PORTRAIT VERSUS LANDSCAPE

TASK AND HARDWARE DETERMINE USERS' MOBILE PHONE ORIENTATION BEHAVIOR

Jeffrey M. Quinn, Justin Eddings, & Tony Stewart
Sprint
jeff.m.quinn@sprint.com, justin.eddings@sprint.com, tony.a.stewart@sprint.com

Designers make certain assumptions when they create mobile phone applications. For example, they might assume that users will hold their phone in vertical/portrait orientation when using the app and, thus, will create visual elements that make use of the ample vertical space in portrait mode. It is possible that an app designed to be used in portrait mode might not function as well in landscape. Thus, a mismatch between the designer's expectations about user behavior and the user's actual behavior could result in a less-than-satisfying user experience.

There are few resources to guide designers in making decisions about which orientation users will likely adopt while performing a certain task. Published research studies that have investigated the ways that users hold their phones (e.g., Hoober, 2013; Karlson, Bederson, & Contreras-Vidal, 2007) have only addressed the question of whether phones are held with one versus two hands. Little is known about users' tendencies to hold their phones in portrait versus landscape orientation during performance of common phone tasks.

The present research represents an initial attempt to describe users' tendencies related to phone orientation. It summarizes the results of a survey in which mobile phone users reported on the orientation in which they typically hold their phone to perform several phone tasks. Results of this study offer designers some basic guidelines regarding user behavior with which they can make informed decisions about how best to create mobile applications.

METHOD

PARTICIPANTS & PROCEDURE

Participants were 541 Sprint customers (48% women, 52% men) who ranged in age from 17 to 75 (median = 36, M = 38.11, SD = 12.52). Each of these individuals completed an online survey in which they answered questions about their phone usage and relevant behaviors. All participants owned a smartphone (74% Android, 26% iOS). The majority of these phones (72%) had a bar form factor with only a virtual keyboard for data input. The remaining 28% of the phones had a slide out Qwerty keyboard in addition to an on-screen virtual keyboard for data input. Participants received a $5 credit on an upcoming monthly bill as compensation for completing the survey.

MEASURES

The survey contained a variety of questions about participants' phone usage. Most of these questions were not relevant to the present research and are not discussed further. The relevant section of

the survey began by describing *portrait* and *landscape* orientations (also described as upright and sideways, respectively) to ensure that the questions that followed were clear and understandable even for participants who previously were unfamiliar with such terminology. The survey also included pictures of a mobile phone in each orientation. Next, the survey instructed participants, "For each task listed below, please tell us whether you typically perform that task with your phone upright (portrait) or sideways (landscape)." Six tasks were listed. These were: dialing a phone number, browsing the internet, reading a message (e.g., a text message or email), writing a message (e.g., a text message or email), watching a video (e.g., on YouTube or Netflix), and using Facebook. For each task participants selected one of three responses to indicate that the orientation in which they perform the task is: (1) usually upright/portrait, (2) sometimes upright and sometimes sideways, or (3) usually sideways/landscape.

RESULTS

Table 1 shows the responses of the full sample of participants. In this initial look at the data, it is apparent that participants frequently hold their phones in portrait orientation. This was especially true for the task of dialing a phone number – 87% of participants reported that they usually did this in portrait mode. Portrait also was the most common response for reading and writing messages and using Facebook. For browsing the internet, participants were about equally likely to select *usually portrait* or *sometimes portrait, sometimes landscape*. Watching video was the only task for which the majority of participants reported that they usually used landscape orientation.

Task	Usually portrait	Sometimes portrait, sometimes landscape	Usually landscape
Dial phone number	**87%**	11%	2%
Read message	**63%**	29%	8%
Use Facebook	**60%**	31%	9%
Write message	**48%**	29%	23%
Browse internet	**43%**	**44%**	14%
Watch video	9%	27%	**64%**

Table 1. Phone orientation for six tasks.

It is important to keep in mind that the majority of our participants owned phones with a bar form factor and virtual keyboard and the overall results in Table 1 largely reflect the behavior of individuals with this type of phone. Plausibly, participants who use phones with a different design would report different behavioral tendencies. We examined this possibility next.

Table 2 shows the influence of hardware design on users' tendencies to hold their phones in portrait versus landscape. In short, these results show that the presence of the slide out Qwerty keyboard was associated with increased use of landscape orientation. The difference is most pronounced for the task of writing messages. The method of data input available on the device has an obvious influence on this area of user behavior. Whereas 60% of those who have only a virtual keyboard usually write messages in portrait orientation, only 16% of those who have a slide out Qwerty (plus a touchscreen-based virtual keyboard) reported that they typically write messages in portrait. Among the users with Qwerty keyboards, 53% usually write messages in landscape. This suggests that among participants who purchased a phone with both a slide out Qwerty keyboard and a virtual keyboard, more than half of these individuals primarily use the slide out Qwerty.

Results for three other tasks (read a message, use Facebook, and browse the internet) also showed that the presence of a slide out Qwerty keyboard was associated with greater use of landscape orientation. Compared to users with only a virtual keyboard, those with a Qwerty keyboard were less likely to report that they usually performed these tasks in portrait and were more likely to select *sometimes portrait, sometimes landscape* and *usually landscape*. Plausibly, landscape is used during these behaviors to facilitate typing. For example, a user with a slide out Qwerty might read a message (e.g., a text message) in landscape if she expects she will need to type a reply, or might use the internet browser in landscape if she plans to enter terms into a search field. Performance of the two remaining tasks was less dependent on the phone's form factor and input method. Regardless of phone design, most participants reported that they hold their phone in portrait to dial phone numbers and more than half reported that they hold their phone in landscape to watch video.

We performed one additional analysis to examine the impact of screen size on users' tendencies to hold their phones in portrait versus landscape. One of the phones used by participants in our sample

Task	Form factor/input	Usually portrait	Sometimes portrait, sometimes landscape	Usually landscape
Dial phone number	Virtual keyboard	**90%**	9%	1%
	Slide out Qwerty	**80%**	16%	4%
Read message	Virtual keyboard	**70%**	25%	5%
	Slide out Qwerty	**44%**	39%	17%
Use Facebook	Virtual keyboard	**68%**	27%	6%
	Slide out Qwerty	**39%**	**43%**	19%
Write message	Virtual keyboard	**60%**	28%	11%
	Slide out Qwerty	16%	31%	**53%**
Browse internet	Virtual keyboard	**47%**	**42%**	11%
	Slide out Qwerty	**30%**	**49%**	21%
Watch video	Virtual keyboard	9%	23%	**67%**
	Slide out Qwerty	9%	37%	**54%**

Table 2. Phone orientation by task and form factor/data input method.

had an especially large 5.5" screen (measured diagonally from corner to corner). We compared the responses of participants who owned this phone (n=116) with responses of participants who owned one of two similar phones with smaller 4.0" screens (n=213). All three of these phones had the same form factor (bar) and data input method (virtual keyboard only).

Results of this analysis appear in Table 3. For some tasks, results were essentially the same for users with large (5.5") versus smaller (4.0") screens. Specifically, both groups of users reported the same tendency to use portrait for dialing numbers and writing messages and to use landscape for watching video. For the other three tasks (read a message, use Facebook, and browse the internet), the two groups of users differed slightly in their responses. Both groups showed a preference for portrait mode when reading messages and using Facebook, however, this preference was stronger for the users with smaller screens than it was for those with larger screens. For example, 72% of users with smaller screens usually used Facebook in portrait, whereas only 58% of users with larger screens usually used Facebook in portrait. Users with larger screens displayed a greater tendency to select *sometimes portrait, sometimes landscape* than did users with smaller screens (34% versus 23%, respectively) and were slightly more likely to select *usually landscape* (9% versus 6%, respectively). For the task of browsing the

internet, users with larger screens again reported a weaker preference for portrait mode than did users with smaller screens. In fact, users with larger screens were about equally likely to select *usually portrait* (43%) and *sometimes portrait, sometimes landscape* (44%), whereas users with smaller screens were quite a bit more likely to select *usually portrait* (54%) than to select *sometimes portrait, sometimes landscape* (37%). Thus, it appears that the presence of a larger-than-average screen can encourage the use of landscape orientation, at least for certain tasks.

CONCLUSION

Knowledge of the ways that users are likely to hold their phones in specific situations can help designers make informed decisions about how best to create applications. The present research identified three factors that influenced the ways that users hold mobile phones. These factors were: the task being performed, the phone's form factor and data input methods available, and screen size. In some cases, phone orientation is largely determined by task alone. For instance, almost all users

Task	Form factor/input	Usually portrait	Sometimes portrait, sometimes landscape	Usually landscape
Dial phone number	5.5"	**89%**	11%	0%
	4.0"	**89%**	10%	1%
Read message	5.5"	**67%**	30%	6%
	4.0"	**75%**	21%	4%
Use Facebook	5.5"	**58%**	34%	9%
	4.0"	**72%**	23%	6%
Write message	5.5"	**60%**	28%	11%
	4.0"	**61%**	28%	11%
Browse internet	5.5"	**43%**	**44%**	13%
	4.0"	**54%**	37%	10%
Watch video	5.5"	11%	23%	**66%**
	4.0"	9%	25%	**66%**

Table 3. Phone orientation by task and screen size.

reported that they usually dial phone numbers in portrait orientation. With such consistency in user behavior, perhaps designers can feel confident that it is appropriate to adopt a "one size fits all" approach by creating an application optimized for portrait orientation for all devices. However, the present research showed that for other tasks user behavior was more varied. For tasks such as writing a message or browsing the internet, the use of portrait versus landscape orientation depended on the kind of device hardware available to the user. Both a slide out Qwerty keyboard and a very large screen were associated with increased use of landscape orientation. For such tasks, it is perhaps more challenging to use the "one size fits all" approach to design. Knowing that users with different devices likely will hold their phones in different ways while performing such tasks, the designer may have to make compromises to ensure that the application renders equally well for both the portrait and landscape experience.

REFERENCES

Hoober, S. (February 18, 2013) How Do Users Really Hold Mobile Devices? Retrieved from www.uxmatters.com/mt/archives/2013/02/how-do-users-really-hold-mobile-devices.php on May 2, 2013.

Karlson, A. K., Bederson, B. B., & Contreras-Vidal, J. L. (2007) Understanding One Handed Use of Mobile Devices, in *Handbook of Research on User Interface Design and Evaluation for Mobile Technology*, pp. 86-101, IGI Global.