
PARKING PAY STATION – PILOT USABILITY STUDY

FINAL PROJECT – HCDE 517 C

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EXECUTIVE SUMMARY

The objective of this pilot usability study was to evaluate the relative usability of the two parking pay station designs available in the City of Seattle. Our study method was a comparative, between subjects, unobtrusive observation field study. We observed people using Seattle parking pay stations and debriefed users following their transaction. Through observation, the full scale study will uncover and document design issues that cause usability issues.

KEY FINDINGS

- Parking pay station observers can collect useful data by observing real world parking pay station use.
- Seattle pay station users are willing to discuss their pay station use and concerns during debriefs.
- With a few study structure and logistics modifications, this study design is ready for large-scale execution.

PILOT STUDY FINDINGS

(Note: The goal of this pilot study was to demonstrate a proof point for a large-scale unobtrusive observation usability study. As a pilot study, these observations should not be viewed as preliminary findings.)

- **Satisfaction:** The horizontal button design pay station had a higher reported satisfaction rate than the scattered button design. One scatter design user volunteered that he preferred the horizontal button design.
- **Errors:** We observed card insertion errors, such as inserting the card at the wrong time, or inserting cards multiple times, more than any other error.
- **Task Completion:** All participants successfully completed payment, however one user failed the task (abandoned payment and got out of line) before successfully completing payments.
- **Instructions:** Two experienced users, those who use the machine almost weekly, referred to the instructions while using the pay station machine.
- **Parking Receipt:** After reading the parking receipt instructions, a 'first-time' pay station user placed the parking receipt in the wrong location. After observing the placement of the receipt on adjacent cars, the user corrected the receipt placement.
- **Overall:** In our small pilot study, we noticed key differences between the two designs. Specifically we found differences between reported satisfaction and time to completion. If the differences hold over the course of a larger study, study administrators may decide to end the study early.

STUDY MODIFICATION RECOMMENDATIONS

Recruiting	<ul style="list-style-type: none"> Recruit participants with diverse levels of experience with parking meters Increase sample size to achieve statistically significant results for the population
Unobtrusive Observation	<ul style="list-style-type: none"> Design a communication plan to feed questions from observer to the interviewer Plan for inclement weather
Debrief	<ul style="list-style-type: none"> Increase debrief length to include additional qualitative probing regarding machine aspects and levels of satisfaction with machine use
Overall Recommendations	<ul style="list-style-type: none"> Consider sample logistics of a larger study Train observers and interviewers for a larger study Adjust study materials for optimal use
Opportunity for Future Study	<ul style="list-style-type: none"> Explore why some users bypass the parking pay station without paying for parking. (For example: poor usability of pay for parking signs, expected poor performance of parking pay stations, or for scofflaw reasons)

PARKING PAY STATION STUDY INTRODUCTION

Seattle's Parkeon Parking Pay Stations grew out of a 2003 City of Seattle Department of Transportation best practices parking review. The review came from a desire to expand payment options for customers and improve management of the parking environment. The following year the City of Seattle developed a \$20.5 million contract with Parkeon to install and manage 'pay and display' systems¹. There are over 1,600 Parkeon Parking Pay Stations in the Seattle Area². These Parking Pay Stations allow drivers to purchase a specified amount of time to park and use their payment method of choice, including coins and a credit or debit card. The Parking Pay Station prints a receipt that drivers must display on their vehicle to avoid citation. The City of Seattle employs two parking pay station designs throughout the city; a design we refer to as the Horizontal Button design and a design we refer to as a Scatter Button Design (See **Error! Reference source not found.**). Through periodical studies and reviews, the City of Seattle makes annual adjustments to parking rates and reviews the city's parking efficacy.

OBJECTIVE OF STUDY

Because parking pay stations are critical services for Seattle drivers, a source of city revenue, and in many contexts are the only way for drivers to avoid parking citation, usability studies are necessary for each hardware design. Currently, the city uses two parking pay station designs that differ in their hardware layout and instructions. The City of Seattle invested \$25,000 to redesign the parking meter instructions³. However, the efficacy of the city parking meters in terms of usability outcomes is not publically documented after the first parking pay station roll out. Our goal is to document the usability of the two parking pay station designs, and through a large-scale study make a recommendation for the best design for future city purchases.

AUDIENCE OF STUDY

We structured our study to observe members of the public who use credit/debit cards to pay for their parking. We focused on credit/debit cards due to high credit/debit card adoption rates⁴, and to examine the usability of the expanded payment options of the Seattle parking pay stations⁵. In both the pilot and large-scale study, we exclude both consumers who pay with coins and consumers who begin with one type of payment method (cards or coins) and end with or attempt another type, from our study. We limit our audience of study to the following characteristics:

¹ <http://www.roadtraffic-technology.com/projects/parkeon/>

² <http://www.seattle.gov/transportation/parking/paystation.htm>

³ <http://www.seattleweekly.com/2006-04-12/news/parking-sticker-shock/>

⁴ Harris Interactive 2010, Consumer Payment Preferences Study, Hitachi Consulting and Bank Administration Institute (BAI) company website, Nov. 1, 2010. Also available at <http://epaymentnews.blogspot.com/2011/01/2010-bai-hitachi-study-of-consumer.html#axzz1l6CWuqk8>.

⁵ <http://www.seattle.gov/transportation/parking/paystation.htm>

Parking pay station users on the day and time of observation:

- Pay using credit or debit card
- When groups of people use the parking pay station together we will record the debrief responses of the card holder

Convenience sampling

- We may not be able to debrief all observed pay station users
- We will capture demographic information during the debrief
- We will exclude persons with impairments that affect their ability to use the parking pay stations from this study
- In the event of heavy parking turnover and traffic we may not be able to observe all pay station users

PILOT TEST AUDIENCE

Our pilot test followed the audience criteria stated above. Over the course of two Saturdays in February and March 2012, we observed nine (9) parking pay station users and debriefed seven (7). All but one of the participants debriefed self-reported that they were weekly pay station users. The exception was a first time pay station user.

SCATTER DESIGN

For the scatter design parking pay station, we observed and interviewed members of the public who used the parking pay stations at the Elliot Bay Books site (see Appendix A: Study Sites). In this location, we observed five (5) scatter design users and debriefed three (3).

HORIZONTAL DESIGN

For the horizontal design parking pay station we observed and interviewed members of the public who used the parking pay stations at the Revolutions Espresso Green Lake Side Street Site (See Appendix B: Study Sites). In this location, we debriefed four (4) horizontal design users.

	Scatter Button Design	Horizontal Design	Total Count of Participants
Total Debriefed	n=3	n=4	n=7
Total Observed (2 declined)	n=5	n=4	n=9

TABLE 1 DEBRIEFING AND OBSERVATION RESPONSE RATES

ISSUES AND METHODS

Based on a heuristic evaluation of parking meters around the world, we wanted to study possible issues in the following six areas of parking meter usability⁶:

- (1) Hardware, buttons and task flows
- (2) Feedback to the user
- (3) Parking receipt design
- (4) Error correction
- (5) Instructions/Walk up and use usability
- (6) Overall experience

We wanted to examine the real world usability outcomes and issues people experience using Seattle parking pay stations because real world parking pay station use is not easily replicable in a controlled study. We chose to conduct a comparative field study of the two parking meter designs using unobtrusive observation methods with a user debriefing. We focused on unobtrusive observation (only interacting with users after they concluded pay station and parking receipt use), to ensure we did not disrupt the flow of the quick, multifactorial transaction. For each area of concern, we determined study questions and then evaluated the best method to gather data: unobtrusive observation or user debriefing (See Appendix D: From Issues to Methods).

The below table highlights the data collected with each usability testing method.

Observation	<i>Time on task, observable errors (hitting cancel, inserting card at the wrong time), amount of time purchased (parking receipt), parking cost (parking receipt), take ticket, display receipt properly.</i>
Debrief	<i>Demographics, unobserved concerns, pay station satisfaction, reported expiration time, reported parking cost, concern with receiving citation, perception of transaction time, instructions use, instruction satisfaction, and further issues.</i>

TABLE 2 DATA COLLECTED BY METHOD

FURTHER INFORMATION

During pilot study tests, we found that we could observe the key discreet payment steps by standing at a 30 to 45° angle to the parking meter at a distance of eight to ten feet. Due to the city activity and foot traffic, parking pay station users appeared unencumbered by our presence.

⁶ Pierson, C., Klompenhouwer, M. and Nieuwland, J. 2008, Parking meters, need change?, *World Usability Day 2008, theme "Transportation"*, <http://www.userintelligence.com/ideas/publications/parking-meters-need-change>.

PILOT STUDY FINDINGS

As documented, we limited our study to credit/debit card users. Below we have listed the observed usability issues by the respective category.

(Note: Findings from this pilot study should not be viewed as 'preliminary' findings).

CATEGORY: HARDWARE, BUTTONS AND TASK FLOWS

Ease of use greatly depends on the placement and characteristics of the buttons and hardware. We set out to explore how well the two designs supported the primary credit/debit card payment flow.



FIGURE 1 FROM LEFT TO RIGHT, SCATTER DESIGN PURCHASE TASK FLOW AND HORIZONTAL DESIGN PURCHASE TASK FLOW

FINDINGS

Users were able to successfully complete payment, print their receipt, and pick up their receipt successfully. Card insertion errors, such as inserting card at the wrong time or multiple times, were the most common errors observed.

SCATTER DESIGN

- One user inserted their credit card five times before abandoning the task, getting back in line and subsequently completing the task successfully.

HORIZONTAL DESIGN

- One user re-inserted their more than card once.

CATEGORY: FEEDBACK TO THE USER

We set out to explore whether the parking pay stations and receipts effectively communicated parking cost and parking expiration time to users.

FINDINGS

Most participants were able to correctly report when their parking receipt expired as well as the amount they paid for parking.

SCATTER DESIGN

- All scatter design participants correctly identified when their parking expired.
- One scatter design participant could not effectively report how much they paid for parking.

HORIZONTAL DESIGN

- One horizontal design participant could not effectively state when their parking expired. This participant also pressed “max time”.
- All horizontal design participants effectively reported how much they paid for parking.

CATEGORY: PARKING RECEIPT DESIGN

We set out to explore whether users, given several sets of instructions on the placement of the parking receipt (appearing on the machine surface, the machine display, and the parking receipt itself), would be able to place the receipt on their vehicle correctly.

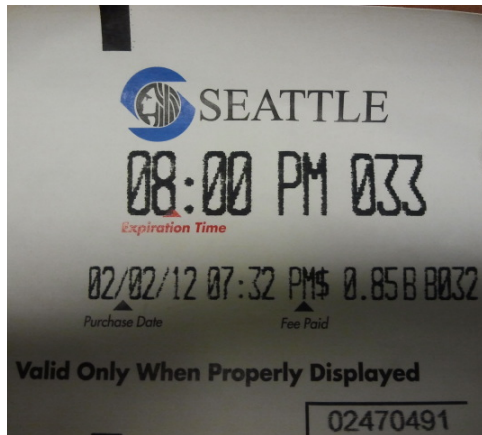


FIGURE 2 PARKING RECEIPT DESIGN

FINDINGS

Both parking meters employed the same parking sticker design, and therefore the findings below are applicable across both designs.

- All participants placed the receipt correctly.

Participants had differing views as to the efficacy of parking receipt instructions:

- One participant was unsure how to place the receipt effectively and referred to the instructions. The user rated the parking receipt instructions to be “very helpful” in figuring out how to properly display the receipt.
- The only first time user sampled initially placed the ticket on incorrectly on the driver side window. After seeing other drivers display tickets on curbside window, the user corrected the placement of the receipt. The user rated the receipt instructions as two (2) on a scale of 1 to 7 ranging from “Not Helpful” to “Very Helpful”.

CATEGORY: ERROR CORRECTION

We set out to explore whether users were able to recover from errors made in the purchasing task flow, whether they resorted to the cancel button, and why.

FINDINGS

Two users experienced errors; one user's error resulted in task failure (abandoning the task).

SCATTER DESIGN

- The scatter design participant, who experienced payment card errors, used the cancel button. This user inserted their card into the machine 5 times. Due to difficulties communicating between the observer and the interviewer, we were unable to capture qualitative feedback on why the user used "Cancel". We address this issue in Evaluation of Test Process section. The user was able to purchase the parking ticket after using cancel.

HORIZONTAL DESIGN

- One user re-inserted their more than card once.

CATEGORY: INSTRUCTIONS/WALK UP AND USE USABILITY

Our study explores whether users would be able to successfully use either of the parking pay station designs without turning to instructions. In cases when the user uses instructions, we explore whether or not instructions were helpful in aiding task completion.

FINDINGS

People refer to instructions to aid their task completion. Two users who self-report using the parking pay station weekly referred to the instructions.

SCATTER DESIGN

- The first time user rated both machine and receipt instructions poorly. This user also made a mistake in the placement of the parking receipt on her car after referring to the receipt instructions (See **Error! Reference source not found.**).
- One weekly user and one first time user referred to instructions because they had trouble adding time for parking.

HORIZONTAL DESIGN

- One user reported using the machine instructions, referring to the display prompts. This highlights that some users may expect the display prompts to provide the instructions needed for use.

Ratings	Machine Instructions	Sticker Instructions
Scatter Design	P1 = 5, P10 =3	P1 =7, P10 =2
Horizontal Design	P7 = 7	N/A

TABLE 3 HOW HELPFUL WERE THE INSTRUCTIONS? (1 = NOT HELPFUL, 7 = VERY HELPFUL); P10 IS A FIRST TIME USER

CATEGORY: OVERALL EXPERIENCE

Our study explores how satisfied parking pay station users are with their overall experience and whether this differs for the two designs. We also explore how confident parking pay stations users are that they will effectively avoid citation. We aim to surface what additional concerns users have regarding parking pay station use. In the full-scale study we will explore whether or not the overall experience rating differs according pay station expertise.

FINDINGS

- Overall people voiced concerns about the increments of the ‘add time’ intervals. Users self-reported that the increments were not big enough.
- One user volunteered that using the scatter button design was a pain, and that he preferred the horizontal button design.
- The first time user expressed concern about the integrity of the machine- she felt if ATMs can be compromised, than parking meters could as well.
- Users reported a higher perceived time on task for scatter design parking pay station, this matched actual time on task performance.
- This study requires more observations to measure variance between experienced users and less experienced parking pay station users.
- When asked about additional concerns regarding the user of the parking pay station, two users expressed concern over malfunctioning of the machine. One user was concerned about potentially being over charged, and another stated concern over receiving a citation in case of machine malfunction.

“I don’t have problems with this one. This one is a better design than the [scatter button design] downtown.”

SCATTER DESIGN

- We observed a median of 62 seconds time on task for the scatter design.
- The horizontal design pay station scored a median three on a scale of one to seven, in terms of whether the pay station use was faster (1) or slower (7) than expected.

HORIZONTAL DESIGN

- We observed a median of 37 seconds time on task for parking pay station use.
- The horizontal design pay station scored a median two on a scale of one to seven, in terms of whether the pay station use was faster (1) or slower (7) than expected.

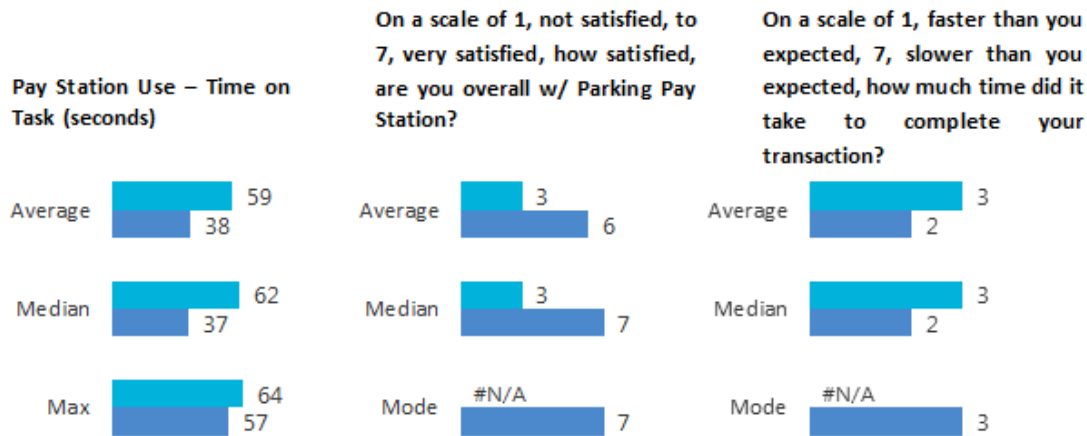


FIGURE 3 SCATTER BUTTON DESIGN LISTED IN LIGHT BLUE, HORIZONTAL DESIGN IN DARKER BLUE

EVALUATION OF TEST PROCESS

We evaluated our test process based on three main components: recruiting, unobtrusive observation, and debrief. We also give overall recommendations for scaling up the study and highlight additional concerns that should be considered for a larger study.

RECRUITING

What Worked

Recruiting participants on the street is feasible.

Obtaining written consent from participants is feasible.

Recommended Modifications

Monitor novice and less experienced user response rates.

Increase sample size to achieve statistically significant results for the population.

WHAT WORKED

Our recruitment strategy required team members to approach general members of the public. Initially, we were unsure of response rates and general public acceptance. By clearly displaying our University of Washington affiliation, we collected debriefings with high response rates (7 out of 9 observations agreed to participate in the debrief). We were also able to obtain written consent from all seven participants that initially agreed to a debriefing. We were surprised participants willingly provided written consent.

RECOMMENDED MODIFICATIONS

MONITOR NOVICE AND LESS EXPERIENCED USER RESPONSE RATES

In the full-scale study, we will need to ensure we recruit a participant group with more varied experience. Six of the seven participants debriefed self-reported that they use parking pay stations weekly. We expect a full-scale study will remedy this challenge.

We recommend study administrators monitor novice-user response rates, if response rates are low, administrators should seek out events and locations that might attract more infrequent pay station users.

INCREASE SAMPLE SIZE

During the full-scale study we recommend a larger sample size between 380 debriefs and 540 observations (assuming a 70% observation to debrief conversion rate).⁷ We recommend this large sample size to identify small differences in usability of the two machines. Because a high volume of drivers use the pay station every day, small usability differences could have monetary impact on city revenue.

We recommend study administrators plan for a large-scale study with 380 debriefs and 540 observations; if there is a clear difference in usability between the two machines, study administrators may terminate the study early.

UNOBTRUSIVE OBSERVATION

What Worked

*Discreet pay station actions are observable through unobtrusive observation.
A number of unobtrusive observation techniques proved valuable; however observing from a parked vehicle proved least conspicuous and most comfortable for the observer.*

Recommended Modifications

*Identify locations that afford lingering.
Develop a real-time communication system to transmit questions from observer to the interviewer.
Plan for inclement weather.*

WHAT WORKED

The scatter design site at Elliot Bay Books experienced high traffic, and up to eight spaces per parking meter, the location however employed parking pay stations that faced the street. Observation from the street was attempted but found too conspicuous, so we developed new techniques while maintaining the specified 30-45 degree angle that provided clear observation. We ultimately discovered we could obtain a parking space directly in front of the parking pay station by arriving before 8 am. The interior of the parked vehicle proved an optimal and comfortable location for inconspicuous observation. The interviewer remained close by on a park bench.

⁷ We recommend 380 debriefs and 540 observations, based on a 95% confidence interval and 5% margin of error to extrapolate for a population of 100,000. <http://www.surveysystem.com/sscalc.htm>

For parking pay stations that face inward from the street, the optimal location depends on the location. For our pilot study, we chose locations that provide seating or table arrangements. We found that a coffee table outside of Revolutions Espresso allowed team members to rotate and take turns observing and interviewing.

RECOMMENDED MODIFICATIONS

IDENTIFY LOCATIONS THAT AFFORD LINGERING

Some observation posts such as bike racks are difficult for more than one person to linger without attracting attention. In these instances, the interviewer usually found a spot close by to wait until the completion of the task before approaching the participant.

We recommend study administrators choose locations where a bench or a coffee table is nearby; users appeared to be less suspicious of people gathered at tables and benches nearby.

DEVELOP A REAL-TIME COMMUNICATION SYSTEM

To develop a complete picture of quantitative and qualitative usage data we followed up pay station user observation with a debriefing. Given the difficulty of finding good vantage points for the observer and interviewer, in addition to the risk in disturbing users by having more than one user actively observing their actions, the interviewer often did not have enough information to formulate probing questions.

For the full-scale study we recommend observers develop a quick and simple communication via text message or, when observer and interviewer are in close proximity, some other method, to identify areas for probing.

PLAN FOR INCLEMENT WEATHER

As with all outdoor activities, weather proved to be an uncontrollable factor in our parking pay station study. To account for this, we recommend flexibility in the test schedule so that dates and times may be moved for optimal conditions. Warmer weather has the dual benefit of more foot traffic and parking turnover as well as decreasing the conspicuousness of observers and interviewers sitting outside.

We recommended that the study is completed during spring and summer seasons when inclement weather is less likely to affect the study.

DEBRIEF

What Worked

Pay station users are willing to engage in a five minute debrief.

Recommended Modifications

Increase the length of the debriefing to capture additional qualitative information and to explore specific aspects of the parking pay station.

WHAT WORKED

Overall, the debrief structure proved to be successful for gathering usability information and engaging participants in the study. All seven debriefed participants were able to use the seven point Likert scale without issue. Additionally, open-ended questions gave users an opportunity to voice concerns. Although many of these concerns were unsolicited, it was revealing to hear users unfiltered reactions to parking pay stations.

We found that, although we were turned down twice due to time concerns (participants reported being in a hurry), the rejections occurred before the length of the study was mentioned. This leads us to believe that these same participants would have declined regardless of study length. For those that did participate, the length of questioning did not seem to be a burden as participants were patient and attentive throughout the debriefing.

RECOMMENDED MODIFICATIONS

INCREASE THE LENGTH OF THE DEBRIEFING

Given that the study length was not a concern for participants, we believe that the length of the debrief can be increased to include a few more questions that help us gather more qualitative measures such as more focused follow up to each Likert rating provided by the participant.

We recommend expanding the debriefing length and incorporating mandatory probing on key areas of concern. (Such as what is the first step of pay station use? Did you have to insert your card multiple times? etc.)

OVERALL RECOMMENDATIONS AND ADDITIONAL CONCERNS

Overall Recommendations

*Consider the logistic implications of a full-scale study.
Train observers and interviewers who will be conducting the full-scale study.*

Additional Concerns

Explore why some users bypass parking pay station use all together. For example, due to poor usability of parking pay station signs, due to expected usability challenges, or due to scofflaw behavior.

OVERALL RECOMMENDATIONS

We want to highlight that obtaining statistically significant results for a hypothetical population of 100,000 parking meter users does not have to be a prohibitively expensive task. Consider the sample logistics for such a population:

- One observer/interviewer pair per location
- One participant debrief per team every 15 minutes
- Two teams working simultaneously at multiple locations can observe and debrief approximately 320 parking pay station users over the course of 5 days

We discovered some minor issues with the observation data sheet and debrief materials that will be corrected before a larger study is conducted. These include:

- Adding a location field to the data observation and interviewer sheet
- Increasing font size and error collection target areas for easier data collection
- Adding participant number field to the debrief sheet

ADDITIONAL CONCERNS

As we mentioned previously, we noticed that many concerns did not pertain to the actual machine itself. We were also able to observe many people walking away from their vehicle with no intention to pay. We were unable to determine whether they were aware of the fee for parking. These concerns and potentially poor signage lead us to believe that a future usability study could include other factors, such as better signage to mark paid parking areas, and more assurance that parking pay station use is a fast and pain free experience.

CONCLUSION

Our pilot study verified our study design and identified additional opportunities for improvement. We know that the study design works; with only nine observed participants and seven interviews, we cannot extrapolate our findings to a larger population. We noticed a few areas, such as novice vs. experienced users, where our pilot study could not provide enough information, but where a full study would prove useful. We feel confident the foundations of this study are ready for a larger scale pilot to train pay station observers and finalize observable locations.

We also recommend study administrators coordinate with the City of Seattle to identify any usability data the city captures on the machines themselves, or observation equipment they might have on hand. Final recommendations would be useful to compare against City of Seattle statistics of horizontal vs. scatter button design success and abandonment rates.

APPENDIX A: THE TWO PARKING PAY STATION DESIGNS

Horizontal Button Design: Shares core parking pay station task flow as the scatter button design however, the horizontal button design aligns the buttons used for tasks a uniform horizontal arrangement (Figure 1). Horizontal and scatter button designs differ in their instruction placement and content but share the same parking receipt and parking receipt instructions.

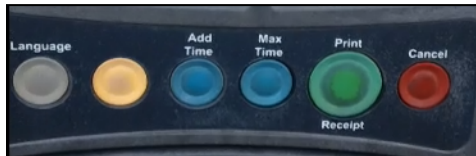


FIGURE 4: BEGIN BY INSERTING YOUR CARD, ADD TIME BY CLICKING THE BLUE 'ADD TIME' BUTTON, PROCESS PAYMENT BY HITTING THE PRINT BUTTON. THERE IS NO BUTTON TO DECREMENT TIME

Scatter Button Design: Shares core parking pay station task flow as the horizontal button design however, the scatter button design arranges buttons in grouped arrays distributed across the parking pay station (Figure 2). Horizontal and scatter button designs differ in their instruction placement and content but share the same parking receipt and parking receipt instructions.



FIGURE 5: BEGIN BY INSERTING YOUR CARD, ADD TIME BY CLICKING THE SMALL BLUE ADD TIME BUTTON, PROCESS PAYMENT BY HITTING THE LARGE PRINT BUTTON. THERE IS NO CANCEL BUTTON.

APPENDIX B: STUDY SITES

SCATTER BUTTON DESIGN - PARKING METER SITES

PRIMARY LOCATION

Dahlia
2030
Seattle, WA 98121

Bakery
5th

Site
Avenue

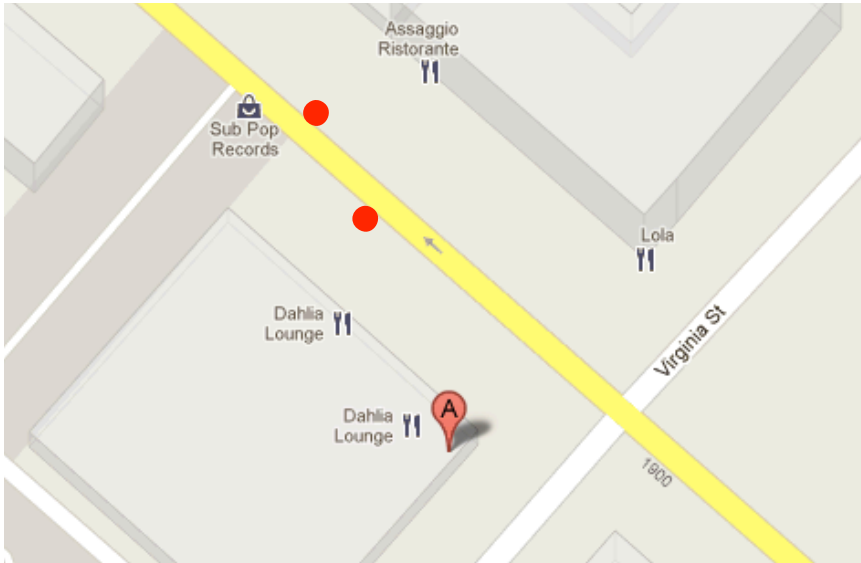


FIGURE 6: PARKING METER LOCATIONS ARE MARKED AS RED DOTS.

Restaurants on this side street allow an observer to idle in close vicinity to the parking meters without making parking meter users uncomfortable. Dahlia Bakery offers street-side tables that allow for unobtrusive observation of parking meter use.

SECONDARY/BACKUP LOCATION

The Elliot Bay Books Site
1521 Tenth Avenue
Seattle, WA 98122

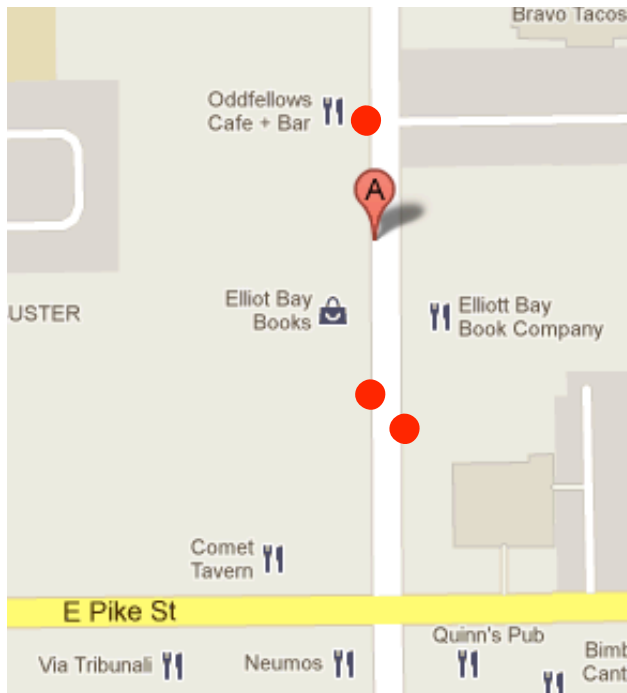


FIGURE 7: PARKING METER LOCATIONS ARE MARKED AS RED DOTS.

HORIZONTAL BUTTON DESIGN - PARKING METER SITES

PRIMARY LOCATION

Freemont PCC Side Street Site
608 North 35th Street
Seattle, WA 98103



FIGURE 8: PARKING METER LOCATIONS ARE MARKED AS RED DOTS.

Shops on this side street allow an observer to idle in close vicinity to the parking meters without making parking meter users uncomfortable. A café at the corner of N 35th and Fremont Pl N offers street-side tables that allow for unobtrusive observation of parking meter use.

Revolutions Espresso Green Lake Side Street Site
7012 Woodlawn Ave NE
Seattle, WA 98115

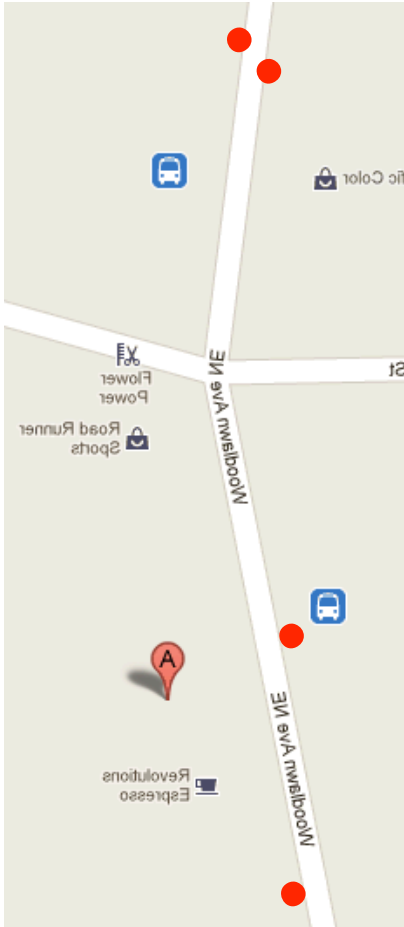


FIGURE 9: PARKING METER LOCATIONS ARE MARKED AS RED DOTS.

Revolutions Espresso Coffee shop has side-street tables that allow for unobtrusive observation of parking meter use.

APPENDIX C: PARTICIPANT DEMOGRAPHICS

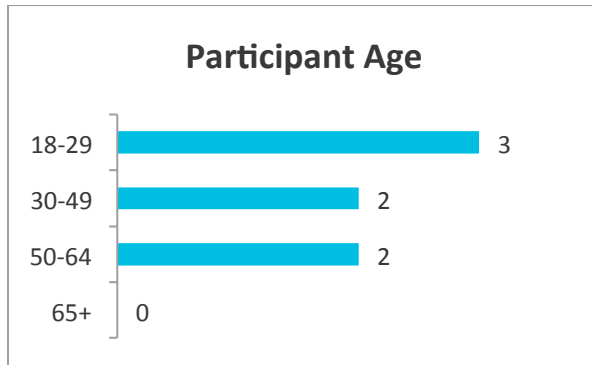


FIGURE 10 PARTICIPANT AGE

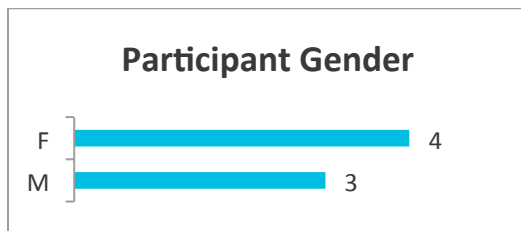


FIGURE 11 PARTICIPANT GENDER

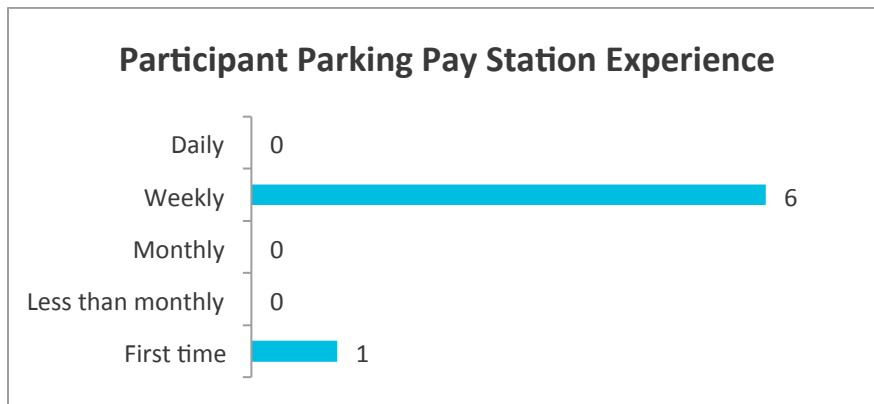


FIGURE 12 PARTICIPANT PARKING PAY STATION EXPERIENCE