green icons for taking/rejecting a call, separated numerical keys, dedicated keys rather than softkeys, and text labelling on keys. Furthermore, we drew on the research of Arning and Ziefle for another aspect of mobile phones that refers to apparent usability of technology averse people, namely menu-complexity. The positive and negative aspects for each phone were charted. The results are presented in Table 1.

Table1 shows that the ‘simple’ mobile phones incorporate different aspects that we found in literature. None of the phones incorporated all those aspects mentioned in literature. Features such as red/green keys for taking a call or text labelling may improve apparent usability and are taken up variously in the phones. Menu complexity is simplified in the Vodafone with dedicated keys, but in the Nokia 3310 the single softkey still does not help in providing a direct (mechanical) link. Users still need to go through the normal menu structure to find other features.

Table 1: Evaluation of keypad aspects of three simple mobile phones, Nokia 3310, Vodafone Simply VS4, KPN Swing 820.

Nokia 3310	Vodafone Simply VS4	KPN Swing 820
<b>Positive aspects</b>		
<ul style="list-style-type: none"> <li>- Separated numerical keypad may give an impression of ease of use.</li> <li>- Only one softkey, which corresponds with text in the display.</li> <li>- Text labelling is placed on the keys, which may facilitate perceived ease of use.</li> </ul>	<ul style="list-style-type: none"> <li>- Red/green icons (take/reject call) recognizable and possibly familiar.</li> <li>- Three dedicated keys to “main menu”, “contacts”, and “messaging”: enhances accessibility of main three levels in the menu .</li> <li>- Text labelling is placed on the keys, which may facilitate perceived ease of use.</li> </ul>	<ul style="list-style-type: none"> <li>- Red/green icons (take/reject call) recognizable and possibly familiar.</li> <li>- Pressing any direction of the 5-way navigation key can give access to the menu.</li> <li>- Entering a phone number in standby for directly saving it.</li> <li>- Text labelling is placed on the keys, which may facilitate perceived ease of use.</li> </ul>
<b>Negative aspects</b>		
<ul style="list-style-type: none"> <li>- Inconsistent number of sub-menu entries displayed at once.</li> <li>- No red/green icons.</li> <li>- No dedicated keys.</li> </ul>	<ul style="list-style-type: none"> <li>- Clustered numerical keypad.</li> <li>- Three dedicated keys: other functionalities have to be found with normal navigation.</li> </ul>	<ul style="list-style-type: none"> <li>- Clustered numerical keypad .</li> <li>- Poor icon design in UI.</li> <li>- Automatically going back to standby when working in the menu but not pressing any keys.</li> <li>- No dedicated keys</li> </ul>

## 5 Discussion

The literature provides data on perceptual and cognitive capacities of elderly that can be used to design mobile phones. Aspects that relate to apparent usability which are taken up variously in the design of current simple phones are icon design, text labelling and separated numerical keypad.

For technology averse people, another issue is important for the design of a mobile phone, namely a clear presentation of the underlying menu structure of the phone. Design opportunities of a new mobile phone for elderly, apart from those matching their motoric and sensory capacities, are a clear direct (mechanical) link between the operation and the resulting action(s) of a product prevent them from trying out options of the mobile phone.

When designing a phone especially targeted at technology-averse people the aspects found in this study may be applied for keypad design. However, this does not imply that people will actually understand which keys to press. Such a mobile phone should also help to overcome fear and reservation in order to explore features and options of the phone in the menu underneath the keypad.

In this research, we explicitly distinguished physical motoric capacities and perceptual/cognitive capacities. Unlike diminishing motoric capacities, such as control

of movements, perceptual and cognitive capacities of elderly can be updated. Still, when elderly are confronted with new technologies, such as digitalization, their perceptual and cognitive capacities may fall short on them.

In reality the two types of capacities that we distinguished are drawn upon simultaneously. Diminishing motoric capacities might even increase technology aversity as a result, for instance when handling a (too) small joystick of a mobile phone to navigate through the phone's menu. Here, we could identify areas where motoric capacities and perceptual/cognitive capacities conjure with all possible consequences. Further research might provide insight in this matter.

This research is a first step into the understanding of the capacities and needs of technology-averse and elderly people and their usage of mobile phones. A next step in this research would be to search for technology-averse people, who may be not so easy to find, and invite them and elderly people to use 'simple' phones to study their ways of using a mobile phone and to apply this knowledge into new mobile phone's features.

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