

Quantitative Analysis

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Research Questions

The purpose of this study is to get at the heart of the user's experience in relation to smart home devices. To narrow the scope of this work, we focus specifically on Amazon Echo devices equipped with the Alexa voice assistant and survey participants who have used Alexa to voice-shop for items.

- RQ1: How has voice shopping with Alexa changed or otherwise affected users' shopping behaviors online or in person?
- RQ2: What factors affect Alexa users' decision to buy an item using voice shopping vs online or in person?
- RQ3: What advantages do in person or online shopping have over voice shopping? On the other hand, what advantages does voice shopping have over these traditional methods?
- RQ4: Are users' searching and purchasing needs sufficiently met by Alexa voice shopping? In what ways can it be improved?

Survey Questions

We created a survey on Qualtrics and distributed it via a shareable link to the iSchool insider mailing list as well as to our social (e.g., Facebook) and personal networks. The survey questions are reported as follows. The first two questions are not included, as they are screener questions intended to ensure that participants have used Alexa for voice shopping. We collected responses from a total of 37 participants, though only 11 of them passed both screening questions.

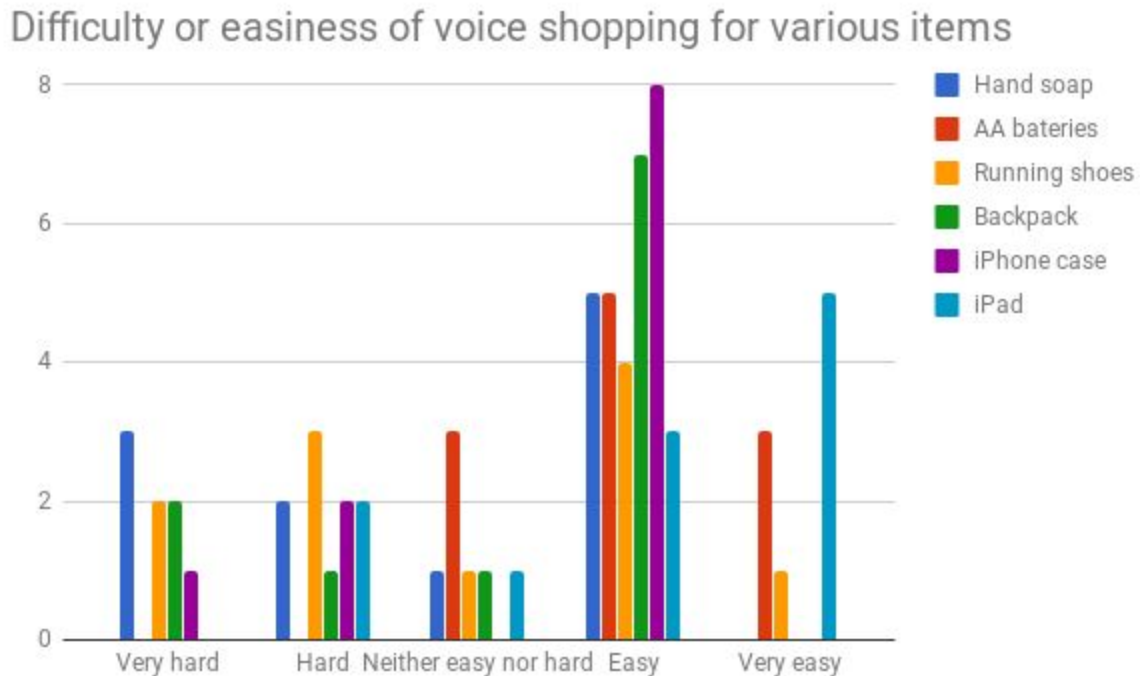
- **Q3. About how often do you voice-shop using Alexa? (multiple choice)**
 - A few times a year
 - A few times a month
 - A few times a week
 - Almost every day
- **Q4. How easy or difficult do you think it would be to order the following items using Alexa voice commands? (Likert scale; 1 being most difficult, 5 being easiest)**
 - Q4A. Hand soap of your choice (e.g., preferred brand, scent, etc.)
 - Q4B. AA batteries of your choice
 - Q4C. Running shoes of your choice
 - Q4D. A backpack of your choice
 - Q4E. An iPhone case of your choice

- Q4F. An iPad of your choice (i.e., model)
- **Q5. In general, which shopping method do you most prefer (1 being the most preferred, 3 being the least)? (ordered response)**
 - (1) In-person shopping, (2) On-line shopping, (3) Voice shopping
- **Q6. Why might you prefer in-person shopping over other methods? (free-form text)**
- **Q7. Why might you prefer online shopping over other methods? (free-form text)**
- **Q8. Why might you prefer voice-based shopping over other methods? (free-form text)**
- **Q9. How can Alexa be improved to better meet your voice-shopping needs? (free-form text)**
- **Q10. What is your age? (free-form text)**
- **Q11. Which best describes your ethnicity? (multiple choice)**
 - White
 - Black or African American
 - American Indian or Alaska Native
 - Asian
 - Native Hawaiian or Pacific Islander
 - Other
 - Prefer not to say
- **Q12. Which best describes your gender? (multiple choice)**
 - Male
 - Female
 - Other
 - Prefer not to say

Shopping Scenarios

In the questionnaire we polled Alexa users to examine how easy or difficult they felt it would be to order a variety of items (Q4), ranging from electronics to clothing accessories. The questions were presented using a Likert scale, with 1 being very difficult and 5 being very easy. Of the items we asked respondents about, batteries ($M = 4$, $SD = 0.77$) and an iPad ($M = 4$, $SD = 1.18$) were thought to be the easiest items to order using Alexa voice shopping. Additionally, hand soap ($M = 4$, $SD = 0.77$) was another item participants thought was easy to order. Conversely, running shoes ($M = 2.91$, $SD = 1.36$) and a backpack ($M = 3.18$, $SD = 1.25$) were thought to be the most difficult items to order using Alexa. The iPhone case ($M = 3.36$, $SD = 1.12$), was an item that was not difficult to order, but it also was not rated as easy to order as the batteries or the iPad. Overall, none of the items were thought to be extremely difficult to order using Alexa voice shopping, but there were a few that received noticeably lower scores. These results shed a bit of light on our second research question, which relates to factors that determine if a user buys an item using voice shopping. The items that were rated higher were items with a lot of substitutes where preference doesn't matter much. If we ignore brands, either Duracell or Energizer will satisfy my shopping needs if I want to purchase a pair of double A batteries. Additionally, items that were fairly specific were also rated highly. Ipad, for example, is a very specific item without many substitutes. Therefore, it should be simple to order it using Alexa

voice shopping. However, items that have many substitutes and relied heavily on preference (running shoes and backpack) were rated more difficult to order.



Comparison of Shopping Methods

In our survey, we presented open-ended questions that asked participants to share feedback indicating their preferences when using a traditional shopping method vs. using an Alexa-enabled device for voice shopping. The purpose of this was to examine what opportunities exist to improve how voice-enabled Alexa devices function when people interact with Alexa to shop/make purchases.

Among in-person shopping, online shopping, and voice shopping, we asked participants to rate their preferred method in order from most to least preferred (Q5). We found that most participants (7) preferred in-person shopping most followed by online shopping and lastly by voice shopping. (4) participants preferred online shopping most, then in-person shopping, and again lastly by voice shopping. In both cases, voice shopping was the least preferred method of all.

When asked to share **WHY** they might prefer in-person shopping over other methods (Q6), some of our participants responded with the following statements:

- “Simple. Quick. Don't have to wait on delivery.”
- “For knowing the material and knowing how something fits.”
- “Ability to get hands on. First hand experience.”

- “I prefer in-person shopping for clothing because you can try on the items and see how they fit. You can also feel the materials.”

Based on the feedback gathered from this question, we can infer that users/customers appreciate their ability to control their shopping-experience when shopping for clothing or other physical items like home appliances or furniture. Voice shopping provides an immediate and accessible opportunity to begin the shopping process, but cannot mirror the complete in-store shopping experience which often relies on touch and sight to inform a users' consideration/purchase process. In addition, an in-person/store experience gives users the desired option of avoiding a delivery process.

When asked **WHY** they would prefer online shopping over other methods (Q7), some of our participants responded with the following statements:

- “Online shopping provides more number of choices compared to other ways of shopping. Also, most of the times I read reviews before buying anything.”
- “Don't have to go in to a store with my kid asking to buy everything.”
- “The easy is delivery and having something I want from the comfort of being at home.”
- “Prices are better/competitive.”
- “Because it saves money.”

Based on the feedback gathered, we can infer that online shopping provides our survey respondents with an accessible, convenient, and efficient way of controlling their shopping experience. Some participants also mentioned how online shopping offers more options and allows them to compare the prices of other retailers. This parallels how shopping via an Alexa only gives users access to Amazon's retail catalog, limiting/constraining their options. Although Amazon prides itself on keeping their prices low to remain competitive with other big retailers, users still participate in price-checking and referencing to ensure they are getting the best offer.

When asked **WHY** they would prefer voice-shopping over other methods (Q8), some of our participants responded with the following statements:

- “When I know exactly what I want to buy, then it's fun to ask Alexa to buy it for me.”
- “You can multitask. I could be looking in the fridge and tell Alexa what I need.”
- “It's new and innovative”
- “When you have to reorder certain items. It's just that easy.”
- “Because it is fast.”

Based on collected feedback, we can infer that participants perceive voice-shopping and interacting with Alexa as a novel interaction because of how new the technology is. In addition, voice-shopping is a convenient/fast alternative to traditional shopping methods because it supports mobile usage, allowing users to execute complex command/intents right from the comfort of their home. With that said, the advantages of voice-shopping do not outweigh or

replace other traditional methods, but rather, act as an accessible/alternative method as ubiquitous computing becomes more prevalent.

Suggestion for Improvements and Usage Frequency

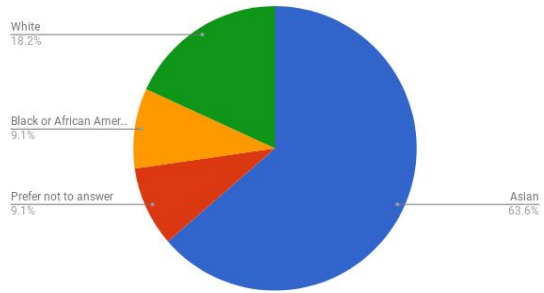
We asked participants to provide suggestions as to how Alexa could be improved (Q9). Responses reflected some common themes. First and foremost, participants wanted better natural language understanding, for example, for users whose first languages are not English, for more robust verbal search queries, and avoid repetitive questions. Many users also indicated a desire for visuals; while most Echo devices have only a speaker but not a screen, the Echo Show and the Amazon smartphone app allow users the additional luxury of visual interaction, suggesting that it may be preferable to design more devices with screens in the future. Lastly, some participants suggested providing more options and recommendations based on their own shopping patterns. This is implemented for online shopping systems and would further enrich voice shopping experiences.

We asked participants to indicate how often they voice shop with Alexa (Q3). No participants indicated that they voice shopped with Alexa more than a few times a month. Specifically, most participants (8) used Alexa voice shopping only a few times a year. Overall, this suggests that voice shopping is not a common task, likely due to the advantages posed by other shopping methods and disadvantages of voice shopping itself. We believe that as the technology powering Alexa continues to improve and more features are added, as suggested by our participants, voice shopping would additionally grow in use and popularity.

Demographics

We ask participants to report their age, ethnicity, and gender. Most of our participants were Asian (63.63%), followed by white (18.18%), and lastly black or African American (9.09%) (one participant declined to answer). Most of our participants were also male (63.63%) and the remainder were female (36.63%). We also found our participants to be from a younger crowd ($M = 25.72$, $SD = 5.25$). We note that these statistics are most likely not representative of the population that voice shops with Alexa. Firstly, our sample size is just too small. Though most people indicated in the screening questions that they have used Alexa, many have never voice shopped before and were thus disqualified from the survey. Secondly, we targeted participants from the iSchool and our personal and social networks. The majority of people from these groups are students and are thus younger. To obtain more accurate results, we should target a larger and more diverse pool of participants in the future.

Which best describes your ethnicity?



Which best describes your gender?

