Uber Mobile Application Iterative Design for People Who are Blind

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Abstract
Due to advanced technology development, ride-sharing is one of the most popular transportation nowadays, which provides benefits for both driver and passenger. However, it might be a challenge for the blind people to use this service. In this study, we sought to assess the usability and accessibility of the Uber ride-sharing application. We conducted four interviews and observations with the people who are blind, and organized our findings into four themes: 1) contacting the driver is challenging, 2) identifying the car is difficult, 3) frequent cancellation of rides and inability to report the cancelled ride, and 4) drivers lack in training of serving the disabled. We provided several design recommendations to improve the features and usability of the Uber application, for example, find a more efficient way of communication between drivers and riders, and educate Uber driver knowledge about disabilities.

Author Keywords
Visual impairment; blind; ride-sharing; mobile application; Uber; transportation; accessibility; human-computer interaction.

CSS Concepts
• Human-centered computing~Empirical studies in accessibility;

Introduction

Ride-sharing services like Uber and Lyft provide people who are blind with greater mobility and independence of transportation [8]. Mobile applications for both companies use built-in screen readers, e.g., iOS VoiceOver. They are compatible with wireless braille displays and the Aira service [3, 7]. Through the accessible features and service, these applications allow people who are blind to request and track the rides easily [5]. Uber and Lyft improve blind people's lives by "providing fast, convenient and affordable transportation [5]." Riders know the cost before accepting a ride and the services use a cashless payment method to prevent worry about the exchange of money [6]. The ETA (Estimated Time of Arrival) feature provides a notification about the arrival time of the car. It also gives blind users notice when the driver arrives, which helps them identify the cars they request. These mobile applications also offer the detailed information of the driver and the car, including first name, license number, and model of the car. This would reduce the blind user's safety concerns [5]. Additionally, the users could contact the driver either by texting or calling. All these features in ride-sharing mobile applications give people who are blind more control over their ride environment and they also gain more confidence in their transportation experiences [8]. Ride-sharing services operate in about 400 US cities and several other countries [2]. Although the ride-share companies have made commitments to support people who are blind, there are still many accessibility problems with their mobile applications for this population [2, 4, 6, 8].

People who are blind have commonly complained about difficulties contacting drivers, identifying the vehicles, how to identify themselves to their drivers, and cancellation of rides [1, 3]. They rely on the notification of the driver's updating arrival time and sighted people's help to find the car [8]. Additionally, some riders have shared concerns regarding the trustworthiness of the ride-sharing services [5]. Kameswaran et al found the problems around reading the map and locating the destination [8]. In order to find a deeper understanding of a particular ride-sharing service, in this project, we analyzed perceptions and usability of the Uber mobile application through interviews and observations with four participants who were blind. Our findings have several implications for design improvements. Specific research questions included:

1. How easy is it for blind people to request a ride?
2. How satisfied are blind people with the estimated time of arrival (ETA) feature?
3. How can contacting Uber drivers be improved?
4. What is the most efficient way for drivers to identify riders who are blind and for riders to identify their drivers?
5. How to improve training for the drivers for interacting with riders who are blind?

Methods

We describe our participants, interview and observation procedures, and methods for data collection and analysis.

Participants

We recruited our Chicago-based participants (n = 3) through personal networks and our Florida-based

participant (n = 1) through the Lighthouse of Central Florida, an organization that provides services for people with vision impairments. All participants were at least 18 years of age, self-identified as blind in both eyes, were experienced using screen-readers on iOS, and had used the Uber mobile application before. They owned an iPhone and used VoiceOver. All participants reviewed our consent form and provided verbal consent prior to taking part in the study. See Table 1 for a summary.

Participant	Age	Gender	Location	Age of Vision Loss
Mary	47	F	Chicago	27
Penny	45	F	Chicago	20
Mike	30	M	Chicago	Born
Carol	60	F	Edgewater	31

Table 1: Participant demographics.

Data Collection

We conducted in-person observations and interviews. After receiving verbal consent, we interviewed four blind Uber users to learn about their previous ride-sharing experience.

We then had the participant request a ride to a nearby coffee shop using the Uber mobile application. We provided the name and the address of the destination. We observed the participant's interaction with their phone and the driver before and during the ride. After the ride was completed, we asked the participants questions about the level of satisfaction and the difficulties they encountered in their trip. Each session was concluded by thanking the participant with an Uber reimbursement and a $20 Amazon gift card via email.

We took notes, pictures, and audio or video recordings of our participant's experience with their mobile device's screen and conversations with the driver. Each session took about 60 minutes to complete.

Data analysis

We used the AEIOU (activities (A), environments (E), interactions (I), objects (O), and users (U)) framework to analyze our observation notes. We also analyzed transcriptions of the interviews inductively. We organized all of our notes and codes into common and salient categories using an online affinity diagramming tool called Stormboard.

Findings

All four participants successfully completed the task, beginning with requesting an Uber trip to finishing the ride. Findings from our interviews and observations include: 1) contacting the driver is challenging, 2) identifying the car is difficult, 3) frequent cancellation of rides and inability to report the driver who cancelled, and 4) drivers lack in training of serving the disabled.

Contacting the driver is challenging

All four participants had trouble contacting their drivers in their past experiences. The intention of "contacting driver" feature that Uber provided is great. All the participants wanted to tell their drivers that they needed the driver to call their names when arriving at the pick-up location. However, the most common situation was that drivers neither replied to participants messages nor answered their phone calls.

One participant Mike also mentioned an issue that some drivers could not speak English. It increases the difficulty of contacting the driver.

Additionally, participant Penny shared with us that she had double-tapping interaction issue. She needed to double tap screens to confirm her actions when interacting with the Uber mobile application by using the VoiceOver. However, she had difficulty doing this action. It happened every time when using this application.

Identifying the car is difficult

After the driver arrives, it is difficult for the participant to know where the car is. "You're gonna have to say something, so I can find you because I cannot see you," Mary claimed. She said the driver needs to read the message and know it is necessary to call her name. It is the primary method of identifying the car for blind riders, but the driver did not get out of the vehicle to call their names in time. All four participants knew the car arrived through the notification of driver's arriving on the application. However, all of our participants opened the application to contact the driver when the car was in front of them because they could not know it. Three of the drivers sat in the car and looked around for a while. After being aware of the riders were blind and needed help, the drivers got out of the car and called their names.

This difficulty would happen more in the busy city. Participant Carol, in Orlando, said the streets are loud, and she is not confident in finding the car without help. Her home in Edgewater is on a quiet street, so she can hear when a car is pulling up to her driveway. Participant Penny's house is in a quiet neighborhood. She listened to the car and was guided by her dog to find the car. She mentioned that in a busy street, like Chicago downtown, she would ask for sighted people's help or ask the driver to call her name.

Another solution from participants is describing as much as possible about themselves and location information to help the driver find them. "If I call the driver, I will try to be as descriptive as possible to tell him where I am at," Mary said. She would also describe what she was wearing to the driver and be standing outside to let the driver find her quickly.

Three of the participants said ETA is not reliable to them. Mike pointed out the ETA worked well when he was requesting the ride, but after he sent the request, there were problems to get the updated information. He also wanted the real-time information on the map to be accessible, which could help him to identify the car.

Frequent cancellation of rides and inability to report the driver who cancelled the trip

All participants had similar experiences with rides getting cancelled after notifying the driver of their blindness and that they have a service dog with them. Participants noted that once a ride was cancelled, they no longer had the driver’s identifying information and could not report them to Uber for discriminating behavior. In addition to this, the riders were also charged a $5 cancellation fee.

To combat this issue, Mary began taking a screenshot of the driver’s information after they accepted the ride. If the driver canceled, she could send the screenshot to Uber and they could confirm the driver cancelled upon arriving at Mary’s location.

Two of our participants, Mary and Penny, mentioned they had been successful in reporting a cancelled ride. Penny mentioned that after she reported a driver, Uber underwent an investigation. Once Uber's investigation was complete and they ruled that the driver violated their rules, she received a refund for the $5 cancellation fee, a $25 credit for the inconvenience, and was notified that the driver received a warning.

Drivers lack in training of serving the disabled

Through the responses and feedback, we received from the interviews and observations, the dissatisfaction and communication barrier between the blind and the driver exist due to the unprofessional training of drivers. Drivers had a lack of knowledge about disabilities and did not know how to interact or help the blind.

Three participants (Pam, Mary and Mike) mentioned that they wanted to have the driver drop them off to the door of the place that they are not familiar with. Mary said, "sometimes if I have to go somewhere that I'm not familiar with, or some place I've never been, I want them to take me to the door, whereas with the bus you know they're not going to drop you at the door." Pam said, "I don't know where you are dropping me off. So, I needed you to walk me to the door. I've had them drop me off at the wrong address." Mike said, "sometimes if I am going to a place that I am not familiar with, the driver will help me find the door. It will definitely be helpful for Uber to train driver to pay attention to the varieties of disabilities, so the drivers are aware of the potential needs."

Discussion

Our goal was to understand the challenge of the blind when they are using the Uber application and evaluate the usability and accessibility of it. In this project, we conducted observations and interviews with four blind people to learn about the ride-sharing experiences of them. We found that it was difficult for the users to contact the drivers and identify the cars, which is aligned with Kameswaran et al's study [8]. That caused the frequent cancellation of rides. Another reason for cancellation is due to the service animal. Moreover, users cannot report for the cancelled trips. They feel frustrated about it, and they are also not satisfied with the driver's service. They hope the driver would know more about disability and provide appropriate help.

Recommendations for design

Based on the findings from our research, we generated design recommendations driven by the needs of blind users. We recommend the following to improve the accessibility of the Uber application:

- Find a more efficient way for communicating between drivers and blind riders
- Educate Uber driver knowledge about disabilities
- VoiceOver the ETA and text message to the blind and allow the blind to interact with the map
- Add real-time notification in the application to update the blind on ETA and destination
- Harsher punishment for drivers who discriminatingly cancel on blind riders
- Keep a history of every requested ride, so that user can check them in their ride history

- Blind riders can set their in-app preferences to always text the driver a custom message whenever a requested ride gets accepted

Limitations

Our study was limited by our small sample size. We conducted research sessions with four participants, which is too small of a sample size to generalize findings to a larger population. In addition, accompanying the participants when observing them taking rides may have affected their and the drivers' performances. Further, all participants were iPhone users; we did not test the Android version of the Uber application. We also did not research drivers, which are an important factor within a ride-sharing context.

Future Work

In future studies, we would like to include testing with a larger participant pool, Android mobile devices users, and more diverse population. In this way, we could generalize findings to a larger population. Additionally, it would be valuable to interview Uber drivers to gain insights from different aspects. Lastly, we will also implement our design recommendations in an interactive prototype and conduct the usability test with blind users.

References

[1] Deborah Kendrick. 2016. Lyft and Uber Have Changed the Transportation Gamkloae for People with Visual Impairments. (November 2016). Retrieved November 8, 2019 from https://www.afb.org/aw/17/11/15386

[2] Inside Edition. 2019. Lyft Fires Driver Who Refused to Give Blind Man Ride Because of His Guide Dog. Retrieved November 9, 2019 from https://www.insideedition.com/lyft-fires-driver-who-refused-give-blind-man-ride-because-his-guide-dog-52341

[3] Lyft. 2017. Empowering Lyft's Visually Impaired Community. Retrieved November 9, 2019 from https://blog.lyft.com/posts/2017/12/18/empowering-lyfts-visually-impaired-community

[4] Lyft. 2019. Lyft, Aptiv, and the National Federation of the Blind Partner to Provide Rides to Blind and Low Vision Passengers. Retrieved November 9, 2019 from https://blog.lyft.com/posts/lyft-aptiv-nfb-low-vision-riders

[5] Robin N. Brewer and Vaishnav Kameswaran. 2019. Understanding Trust, Transportation, and Accessibility through Ridesharing. *In CHI Conference on Human Factors in Computing Systems Proceedings* (CHI 2019), May 4–9, 2019, Glasgow, Scotland UK. ACM, New York, NY, USA, 11 pages.

[6] Simek, C. L., Higgins, L. L., Sener, I. N., Moran, M. M., Geiselbrecht, T. S., Hansen, T. H., … Plunkett, M. (2018). Safety Perceptions of Transportation Network Companies (TNCs) by the Blind and Visually Impaired. Safety through Disruption (Safe-D) National University Transportation Center. Retrieved from https://vtechworks.lib.vt.edu/bitstream/handle/10919/88895/02-010_Final Research Report_Final.pdf?sequence=1&isAllowed=y

[7] Uber. 2019. *Accessibility at Uber*. 2019. Retrieved November 9, 2019 from https://accessibility.uber.com

[8] Vaishnav Kameswaran, Jatin Gupta, Joyojeet Pal, Sile O'Modhrain, Tiffany C. Veinot, Robin N. Brewer, Aakanksha Parameshwar, Vidhya Y, and Jacki O'Neill. 2018. 'We can go anywhere': Understanding Independence through a Case Study of Ride-hailing Use by People with Visual Impairments in metropolitan India. *In Proceedings of the ACM on Human-Computer Interaction*, Vol.

2, CSCW, Article 85 (January 2018). ACM, New York, NY. 24 p
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