Optimizing User Interfaces For Older Populations

Human-Computer Interaction

Brandon Woolman

Abstract

Website designers tend to make flashy sites that may not tailor to older populations. Changes in cognition reduce the elderly's ability to understand complex web designs. Previous research with social media and, telehealth sites highlight major difficulties in older adults with less technology experience. Usability principles such as control mapping can be used to evaluate whether a site is suitable for a disadvantaged user. Applications of this in the domain of healthcare are most important where confusion might lead to health negligence. Websites should aim to have simple and clear interactive components to suit the needs of the elderly.

Introduction

Navigating the web as a college student has become like second nature. Things like: using a search bar, navigating a large amount of tabs or, submitting information to a doctor's office might be a herculean task for those who did not grow up with a computer. Many adults over 60 use a smartphone or a device that can connect to the web. It is safe to assume most of them use the internet daily. Approximately 67% of adults over 60 use the internet daily (Anderson & Perrin, 2017); this includes those using smartphones or desktops/laptops. Which means that a large portion of web users deal with changes in perception and ability due to old age. Perceptual changes can alter the way that a user interacts with a system, and might compound difficulty when met with challenges. These issues stem from what could be easily categorized as usability concerns; which primarily would reduce legibility and navigation on the site. The reduction in ability to navigate a site would not only lead to frustration but could be detrimental to one's health if the site involved communication with a health professional.

Reduced ability to navigate a site is the primary result of usability issues. To eliminate any confusion about what a usability concern might look like, I will define the necessary terms. A user interface is the mode through with a human and computer interact. This interaction relies not only on functionality (which requires the website to work properly) but usability as well. The aspects of a website that makes it easy to understand, interact and navigate involve a variety of usability principles. The difficulty of these principles arises in underrepresented groups, which means if the target audience ignores the needs of certain group they may lack important features to make the website accessible to those people. For example, without the elderly in mind, smaller fonts likely would not be detrimental to the average college student and would provide space for more information/intractable content.

Healthy older adults experience changes in vision and tactile control which likely impacts their use of the internet. If sight becomes less acute, then it can be assumed that reading smaller text becomes more difficult. Changes in vision might cause challenges for navigating web pages, and in result makes the typical webpage difficult for a portion of the population. Natural aging is associated with decreases in processing capacity and speed which can change how someone would interact with a deisplay. Decrease in processing capacity likely would mean that remembering the pathways to a specific page of a website might be impossible. Assumptively, user interfaces are not typically designed with the elderly in mind. An overwhelming majority of internet users are young and interested in flashy but usable designs. The weight between usability and flashiness changes as someone ages, where sacrificing usability for savvy might tailor to a younger population but disrupts elderly individual's ability to explore the site. It should be understood that this investigation is not holistic, nor is it likely that any website meets every criteria laid out by this selection. The purpose of this investigation is to provide a range of heuristics that are important to consider with designing a website that will tailor to the needs of an aging population.

Poor Website Designs

Although older adults have no restrictions on what websites they visit, they are more likely to interact with search engines, social media and, health-related services. While this investigation could explore just one of these platforms, the scope will be widened to more easily assess overall usability concerns that plague the elderly. A portion of senior citizens have a Facebook account that may have been made by them or a relative. This provides evidence that most social media platforms have relatively similar proportions of older adults that use their applications. The presence of older adults on the web is not small, which drives the importance

of this work to understand what these websites could do better to accommodate more of their users.

How the elderly interact with social media is a relatively new field of study. These studies can highlight issues with web design that can be generalized to other sites. Some usability studies are looking at how well older populations can navigate and complete tasks on sites like Facebook and Twitter. Some of these goals include finding a homepage, logging in, sending messages, ect. Arfaa and Wang (2014) found that elderly people with little computer experience struggled to log in and interact with posts on Facebook. This is primarily a usability issue; basic navigation on a social media website can translate to just about any site. Finding a homepage and commenting on a post can be translated to filling out forms on any site (for example, making an appointment at a doctor's office). Some navigational issues include symbols, legibility, and number of necessary interactions. The fewer interactive components a website has, the easier it will be for the elderly to interact with it (Chen, 2009). A website that includes only a few points to interact and eliminates unnecessary information will make the site more accessible to elders. This idea comes with a tradeoff that a site needs to contain enough information for someone to understand what the primary use of the site is and, where to find more information if necessary. Reducing some components of a website might be detrimental to younger users who are interested in more information. However, sites that are tailored to the elderly, such as health-related websites might benefit from reducing unnecessary information and limiting interactions.

Considering that with increasing age, health and wellbeing are critical concerns. Websites dealing with making doctor's appointments, hospital visits or telehealth applications are essential applications for the elderly. These applications are arguably the most important locations to employ usability principles. If a site is confusing or lacks functionality, the elderly might have

issues seeking treatment for health problems and in result suffer. Work with healthcare typically involve uses of telehealth rather than just health-related websites. Telehealth is a type of medicine-related site that typically involves online interactions between patient and physician. Telehealth has a variety of uses including consultations, therapy, and diagnosis which would be useful for older populations that might struggle to leave their house. Most of the issues encountered by the elderly stem from lack of experience with technology (Demiris et al., 2023). Older populations did not grow up with the technology that might seem like second nature to younger populations that help design websites. The addition of too many features likely distracts from user goals and cause some issues with focus on the task. Changes in cognition would decrease the user's ability to track/understand multiple components of a website. Overloading the short-term memory store with a lot of interactions can cause confusion and lead to a variety of issues. If a website causes too many problems, its possible that an elderly person might become frustrated and give up on using the site. If the site involves health care, giving up on using the site might be directly detrimental to the user's health.

Usability Principles and Web Design

In the following pages I will attempt to apply principles set forth by Jakob Nielsen (1994) as an application to website design for the elderly. Nielsen (1994) and others such as Don Norman's *The Design of Everyday Things*, have identified six of the most influential principles relating to design: visibility, feedback, constraints, mapping, consistency, and affordance. Some of which are more important than others when designing a website for the elderly. When applying these principles to a website, the considerations are mostly for visual interface; meaning that auditory and tactile displays will not be discussed.

Visibility of functions and information are extremely important for any design. For older individuals, it would be particularly important to focus on a color palate that highlights differences in functions. Adding too many different colors to a webpage might make it flashy but would also raise concerns over how important each component of the webpage is. A webpage with many moving/sliding parts would overload the amount of visuospatial information that someone can handle and make the user more confused.

Feedback and constraints are very similar in function. What occurs when interacting with components is important to assist the elderly with interactions on the site. Using a help bar for constraints, or clear forms of feedback might help during page transitions. Providing indications that the user has switched from the homepage to a secondary/tertiary page with new information can be helpful to show that they interacted with the site.

Mapping of controls does not apply in most scenarios involving webpages. There is a back-button for the browser. If there are interactables to navigate throughout the page(s), then each of these should look similar and operate in the same fashion. However, this point does feed into the fourth heuristic: consistency across operators. Interactive components should be consistent across the entire webpage. For example, they could have the same size box, same text size, font and color, or have same/similar placements on the screen. All interactive components might be placed in the same location for simplicity.

Lastly, the principle of affordance which encompasses how a user understands their options. This may be the most difficult principle to generalize for designing a webpage for the elderly. Affordances can come in a variety of styles that can direct the user toward a specific interaction. This allows the user to understand what they are interacting with and how to use it. If there is a bar to type in, the bar likely has a blinking cursor to signal typing. These types of

interactions tend to have a different color as the rest of the webpage (usually white) and can be easily identified for putting information into the system. The elderly once adjusted to this, which might make a ‘Help’ bar useful in some cases. Highlighting these interactions might mean dimming the rest of the page rather than changing the input bar directly.

Conclusion

Website designs should consider their inexperienced and disadvantaged users such as the elderly. Designs that account for users that may not be able to store all the information on a page will provide less confusion and promote the use of their webpages. Keeping the elderly in mind; the simpler the page, the better. Avoiding flashy displays and too many transitioning sections will help prevent the overload of older user’s memory storage. Complex color palates can make interactable components difficult to see/use. All forms of interactions should look similar in size and nature to prevent confusion. Error and redirection messages can be useful to those unfamiliar with the system and can provide corrections to the user which should nudge toward correct navigation of the page. Several affordances like help icons can be useful to keep frustration at a minimum for older people who might get aggravated when visiting and using a new site. Whether using a social media site or a telehealth site, there are simple ways to reduce cognitive load and keep the internet an elderly-friendly place. Some sites that involve health might directly impact the wellbeing of older people are most important to keep as accessible as possible.

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