A brief Survey on Understanding
the Interaction between Human and Technology
at the Task of Pedestrian Navigation

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Abstract. In this paper we present a brief summary of an online survey we conducted in 2014. 135 participants successfully completed this survey, whereby 46% of the subjects were females and 54% males. We found out, that nowadays many users fall back on using smartphones in order to orientate themselves in unknown environments. In terms of analog navigation methods, people still rely on street name signs and landmarks such as characteristic buildings. However, relying on current smartphone habits for navigation tasks, visual attention is usually heavily drawn, which can cause a reduced perception and potentially makes smartphone map navigation more dangerous.

Keywords: Pedestrian Navigation, Urban Complexity, Survey, Human-Computer Interaction, Smartphone Usage, User Habits.

1   Introduction

The goal of this study was to understand 1) the usage patterns of classical 'analog' and new 'digital' guidance as well as 2) the process of planning paths and routes. While landmarks can already provide sufficient information for orientation, many users tend to use smartphones for getting directions. Previous studies have already investigated the smartphone usage in certain locations (e.g. at home, at the office) as well as the awareness of location-based services among smartphone users and non-smartphone users [3,4]. It has been found that directions as well as nearby points of interests (POI), such as shops or restaurants, have high recognizability and thus a great potential usage by both user groups [4]. Moreover, especially when involved in traffic as a car driver, devices for navigation became very popular. In 2013 three-quarters of car drivers used navigation devices, whereby every fifth device was a smartphone [2]. However, this survey aims to provide an insight into the target group of the pedestrian to find out everyday scenarios and common issues while navigating in public space with classical approaches and technology-assisted approaches.

2 Survey

2.1 Preface

Survey Instruments. The frequency of use of classical concepts and orientation aids in comparison to the use of digital and mobile applications for pedestrian has not been investigated in any study yet. To quantify this information we designed a complex questionnaire based on three survey guidelines based on Wester et al. [9], Kirchhoff et al. [5] and Aschemann-Pilshofer [1].

Questionnaire Content. The survey included primarily dictated closed questions, which had to be rated on different rating scales. Additionally, the participants were also able to respond with qualitative feedback in corresponding text boxes. 16 carefully chosen questions cover the following areas:

- daily locomotion
- use of classical/analog guidance
- memorizing unknown routes
- use of digital devices and digital map applications, and route planners
- behavior in unknown scenarios.

Evaluation and Statistics. To carry out the study, we used SoSci from Leiner [6]. The survey was online and accessible for 25 days. Within this time, the survey has been successfully completed 135 times, whereby 46% of the participants were females and 54% males. 61% of all participants were younger than 30 years old, 30% between 30–49 years old and 9% had an age of 50 or above. 80% rated themselves as an intensive smartphone user. 39% of all participants stated to usually take the car, while 46% use public transportation and 15% use both transportations equally.

2.2 Usage of Map Applications and Route Planners

To determine the frequency of usage of digital map applications and route planners we asked the users how often and on which device they are using navigation services.
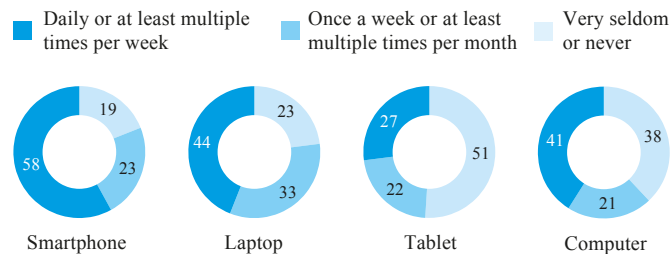

Figure 1. Demonstrating the frequency of use of directions for four devices: Smartphone, Laptop, Tablet, Computer.

While more than half of the respondents use their smartphone regularly for navigation/directional tasks, smartphones are also used noticeably more often than other devices *(see Figure 1)*.

2.3   Memorizing Directions to Unknown Destinations

The survey participants were asked about their most likely behavior when planning a route from home to an unknown destination. We evaluated this question by the different user groups (gender, main transportation, usage of smartphone and age) to identify variances *(see Figure 2)*.
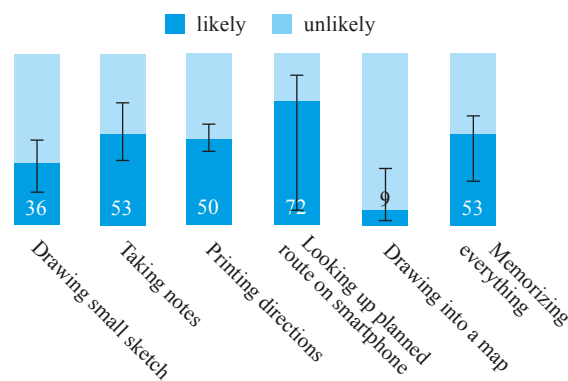

Figure 2. Preferred methods of memorizing when planning an unknown route from home.

Almost half of the respondents reported to possibly not *memorize the planned route* to the unknown destination. Tools such as *taking notes* and *printing directions* seem to be quite popular while *drawing into a map* is only reported to be used rather unlikely. 72% of the respondents reported *to look up directions on the smartphone.* Here, the variance seems to be very high because of certain user groups (intensive usage of smartphone: 87%, extensive usage: 8%).

2.4   Analog Navigation Methods

To gain an insight on how often alternative methods for orientation are being used *(see Figure 3),* we asked the survey participants to rate the suggested alternative as either *often, sometimes, seldom* or *never* based on their subjective perception, since it is hardly measurable with numbers.
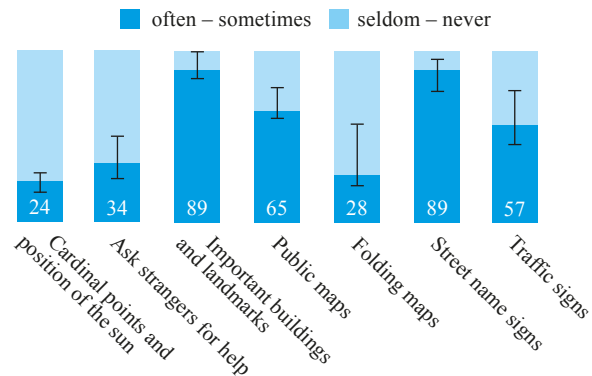
Figure 3. User tendency to alternative navigation aids.

The most significant navigation aids are *important buildings and landmarks* (89%), which was equale to *street name signs* (89%). Also striking is, that the user group above 50 years (58%) still relies on *folding maps,* which does not seem to be an option for younger users (<30 years: 21%, 30–49 years: 34%).

2.5   Smartphone Usage in Different User Groups

The survey included several scenarios, in which the participant had to rate the most appropriate answer on a 5-point Likert scale. In this case, we asked the respondent to imagine him-/herself being on the way as a pedestrian, while getting lost and searching the way to a place (such as the flat of a friend). The statement to be rated was: *"I will check the directions on my smartphone." (see Figure 4).*
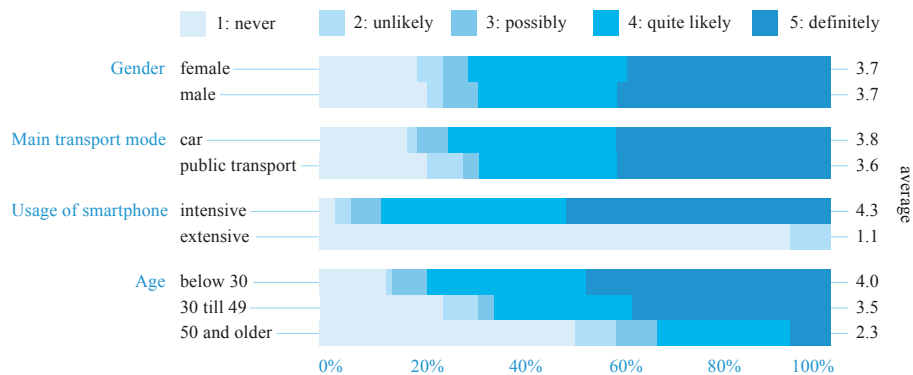

Figure 4. This figure shows the answer for different user groups.

As the result we can observe that users with the daily locomotion by *car* tend to use the smartphone in such situations more often. The discrepancy between genders does not yield any noticeable differences. Also clearly to see, young users most likely tend to use their smartphone and older people tend to use alternatives.

2.6 Qualitative Feedback (Excerpt)

Besides the quantitative rating, most questions were provided with text boxes for additional feedback. Especially this qualitative feedback turned out to provide us with a lot more valuable information, since people were already telling us about many problems or different solutions they find crucial when orientating and navigating in public space. In the following we will highlight some statements, which state problems already very clearly.

Heavy visual attention on the screen. *»I enter the address at home on my smartphone to leave on time and to follow the directions on the go.«*

High demand on memorization causes cognitive load. *»I look up the directions on the internet [at my workstation] and take the nearby station as a starting point. I always try to remember the route to my final destination.«*
»I often use Google Street View. There I can see striking points, which will help me to get my bearings on the go.«

Combining classical 'analog' and new 'digital' guidance. *»If I did not find the street, I maybe would have asked another pedestrian, with having Google Maps open on the smartphone, for help.«*

3 Conclusion

In this paper, we briefly presented insights in user habits when navigating in unknown environments. We can clearly see that smartphones not just caught up with common navigation devices – instead even emerged to the mainly used device for pedestrian navigation. However, smartphone navigation usually demands heavy visual attention, which makes it potentially dangerous to use. We believe that alternative navigation methods, such as vibrotactile feedback [8], can help here in order improve navigation experience for pedestrians and to make it safer. This paper only presents a brief summary with a small number of questions we asked the study participants. Further information about this survey can be found in the Master's Thesis of Anita Meier [7].

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