

The Influence of Ageing on Product Experience

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Abstract

People are living longer and the world population is ageing. At the individual level, ageing leads to functional losses and causes behavioural changes. These phenomena affect product experience on its four levels of response – physical, sensory, cognitive and affective. Unless design takes account of these changes, the quality of experience is compromised. To explore the influence of ageing on product experience a study was carried out with younger and older adults. The findings indicate that older adults had more difficulty understanding how to use products such as computers and mobile telephones. The older adults also tended to develop a less positive relationship with such products and consequently technology was less integrated into their lives. Overall, the study suggests that, with respect to product functionality, the two groups have different needs and expectations. This influences not only their product experiences, but also the extent to which technology is accepted and adopted.

Keywords: Ageing, Affective Response, Product Experience

Theme: Usage and Interaction

Introduction

Decreased birth rates and increased life expectancies in many countries mean that the world-wide population of people over 60 years old is projected to reach nearly 2 billion by 2050 (United Nations, 2001). Promoting social integration and independent life for these older adults is important, not only for the happiness and well-being of the individuals, but because the resources that would be required to provide special care may be unsustainable. As technology becomes ever more prevalent, people's ability to participate in the broader community and to maintain their relationships is governed by their ability or willingness to adopt new technologies, especially communications technologies. However, for many older adults, products like computers and mobile telephones are frustrating, threatening and alienating. Consequently, although older adults might greatly benefit from what these technologies offer, they are often discouraged from adopting them because of unsatisfactory experiences with products.

Product experience has been defined as “the awareness of the psychological effects elicited by the interaction with a product, including the degree to which our senses are stimulated, the meanings and values we attach to the product, and the feelings and emotions that are elicited” (Schifferstein and Hekkert, 2008: p2). We can hence expect product experience to vary with age because at the individual level, ageing is characterized by a steady decline in physical (Kirkwood and Holliday, 1979), sensory (Wickremaratchi and Llewelyn, 2005) and cognitive functions (Baltes et al., 1980; Baltes, 1987). However, research in psychology has demonstrated that as we grow older affective response is not impaired (Gross et al., 1997), and older adults generally show greater emotional control, higher or at least sustained levels of positive affect, and they report fewer negative emotional experiences (Mather and Carstensen, 2005). Designers must therefore take account of these changes if the products they design are to support positive experiences amongst older adults.

To better understand the influence of ageing on product experience, this paper reports on a preliminary study in which younger and older adults were interviewed about the electronic products that are most important to them. To achieve this, users within two distinct age bands were studied – younger adults, aged between 25 and 35, and older adults, aged 65 and over. These age ranges were chosen to mark the transition in the users’ social roles (Neugarten et al., 1965; Phillips and Sternthal, 1977). For this study, this meant that the younger adults would typically be at the point of entering or establishing themselves in professional life, whilst the older adults were typically at the point of retirement or withdrawal from professional life. The study addresses how product experience varies between the two age groups with respect to the four dimensions of ageing mentioned above – physical, sensory, cognitive and affective. The findings from the study are therefore also grouped into these categories of experience, named here as levels of response.

Methodology

Sampling

For convenience and efficiency, potential volunteers were recruited from two local organisations – the University of Cambridge and an independent Cambridge-based organisation that arranges courses and study groups for its members, most of whom are retired. Six younger adults (aged between 26 to 34), and eight older adults (aged between 68 to 92) were recruited into the study (see Tables 1 and 2). All members of the younger group hold at least one university degree in a variety of disciplines, including engineering, computer science, history and design. Of the members of the older group, five had completed and worked in higher education; one worked as

an administration officer in a university college; one is a trained nurse; and one worked as a sales manager. Officially, all members of the older group are retirees, but four of them still carry out some work related to their professions. The resulting sample (both for the younger and the older adults) is consequently biased towards intelligent, literate and education-oriented individuals. At this pilot stage, this offered the advantage that all participants were sufficiently interested in research to volunteer their time, and sufficiently reflective that they could readily provide accounts of their experience with products. The limitations of this sample and the proposed scheme of work that will address these limitations are discussed later.

Participant	Age	Gender	Selected product (number owned or used)	Purpose for which product is used
A	26	M	notebook – Apple (1)	communication, work, organiser, entertainment, e-commerce
B	26	F	notebook – Apple (1)	communication, work, organiser, entertainment
C	26	F	mobile (1)	communication
D	27	M	mobile (1)	communication, work, organiser
E	33	F	notebook – PC (1)	communication, work, entertainment
F	34	F	notebook – Apple (1)	communication, work, organiser, entertainment, e-commerce

Table 1: Phase 1.

Participant	Age	Gender	Selected product (number owned or used)	Purpose for which product is used
G	68	M	notebook - PC (1)	communication, some work
H	69	M	computer - Apple (3)	communication, some work
I	69	F	radio (8)	information, entertainment
J	70	M	desktop - PC (1)	communication
K	71	F	desktop - PC (1)	communication, some work, entertainment
L	71	F	notebook - Apple (1)	communication, some work, entertainment
M	75	F	landline/mobile telephone (2)	communication
N	92	M	notebook - PC (2)	communication

Table 2: Phase 2.

Data Collection

To promote relaxed conversation whilst remaining focussed on the research agenda, informal semi-structured interviews were used for data collection. All interviews were conducted by the first author on a one-to-one basis and took place at the interviewees' homes at a pre-arranged time. The duration of the interviews averaged 20 minutes for the younger adult group, and 40 minutes for the older adult group. This difference in interview duration represents a difference in how quickly and easily the two sample groups could describe their relationship with products.

Every interview started with the interviewer briefly explaining the study and asking some personal background questions. To facilitate later analysis of the interviews, permission was requested to audio record the discussions and take written notes and photographs of any relevant material (permission was granted in all cases). The participants were then encouraged to talk generally about electronic products they own, and specifically about the product that they regard as most important to them. Questions were then asked about issues of product experience relating to physical, sensory, cognitive and affective responses. At the end of each interview the researcher thanked the participant for their time and their help with the study. In most cases, the interviewees then spontaneously told the researcher that they had enjoyed the conversation, perhaps indicating that they felt comfortable answering the questions that were posed.

Data Analysis

Notes were made from playback of the interview audio recordings and these were combined with the notes, photographs and videos recorded during the interviews. By reading and comparing these materials, a number of common themes were identified, e.g. positive or negative feelings towards the product. Relevant extracts from the interviews were then arranged under these themes, allowing similarities and differences between (and within) the two groups' experiences to be identified.

Findings

When asked to select the single product that was most important to them, four of the younger adults opted for their laptop computers, whilst the remaining two decided to talk about their mobile telephones. Among the older adults, six participants described their computers as the product they use more frequently, mainly as a way of keeping in touch with children and friends who live abroad and occasionally to do some work. One older adult preferred to talk about radio and the remaining participant regarded the telephone – mobile and landline – as the most

important items in their life. Notable here is that ten out of fourteen participants preferred to talk about their computers, either laptops or desktops, as the most important electronic product in their daily lives. Also notable is that all the chosen products – radio, telephone and computer – are used for communication of some sort, indicating that all users valued products that connect them with their friends, their families, their colleagues and the wider world.

When describing their experiences with the products mentioned above, the participants in both user groups made comments that relate to the four levels of response – physical, sensory, cognitive and affective. Presentation of the findings is consequently grouped under these headings, with the attitudes and behaviour of one group often best explained by contrasting it with the behaviour of the other.

Physical and Sensory Levels

Because participants concentrated most of their thoughts on the functionality of products, these two levels of response did not receive much attention, but two main issues were identified. Both younger and older adults complained about the weight of laptops and batteries. Those in the first group explained that the weight is important since these users frequently carry their computers when they travel, whilst those in the latter group who use a laptop chose this lighter form of computer hardware not necessarily for its everyday portability, but simply because they are easier to transport when maintenance is required.

“I have had laptops just because when something goes wrong you don’t have to carry that great thing to the computer laboratory to get repaired.” Participant L, age 71.

The second issue was raised by older adults who complained about the difficulty of typing on keyboards and keypads that had small keys and that were labelled with small letters or numbers. Two older participants who reported being unable to type fast/accurately said they have tried different keyboards in order to minimize typing discomfort and mistakes.

“My keyboard is black [with small letters in white] and quite small and if you have bandaged fingers [like I do] it’s even easier to mistype.” Participant K, age 71.

Cognitive Level

At this level, findings were mainly clustered in two groups – usage and learning.

Usage

Although computers and mobile telephones can be used for many non-communicative tasks (e.g. media player, games, organiser, diary, alarm), it was clear that all participants favour these products' communication functions above their other uses. All interviewees who talked about computers claimed that the first thing they do after turning the product on is to check their email. Generally, the use of computers was considered by both groups to be more important than the use of mobile telephones.

Nevertheless, for five younger adults, their products (mobile telephones and computers) are not just a tool for communication and work. They are also a way of organising daily tasks, entertainment and shopping. In general younger adults have various applications open at the same time – email, text/video chat, web browser, media player, and one or two applications specific to their work. They usually carry their notebooks when travelling, even when they are not working, as they see the computer as an indispensable part of their lives.

"I'm totally dependent on my notebook. I have all the important data on there: social contacts, calendar, papers and presentations I'm working on, I read the news on the Internet and sometimes listen to music or watch a movie in between. I can travel around the world and work anywhere I want, as long as this computer is with me and it's working." Participant A, age 26.

In contrast to the younger adults, technology was less integrated into the lives of the older adults studied here, and whilst they used it for communication, they did not always have a clear opinion about how technology products fitted into their lives. Often, during the conversation, they spent time recollecting memories that would help them make sense of a product. In the case of computers, most older adults in this group reported that they seldom use more than three applications simultaneously – usually an email client, a web browser and a word processor.

"I quite often have three applications open at the same time: email, Word and I've got solitaire when I get bored." Participant L, age 71.

Learning

Regarding the ability to learn how to use their mobile telephones and computers, younger adults said they never read manuals or use customer service. They learn by "playing" with the product and if they have any doubts they usually ask friends. Moreover, these younger adults seldom had

memory problems and reported that once they have learned a task they can repeat it with no difficulty.

“I taught myself how to use my laptop. I never ask customer service. Maybe for something very specific like a software I’ve never used and I know a friend uses, then I would probably ask this person. If I forget something I like to play with the settings and figure it out. But, usually if I’ve done it once, I can remember it the second time.”

Participant D, age 33.

In general, older adults find most manuals poorly written and therefore not helpful. When asked about how they learned to use computers, three users in this age group said they attended courses; three said they usually ask children or friends; and two said they try to learn by “playing” with their products. All older adults reported memory problems and said that if they do not use a function for some time they easily forget how to repeat it. However, participants in this group demonstrated that, when motivated, they can be well-trained and benefit from technology if it allows them to compensate for any decline in their functional abilities.

“I prefer very much the use of email to the use of telephone. First of all, because there’s a record of it, and second because I have a bad memory [for remembering what people said].” Participant G, age 68.

Most older adults questioned the need for so many features in a computer or mobile telephone, saying that they actually use just a small fraction of the product functionality. They indicated that they were conscious of how their way of thinking is different from those who create and develop these products. Lastly, they complained that if designers paid more attention to these users’ actual needs, electronic products would be more simple, usable and useful, and the overall experience would be more pleasurable.

“I was at the bottom of my computer class [last year] because you’re dealing with computer programs ideas and these ideas are basically relationships [that operate] in a way that I don’t think. And I’m still struggling with that”. Participant H, 69.

Affective Level

At this level, findings were grouped in three themes – meaning, fear versus excitement, and attachment.

Meaning

When asked what the chosen product meant to them, younger adults mentioned abstract qualities such as ‘freedom’, ‘peace’ and ‘safety’, and more concrete qualities such as ‘productivity enhancer’ and ‘organiser’.

“My laptop means everything to me, everything! It’s a way I organise my life pretty much. It’s simple and tidy; it gives me a sense of order. I meet my peace when I have my laptop. When I’m on holiday, having my laptop is also my sense of security to me because I can access the Internet.” Participant C, age 26.

Because technology is more integrated in younger adults’ lives it has consequently a different meaning for this group: it is a need, as all younger adults answered they could not live without their computers and the Internet. This need is present in different dimensions of life – such as personal relationships, work, information, entertainment and hobbies – and is necessary to the maintenance of these dimensions.

Older adults, in comparison, see technology from a different perspective: it is a possibility, not a need, of doing things faster. When asked what the chosen product meant to them, only one older adult considered the computer as a toy; two answered that they regard their products (radio and telephone) as companions; one said it was a servant; and four said their products were just tools.

“A computer is just a tool. It is, like an electronic type writer. You switch it on, you have the screen and you have a mouse to negotiate around the screen. On the screen you have different programs shown, and by clicking on these programs you can go to them. And you can put in information via the keyboard”. Participant J, age 70.

Excitement versus Fear

When questioned if they were or have ever been afraid of using the chosen product, three younger adults answered that they were excited instead and the other three simply said they were not afraid. Among the older participants, only one reported excitement when first using the product; four older adults said they were not afraid, and three answered that they were frightened.

“I came to computers too late in life and I’m always frightened that if I do something it may break the whole system. It’s always this awful feeling that I’m going to crunch this or loose a program. So I’m permanently in a state of anxiety.” Participant N, age 92.

Attachment

Younger adults are less attached to their physical products in the sense that when they need to upgrade their devices they easily dispose of their current product. In comparison, older adults tend to accumulate products with the consequence that they own and use more than one product of the same type (see Tables 1 and 2).

Regarding the technology, younger adults interviewed for this study said that they cannot imagine life without a computer and reportedly feel safer when they have all their personal data, such as organiser, diary, music and videos, close to them. Participants of this group also associated “freedom” with the laptop, once they can connect to the Internet “anytime anywhere”. In contrast, with exception of one participant – who uses a wheelchair and said life would be extremely difficult without the telephone, seven out of eight older adults responded they could live without their electronic products. For this age group, life without computers and mobile telephones is easily possible, sometimes even a relief.

“A lady said ‘I’ll get you on the Internet, you can look up all and talk to people’. And when I went back to see her, she was very proud: ‘I got you a name and a number and you can get in to the Internet now’. And when I looked [at] all that stuff I said: ‘No, I can’t cope with that. I’m sorry. It’s no joy. It’s awful’. I’d rather sit and I’ve got plenty of friends I could ring up”. Participant M, age 75.

Discussion

The findings reported here indicate that younger and older adults have different goals when using technology, and different patterns of technology usage. For the younger adults in this study, the use of computers and mobile telephones is not limited to communication, because work, organisation, entertainment and shopping are also important. The use of computers by this age group generates more positive than negative feelings towards the product and the technology is far more integrated in younger adults’ lives. In contrast, for the older adults in this study, computers – not to mention mobile telephones – were rarely associated with joy and satisfaction. Difficulty in understanding how to use products led these users to develop fear, frustration and more negative than positive affective response towards the product. As a result, in the cases where the cognitive demands were too high, the product was merely seen as a useless artefact. This could be because most designers are young, able-bodied people who still focus on providing products for users with similar capabilities (Keates and Clarkson, 2001; 2003: p.2). However, as this study shows, ageing influences product experience in many different ways, and

designers should consider this when designing products that are to be used by people at different stages in life.

Limitations and Future Work

The interviews reported on here were conceived as a preliminary study that sought to explore how ageing influences product experience. Whilst it has been successful in that regard, the study is also limited in certain ways. Firstly, the small sample reported on here is not representative of the broader population, because of its socio-economic setting and literacy level. Secondly, the study primarily relied on the participants' self-report and made only supporting use of other data collection methods such as contextual observation. To make generalisations across the broader population, and to establish whether the participants' accounts correspond with their normal behaviour further work is required. This could involve a much larger-scale study, with a more representative sample and various methods of data collection, including questionnaires and focus groups. This follow-up study would provide more reliable findings by focussing in more detail on the issues that this pilot study have highlighted as important.

Conclusions

This study focused on products suggested as the most important by participants. The findings indicate that younger and older adults have different needs and expectations with respect to product functionality. The degree to which these needs and expectations are met generates feelings such as attachment, satisfaction or frustration, excitement or fear, motivation or avoidance. The sum of these feelings makes up the so called affective response, and according to its positive or negative nature, this response will determine the acceptance and use of a product and, beyond that, will determine the acceptance and use of the technology provided by the product. When the findings from this preliminary study are combined with those from future work, it is hoped that guidance can be developed that will effectively support the design of better products for the older population. Such products will potentially assist in bringing gratifying experiences to older adults' lives, and encourage them to adopt technology that sustains both their social integration and their independence.

References

Phillips, L. W. and Sternthal, B. (1977). "Age Differences in Information Processing: A Perspective on the Aged Consumer." *Journal of Marketing Research* 14(4): 444-457.

- Neugarten B L, Moore J W, Lowe J C (1965). "Age Norms, Age Constraints, and Adult Socialization". *The American Journal of Sociology*, 70(6): 710-717.
- Baltes, P. B. (1987). "Theoretical Propositions of Life-Span Developmental Psychology: On the Dynamism between Growth and Decline." *Developmental Psychology* 23(5): 611-626.
- Baltes, P. B., Reese, H. W., Lipsitt L. P. (1980). "Life-Span Developmental Psychology." *Annual Reviews in Psychology* 31: 65-110.
- Gross, J. J., Carstensen, L. L., Tsai J., Skorpen, C. G. and Hsu, A. Y. C. (1997). "Emotion and Aging: Experience, Expression, and Control." *Psychology and Aging* 12(4): 590-599.
- Keates S. and Clarkson P.J. (2001) "Combining Utility, Usability and Accessibility Methods for Universal Access". *ACM CHI Workshop on Universal Design*, Seattle.
- Keates S. and Clarkson P. J. (2003) *Countering Design Exclusion: An Introduction to Inclusive Design*, Springer Verlag, London.
- Kirkwood, T. B. L., and Holliday, R. (1979). "The Evolution of Ageing and Longevity." *Proceedings of the Royal Society of London. Series B, Biological Sciences*, London.
- Mather, M. and Carstensen, L. L. (2005). "Aging and Motivated Cognition: The Positivity Effect in Attention and Memory." *Trends in Cognitive Sciences* 9(10): 496-502.
- Schifferstein, H. N. J. and Hekkert, P. (2008), "Introducing product experience", pp. 1-8. in Schifferstein, H. N. J. and Hekkert, P. (eds) *Product experience*, Elsevier, San Diego.
- United Nations (2001) "World Population Ageing: 1950-2050." *Population Division, Department of Economic and Social Affairs*.
- Wickremaratchi, M. M. and Llewelyn, J. G. (2006). "Effects of Ageing on Touch." *Postgraduate Medical Journal* 82: 301-304.