

Usability of Mobile Map Applications

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Abstract

This investigation is motivated by the increasing significance of the usability of systems in today's competitive technology market. Usability testing and usability evaluations have become important tools in the assessment of user interfaces. This paper presents empirical mobile usability studies of two distinct map applications: Google Maps and Apple Maps. Participants of this investigation were asked to carry out three tasks with each mobile map application. The results of this examination include (a) the contextual factors studied; (b) quantitative data collected from each task; (c) a brief qualitative review of the applications from each participant; and (d) the core usability metrics measured. This paper not only presents the usability metrics collected by the study but also presents a heuristic evaluation of each map application.

Group Members: Katarina Klask, J.B. Morris, Alex Schneider, Khalid Seirafi, and Ronald Uy.

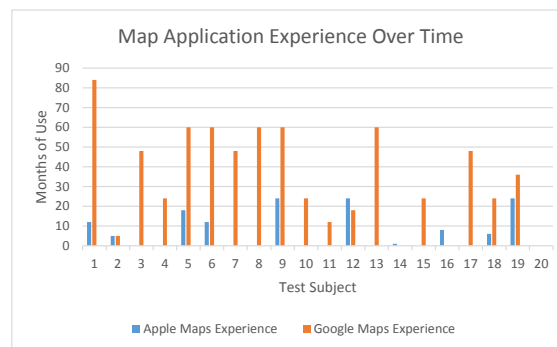
1 Introduction

When the Apple Maps mobile application was first released as part of iOS 6 in September 2012, it received a significant amount of negative feedback. Walt Mossberg of the *Wall Street Journal* was one of many who thought that Apple Maps was the biggest drawback of the iPhone 5.[2] At this time, the Google Maps mobile apps, on both iOS and Android, were used by roughly 81 million people.[3] However, Apple Maps grew, matured, and began gaining traction. By September 2013, Apple Maps gained 35 million regular users. The number of users of Google Maps dropped to around 58.7 million at this time.[3] Although the Apple Maps mobile app is newer than the Google Maps mobile app,¹ the two map applications are comparable with respect to features they provide as well as popularity nowadays.

Since both Google Maps apps and Apple Maps apps are widely known and used, it is important that the usability metrics of the two systems are examined. Thus, this study aims to empirically investigate the usability of each application. The current consensus within the field of interaction design is that usability depends on five distinct metrics: *learnability*, *efficiency*, *errors*, *memorability*, and *satisfaction*. [1] The three metrics on which this particular study focuses are efficiency, errors, and satisfaction.

2 Contextual Factors

Prior to having each test subject perform the tasks, a little contextual data about the users was first collected. Users were asked about their previous experience with Apple Maps as well as their previous experience with Google Maps.



¹The initial release of Google Maps for Mobile was in September of 2008.

The fact that nearly every test subject had significantly more Google Maps experience than Apple Maps experience was a challenge in the conducting of this study. Since this study aimed to test the usability metric of efficiency, and *not* that of learnability, we did not test subjects if they had no prior experience with the application. For future studies, however, it might be worthwhile to give inexperienced users a short tutorial so it is possible to test them thereafter.

3 The Experiment

Each person who participated in this study had to carry out three concrete tasks with the map application[s] with which they were experienced.

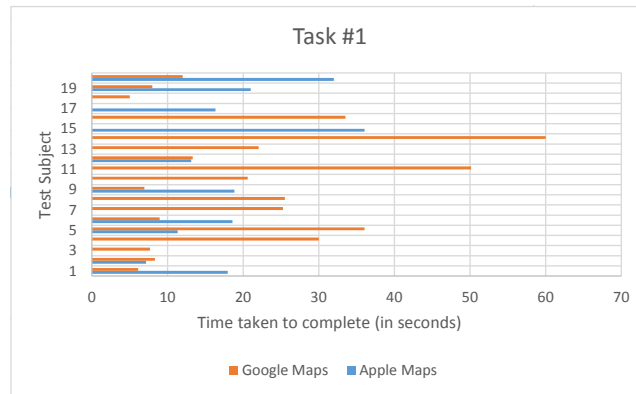
1. Save a pin anywhere on the map and get driving directions to that pin.
2. Find the location of the nearest Vons.
3. Find the fastest route from the current location to LACMA.

In order to keep the study as controlled as possible, all testing was done on iOS devices (no map applications of android devices were tested). As test subjects executed the tasks, information was collected pertaining to their efficiency, errors, and satisfaction.

4 Usability Metrics

4.1 Efficiency

First Task: Drop a pin on the map and get driving directions to that pin.



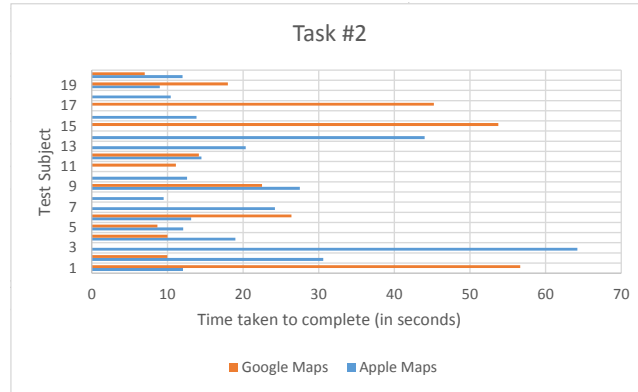
Average time for task #1 on Google Maps app: ≈ 21.08 seconds

Average time for task #1 on Apple Maps app: ≈ 19.24 seconds

This task's results suggest that users are more efficient using Apple Maps. ²

²Though subjects using Apple Maps were more efficient *on average*, it notable that there were a couple of anomalies within the Google Maps users who significantly raised the average.

Second Task: Find the location of the nearest Vons.

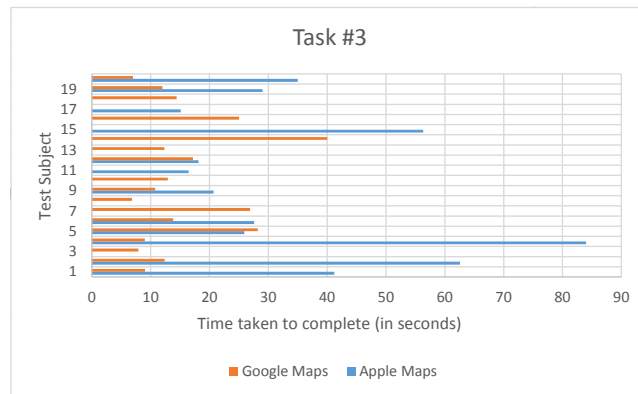


Average time for task #2 on Google Maps app: ≈ 20.53 seconds

Average time for task #2 on Apple Maps app: ≈ 23.62 seconds

This task's results suggest that users are more efficient using Google Maps.

Third Task: Find the fastest route from the current location to LACMA.



Average time for task #3 on Google Maps app: ≈ 15.62 seconds

Average time for task #3 on Apple Maps app: ≈ 35.98 seconds

This task's results suggest that users are more efficient using Google Maps.

4.2 Errors

The only errors collected by this study were incidents wherein the user did something whose result is not what he or she anticipated. The table on the following page shows you some examples of errors from this investigation.

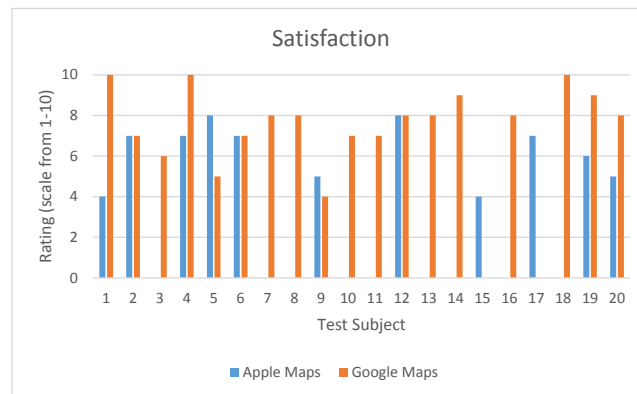
Task	Application	Specific Error
Task1	Apple Maps	hit 'Share' button to try to map to pin
Task1	Google Maps	hit 'Near You' button to try to drop pin
Task2	Apple Maps	tried to manually search for "Nearest Vons"
Task2	Google Maps	voice command attempt instead of search
Task3	Apple Maps	hit 'Current Location' for directions
Task3	Google Maps	found side streets when expecting highway route

The percentage of subjects with errors is analyzed rather than solely the numbers of errors since more subjects tested the Google Maps app than Apple Maps app.

	Task1	Task2	Task3
Percentage of Apple Users with Errors	40%	50%	20%
Percentage of Google Users with Errors	29.4%	17.6%	11.7%

The results suggest that Google Maps is more usable with respect to errors.

4.3 Satisfaction



Satisfaction ratings were on a scale from 1 to 10.

Average rating for Apple Maps: ≈ 6.18

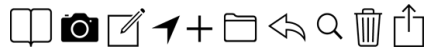
Average rating for Google Maps: ≈ 7.72

5 Heuristic Evaluation

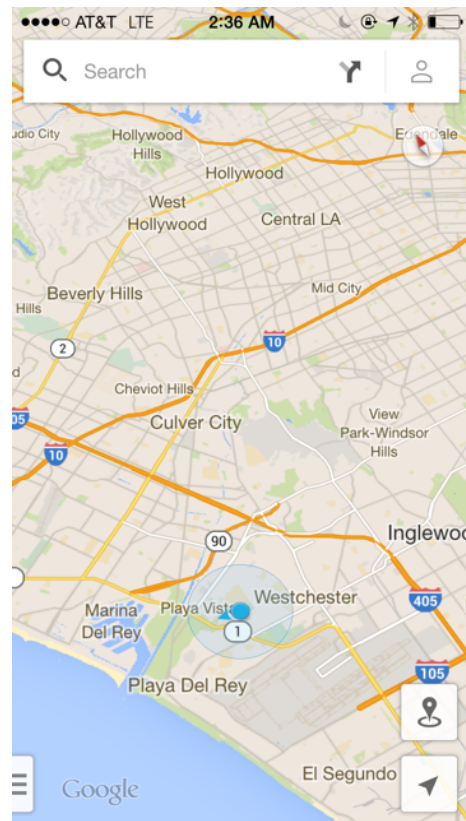
Though usability metrics are extremely important in assessing a system, it is also important to heuristically evaluate systems in order to explore *why* they performed the way they do. My heuristic evaluations of the mobile map applications will be based on the guidelines documents that correspond to the applications.

5.1 Google Maps

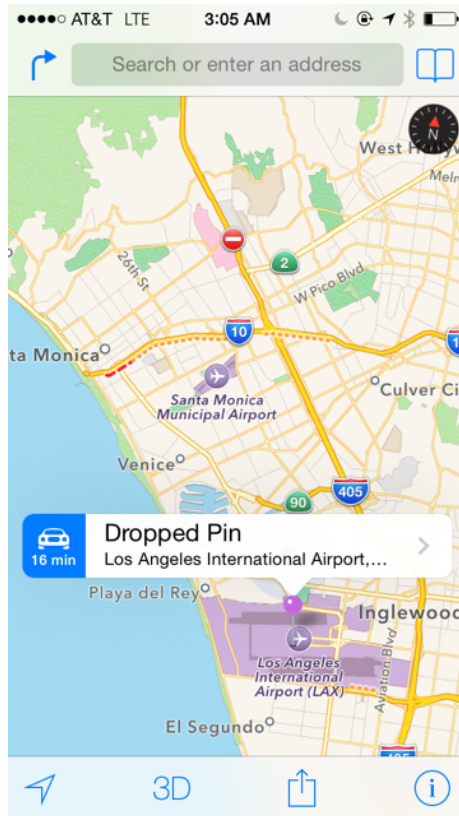
The icons of the Google Maps mobile application comply with the Google Design Guidelines[4]: simple, modern, and geometric in execution. However, Google Maps completely fails to use any standard iOS icons[5]:



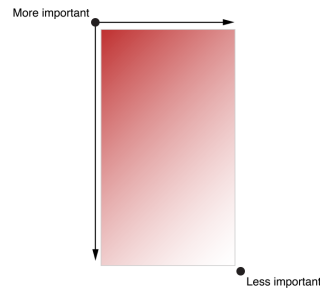
Though it is not required to use these provided iOS icons, the iOS HIG (Human Interface Guidelines) state that it is “a good idea to use the built-in icons as much as possible because users already know what they mean.”[5] Balancing consistency in platform with consistency of brand is a challenge, but there is a possibility that adhering more to the iOS HIG could improve usability of Google Maps even more. There was a higher percentage of errors specifically involving clicking wrong icons in the Google Maps application than there was in the Apple Maps application.



5.2 Apple Maps



One guideline from iOS HIG is that important content or functionality should be ‘elevated’:[5]



This suggests that the icon on the top left-hand corner, which takes you to the directions screen in this case, is the most important. I would have to agree that getting directions is very important functionality, so it seems as if the app is complying to the guidelines. However, a couple of test subjects tried to click on the icon second from the right on the bottom for directions. It is possible that this guideline of important functionality being ‘elevated’ is not intuitive to all users.

The lack of standard iOS icons in the Google Maps app may or may not explain some of the efficiency issues as well as some errors that occurred with the tasks on the mobile Google Maps app. The guideline of important functionality being towards the upper-left corner of the screen may or may not explain some of the efficiency issues as well as errors that occurred with the tasks on the mobile Apple Maps app.

6 Conclusion

The usability metrics of the Google Maps mobile application outranked those of the Apple Maps application in almost every way. Though there are some problems with the UI consistency, it does not seem to bother the users (refer back to satisfaction). Still, using non-standard icons or processes isn't without drawbacks. It's loud. It's authorial voice. It's greater cognitive load for users. Anything inconsistent, first or third party is. On an integrated platform like iOS, integrating with the platform offers a lot of benefits, especially when it comes to user experience.

If you use Google apps, either a lot or a little, does the lack of iOS-style buttons make any difference to you?

must recognize that there are limitations to our studies– didn't test all five metrics; less data for Apple maps; Apple maps is newer; etc. Judgment call – google maps with data that we have now.

References

- [1] Nielsen, Jakob, *Usability Engineering*, Boston: Academic, 1993.
- [2] Mossberg, Walt., “The iPhone Takes to the Big Screen,” *The Wall Street Journal*, September 2012.
- [3] “Analytics for a Digital World - ComScore, Inc.” *ComScore, Inc*, 2012.
- [4] *Material Design*, www.google.com/design/spec/material-design.
- [5] *iOS Human Interface Guidelines*, <https://developer.apple.com/>