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# Ageism and sexism amongst young computer scientists

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**Abstract.** A study was undertaken with 189 young computer science students to assess whether as future developers of technologies for older people, they have ageist and sexist attitudes about people as users of technology. They were shown a picture of either a young or old woman or man and asked to assess the likelihood that this person would use a desktop computer, laptop computer and a smartphone, and their level of expertise in each of these technologies. The results showed that the students did have negative perceptions of the older people in comparison to young people. They although thought that women were less expert with the technologies than men, although there was not difference in the likelihood of them using the technology. However, there was no evidence of a “double standard” of older women being perceived particularly negatively.

**Keywords:** perceptions of older people, ageism, perceptions of older women, sexism, perceptions of technology use, perceptions of technology expertise

## 1 Introduction

To create technologies that are useful, usable and acceptable to older users, developers need to be able to understand and empathise with the needs and wishes of those users. Yet it is well-known that young people tend to have negative attitudes and beliefs about older people. There has been a considerable amount of research exploring different parameters of these attitudes [e.g. 4] and attitudes by different types of young people [7, 8, 13, 14], particularly those who will interact with older people in their professional lives such as doctors, nurses, and social workers [e.g. 3, 6]. Given that there is an increasing imbalance towards women in cohorts of older people, it is also relevant that there appears to be a “double standard” in attitudes and beliefs about older people, with older women being more negatively viewed than older men [9, 12]. In response to these issues, there has been interesting research on how to overcome such negative attitudes and beliefs [e.g. 1, 2, 5].

Very little work on the attitudes and beliefs about older people amongst those creating technologies for older people has been conducted. This work explores the attitudes of ageism and sexism, and the potential double standard of these two parameters in a group of young professionals who in the future might be asked to develop technologies for older people – young computer scientists at the beginning of their professional education. It builds on preliminary work [11] by expanding on the sample of young people participating, which allows for more detailed and robust analyses of both ageism and sexism.

## 2 Method

This study investigated the perceptions of young university students studying computer science of younger and older men and women as users and experts of smartphones and related technologies.

Two classes of first year computer science students at the University of York in the United Kingdom completed a very short survey for the study as part of one of their courses. Students who completed the survey were entered into a prize draw for five Amazon gift vouchers worth £5 (approximately USD 7.50) each.

The survey comprised a photograph of either an old or young man or woman (see Figure 1). Eight different versions of the survey were created, each with a different photograph. Four of the photographs were of older people, four were of younger people. Photographs were chosen carefully so that the person looked to be in their 70s for the older people, and in their late 20s/early 30s for the younger people (so a little older than the target respondents for the survey, but people they would still

consider young). Within each group two images were of women and two were of men. All the photographs were chosen to be close up shots of a person reading a book. All the photographs were copyright free images from the Internet.



**Fig. 1** Images of older and younger people used in the survey.

The survey asked the following nine questions about the person in the photograph.

Firstly, three questions about the age of the person and old age in general:

How old do you think the person is?

Would you call this person old?

What is the minimum age you would think of someone as old?

Three questions about the person's use of technology:

How likely do you think it is that this person uses a desktop computer regularly (rated on a scale from 1 = not at all likely to 7 = very likely)?

How likely do you think it is that this person uses a laptop computer regularly (same rating as above)?

How likely do you think it is that this person uses a smartphone regularly (same rating as above)?

Three questions about the person's expertise with technology:

How expert do you think this person would be with a desktop computer/(rated on a scale from 1 = not at all expert to 7 = very expert)?

How expert do you think this person would be with a laptop computer (same rating as above)?

How expert do you think this person would be with a smartphone (same rating as above)?

Finally, respondents were asked their age and gender.

189 students completed the survey, 162 (85.7%) were men, 24 (12.7%) were women and 3 (1.6%) preferred not to identify their gender. The imbalance between women and men respondents unfortunately reflects the strong male bias in our undergraduate computer science community. Because of the small number of women, no analyses could be attempted on differences due to the gender of the respondents, which would have been interesting to investigate. Respondents ages ranged from 18 to 28 years, with a median age of 18 years.

### 3 Results

In response to the question on when old age begins, on average respondents estimated that old age begins at 53.2 years (SD: 11.95), with a very wide range of answers, from 18 to 78 years. However, somewhat less than half the respondents (40.9%) felt that old age begins between 60 and 65 years, which are the typical ages for retirement and also those used in demographics and aging research [2, 15].

In response to the likelihood that the people in the photos would use a desktop computer/laptop computer/smartphone regularly, a three way multivariate analysis of variance was conducted: Device (desktop/laptop/smartphone) x Age of person in the photograph (Young or Old) x Gender of person in the photograph (woman or man) This showed a significant main effect for device ( $F(2, 360) = 48.95, p < .000$ ) with smartphone being rated as the most likely to be used, followed by laptop, with desktop the least likely to be used. There was also a main effect for Age ( $F(1, 185) = 427.98, p < .000$ ) with young people rated more likely to use all the devices than older people (mean young people: 5.47; mean older people: 2.74). There was no main effect for Gender ( $F(1, 57) = 3.02, n.s.$ ). There was no significant interaction between Age and Gender (which might suggest the double standard in ageism) ( $F(1, 185) = 0.64, n.s.$ ).

The results for the expertise questions were similar to those for the likelihood of use question, with one interesting difference in relation to gender. The three way multivariate analysis of variance showed a significant main effect for device ( $F(2, 370) = 28.12, p < .000$ ) with smartphone being rated as the device with which people would have the most expertise, followed by laptop, and desktop the device with which people would have the least expertise. There was also a significant main effect for Age ( $F(1, 185) = 266.88, p < .000$ ) with young people rated more likely to use all the devices than older people (mean young people: 4.75; mean older people: 2.44). In this instance, there was a significant main effect for Gender ( $F(1, 185) = 6.81, p < 0.01$ ), with women seen as less expert than men. There was no significant interaction between Age and Gender (which might suggest the double standard in ageism) ( $F(1, 185) = 1.31, n.s.$ ).

### 4 Discussion and Conclusions

This paper reported on the results of an investigation into the perceptions of older people as users of technology, particularly desktop computers, laptop computers and smartphones by young, predominantly male, British computer science students. The results showed that the students perceived older people as both less likely to use these technologies and less expert in using them. However, there was less evidence of sexism, with no significant differences in the likelihood of women and men as users of technology, although there were significant differences in the perception of expertise, with women being seen as less expert in the technologies than men. However, there was no evidence of a double standard in ageism, in which older women are perceived less positively than older men. It was interesting that for younger people, they were seen as most likely to use and be more expert in smartphones in comparison to laptop computers and least likely to use and be expert in desktop computers. This reflects the move away from desktop machines to mobile devices and computing.

These results agree with numerous previous studies which have shown that young people hold negative attitudes and beliefs about older people (see Introduction). While the uptake of computing technologies by older people is still a lower that of younger people, older people in the UK are currently the fastest group adopting mobile technologies, especially smartphones and tablet computers [10]. Indeed the usage of portable devices such as laptop or tablet computers amongst older people has grown, in 2016 43% of 65 to 74 year olds now use a laptop or netbook (20% of those 75 and older), 31% use a tablet computer (15% of those 75 and older) and 83% use a mobile or smartphone (50% of those 75 and older) [10]. Undoubtedly these figures will continue to grow as the “baby boomer” generation of those born after the World War II ages. And with the decreasing number of younger people to care for them in old age, they will rely much more on technology than

previous generations of older people. Thus, it is particularly important that the younger generations of computer scientists appreciate that older people are users of computing technologies. Clearly awareness of the issues around older computer users is needed.

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