

## Designers Perspective Colour as a catalyst for improving accessibility

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### ABSTRACT

The aims of this study were to identify problems with current information provision to elderly users when using public transport and to find suggestions for improvement from a designers' point (with particular emphasis on accessibility). To explore the accessibility of information, an exploratory approach was primarily used. First, structured participant observations were used to examine barriers in relation to public transport information use by elderly people, as user research is an essential condition of good information design. Second, qualitative email interviews with design experts were undertaken to investigate various alternative design features to enhance information readability by using their special knowledge and adopting basic design elements. Finally, problems about information provision from the perspective of both older people and design professionals were identified. Various design features to enhance the effectiveness of information presentation; however, the importance of colour scheme was found to be fundamental a vitally significant factor.

**KEYWORDS:** Accessible information, Elderly user, Colour

### INTRODUCTION

The primary function of information is to help people solve their problems. Designing information can be understood that presenting data in an effective and an efficient way to help people's rapid understanding. Wayfinding systems are among the types of information design, because information plays a significant role in wayfinding success [1]. Inappropriate layout of information is one of the reasons for wayfinding problems. For example, poor information quality can be a potential barrier which impacts on people's ability to use buses [2]. However, much research has focussed on physical mobility and seems to overlook the need for accessible information related to public transport (taking consideration of visual acuity and colour sense). In addition, so far, most studies have been concentrated more on technical aspects of travel information while little research approaches the quality of information and user requirements from a user-friendly standpoint [3]. Therefore, in this study, an exploratory approach was employed to explore the accessibility of information (whether it is easy to read and understand) from a user-oriented point of view.

The term 'older people' is defined as "people aged 60 and over, who might or might not experience difficulties using technology caused by the effect of age-related capability change" [4]. Age is a core factor which significantly impacts on the user acceptance of electronic sources [5] and which can also affect both visual acuity and colour vision. Older people are more likely to use timetables and phone inquiries than younger people [6] and would prefer printed information (for instance, timetables and maps) due to lack of familiarity with computers and confidence to find travel information online.

### METHODOLOGY

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In this research, participant observations and email interviews were employed as the main tools to gain insights and to address the research questions. Both methods are “commonly used as research data in qualitative research” [7].

### 1. Structured Participants Observation

Behaviour observation is often a powerful and helpful method of recording data [8]. The aim of the observation is to collect empirical data on users' experiences of public transport information for unfamiliar routes. Firstly, a journey was divided into ten stages to record the behaviour of elderly people at each step. Structured participant observations were conducted with two female elderly people (aged from 65 to 70) each making journeys to a place that was unfamiliar to them.

### 2. Semi-structured Interviews and Questionnaires

Shortly after the observation, semi-structured interviews were implemented. Then, in-depth questionnaires were given to the participants, asking them to express what information they used at each stage, their feelings and opinions about the journey and how information could be improved.

### 3. Design Thinking (DT) Methods

There are six methods and tools for DT: personas, stakeholder maps, customer journey map, service blueprint, business model innovation, and rapid prototyping [9]. In this study, firstly, an actual journey (from each participant home to an unfamiliar destination) was created. Then, ‘a traveller journey map’ was designed by taking basic frames of both the blueprint technique and the customer journey map (CJM) in accordance with the features and aim of the project in order to record and describe the delivery of transport information and users emotional experience. The ‘traveller journey map’ summarises the user action, touch point, contact person, barrier, and emotional experience through observations and questionnaires for the whole journey.

### 4. Email Interviews

Six design professionals took part in this research to find possible design improvements, as designers are knowledge users in an inclusive design approach and designers' special expertise are required in the wayfinding strategies. Email interviews were implemented twice with each individual. In the first email interview, they were questioned about basic information design elements, and what they understand about public information design. In the second email interview, they were asked for suggestions for design improvements.

### 5. Measurements

There are various metrics that could be utilised to test information design [8]. These include: accuracy/knowledge/memory, preference/confidence, insights/opinions/attitude, behaviour/intentions. They can also include a response capture, an informal test, a questionnaire, an interview, an observation, and time. In this research, two tools (time, insights/attitudes/opinions) were used after considering the characteristics of each of these metrics.

## RESULTS

The journey was structured for the participant observation which commenced with the participants home and finished when they found a bus stop to return. Regarding the issue of transport information use during the journey, three barriers were uncovered: information accessibility, lack of consideration of data presentation, and an insufficient range of information formats and sources. Their emotional experiences contrast sharply with each other (2: very calm, 1: calm, 0: neutral, -1: frustrated, -2: very frustrated), shown in Figure 1. This data could be interpreted as showing that the more information they needed, they were more likely to feel frustrated due to unsatisfactory information and a lack of information. These factors could affect the overall quality of transport experiences. Also, there was a high level of demand and need for different types of information at each stage of the bus journey from both participants.

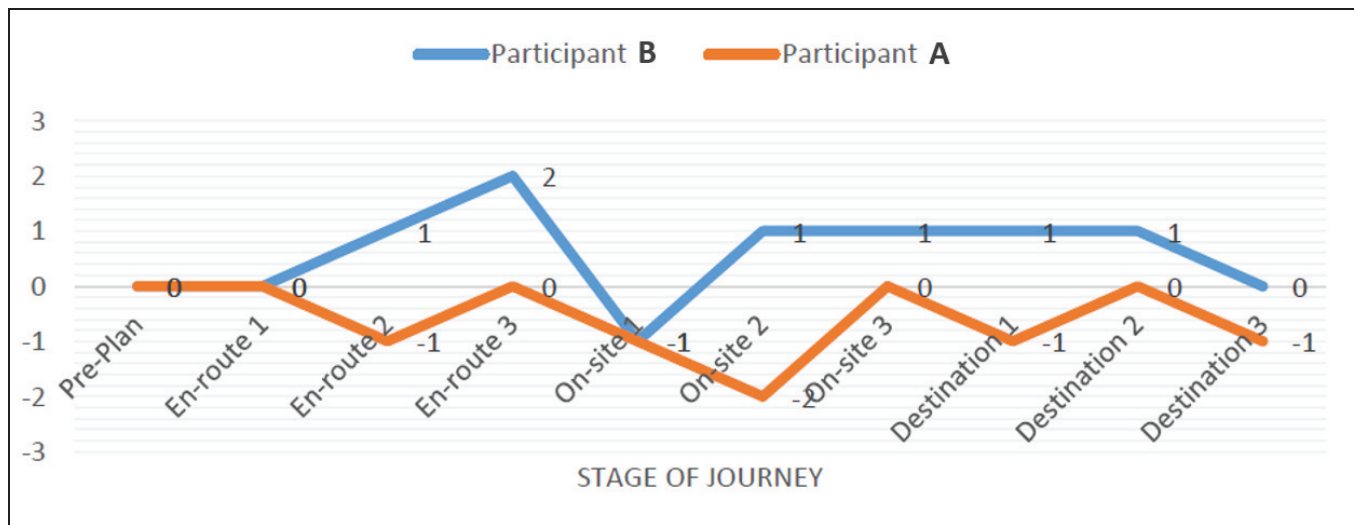


Figure 1: Emotional experience during the journey

In the first email interviews, designers were asked qualitative semi-structured questions regarding basic elements of visual design and knowledge of public information. They all agreed that public information should be readable by everyone, including street signage, timetables, bus route information, tourist map, excluding commercial information. For the question of basic element of visual design, from the collected data the most repeated word was colour from all of them, which might represent the most important factor in visual design from a designer's point of view, was generated through the word cloud (Fig. 2).



Figure 2: Word Cloud Generated from Interview Contents

In the second email interviews, online and print-based transport information was tested. Each designer was asked to access the designated website and search for the same specified route within a reasonable time. Then they described their information seeking behaviour and opinions. The evaluation questions were concerned with usability, usefulness of content, and accessibility, as these are closely related to overall satisfaction with an information service. Relevant questions were provided for each category to test an existing design delivering public transport information, both from the user and designer's position, and asking for suggestions for viable alternative design solutions. Considering ideas for improvement from design experts, a structured layout, grouping skills, and a use of colour schemes were contemplated for easy-to-understand information. There is an area of agreement that although information classes become apparent in the design by applying colours appropriately, present information provision did not seem to use colour schemes. Finally, sufficient and appropriate use of colour was suggested to facilitate more effective and efficient information presenting.

## DISCUSSION

The Journey step was broken down into ten stages. During the semi-structured questionnaire, however, it was revealed that older participants felt confusion about each of the journey steps when they recalled the journey to fill in the form. This is one of the limitations of the observational study, so in any future studies, it would help if elderly people took part in a session discussing the journey process from their viewpoint. In terms of online information, although only two female participants were involved in this study, there was a large difference between them in getting information online. One used online information. The other did not. This may be affected

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by personal characteristics, for example, personality, mobility, and familiarity with new technology. Therefore, diverse user characteristics and information formats need to be discussed from a user-friendly standpoint. Overall, the limitation on generalizability of findings should be considered. This is because only two elderly females were involved in the observational study, and six designer interviewees, which may be too small for generalisations. Although, the two female participants in observation played invaluable roles for the study, more participants (perhaps with more diverse backgrounds and characteristics) would be helpful.

### CONCLUSION

The researcher used an eclectic approach to produce useful data from elderly users and designers. It included structured participant observations in conjunction with questionnaires, semi-structured interviews and email interviews. It is important to note that similar problems were identified by both users and design experts. Also, this study showed that designers can improve the accessibility of current public transport information provision, and how they could have a role enhancing approaches to wayfinding. Most of all, colour is the most fundamental as well as the vitally significant element for every designer when it comes to design work regardless of their specialism to enhance information accessibility.

### REFERENCES

- [1] Jeffrey, C. 2017. *Wayfinding perspectives*. In: Black, A. et al. ed. Information design research and practice. New York: Routledge, pp.509-526.
- [2] Broome, K., Worrall, L., Fleming, J. and Boldy, D. 2011. *Characteristics of age-friendly bus information*. Journal of Public Transportation, 14 (4), pp. 43-61.
- [3] Paulley, N., Balcombe, R., Mackett, R., Titheridge, H., Preston, J., Wardman, M., Shires, J. and White, P. 2006. *The demand for public transport: The effects of fares, quality of service, income and car ownership*. Transport Policy, 13 (4), pp. 298-306.
- [4] British Standard, 2010, BS 8878:2010. *Web accessibility-Code of practice*. London: British Standards Institution
- [5] Schaar, A.K. and Ziefle, M. 2010. *Potential of eTravel assistants to increase older adults' mobility*. In: Leitner, G. et al. ed. HCI in Work and Learning, Life and Leisure. Berlin and Heidelberg: Springer, pp.138-155.
- [6] Farag, S. and Lyons, G. 2008. *What affects use of pretrip public transport information? Empirical results of a qualitative study*. Transportation Research Record: Journal of the Transportation Research Board, 1 (2069), pp. 85-92.
- [7] Crouch, C. and Pearce, J. 2015. *Doing research in design*. 3rd ed. London and New York: Bloomsbury Academic.
- [8] Timmins, W.S. 2017. *Methods for evaluating information design*. In: Black, A. et al. ed. Information design research and practice. New York: Routledge, pp. 451-462.
- [9] Chasanidou, D., Gasparini, G.G. and Lee, E. 2015. *Design thinking methods and tools for innovation*. In: Marcus, A. *International conference of design, user experience, and usability: Design Discourse. 2/7 August 2015, Los Angeles*. Switzerland: Springer, pp. 12-23.