Millennials, Amazon Alexa & the News: How and Why Millennials Use Smart Speakers

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Executive Summary

Smart Speakers are an emerging technology that remains largely under-researched. Particularly, millennials’ smart speaker use presents an interesting area of exploration because millennials are some of the fastest adopters of new technologies and are the largest consumer market in North America¹. In our report, we address this research gap and focus our exploration on age 18 to 25 millennials and their usage patterns of Amazon’s smart speaker device, the Echo Dot. We examine WHY they use the Alexa interface and certain services (Section 1), HOW millennials use the Echo Dot (Section 2), and WHAT features and content they prefer (Section 3). In order to fulfill our research objectives, the Audience Lab designed an innovative mixed-method within the Living Labs² approach: A method that prioritizes experimentation in a real world setting, highlights participants as co-creators, and most importantly involves an ideal mix of qualitative and quantitative data collection. This study combined a period of experience sampling, where participants completed a total of 800 short surveys in 20 days, with follow-up focus groups that gathered context and clarification about the quantitative data gathered during the survey period. Using this unique approach we discovered three overarching themes:

- Due to their self-proclaimed busy lives, millennials prefer short, simple, and easily accessible content that permits multi-tasking.
- Music is the #1 preferred Alexa skill³ genre of millennials, with a total of 30% of survey responses expressing a music skill as the most used within a 24-hour period.
- News matters to millennials, and they prefer to have the option to personalize what news they hear and when they hear it.

In addition to these discoveries, our background research has revealed that media consumption habits have changed drastically within a short period of time. Our research shows how quickly trends change, and how trend discovery (which is the foundational objective of this project) should be studied iteratively (e.g. annually) to understand both current trends and the rate of change of these trends. Ultimately, what we have seen is the emergence of generational habits being influenced by new technology and new cultural incentive. Secondly, we have also discovered that technology adoption and content consumption have become highly individualized, which means looking at an entire generation as one segment or demographic can challenge content creation strategies that may

¹ For more background information about the millennial demographic, please see the Wider Lens section, page 39.
² For more on the Living Labs method, please see pages 26-27.
³ For a full definition of what an Alexa skill is, please see the Wider Lens section, page 33.
have been successful in the past. Therefore, it is recommended to look deeper than these generational segments to sub-segments defined by other characteristics, in order to understand developing trends and behavioural patterns. Studies have to be repeated more often (in line with the accelerated development of technology) to predict what particular generational segments want as well as what different sub-segments form, how they form, and with what consumption characteristics. This study was conducted with 20 participants, over the course of 20 days. Due to the size of the study, it is important to note that while our findings are certainly indicative, they are not truly predictive nor representative of an entire generation. The Amazon Echo Dot and Alexa interface are very new to Canada, officially released to the Canadian public Q4 of 2017. Attitudes and preferences towards Alexa’s skills or their structure are apt to change, especially as users gain more experience with the Echo hardware and Alexa interface.

In the face of accelerated change in technology and adoption trends, it is important that the CBC has taken on the responsibility of discovering and understanding these trends. Additionally, the willingness to use a uniquely designed new method to study these trends speaks to the innovative characteristics of Canada’s national public broadcaster. Of particular importance to the CBC, this study has discovered that of all our participants, those who identified as CBC users listen to flash briefings (a type of Alexa skill that allows users to listen to short clips of content, including news broadcasts and other forms of content) more often than non-CBC users. Knowledge of this trend will allow the CBC to focus content creation strategies to keep developing their skills (specifically their news skill) to attract and maintain the interests of their audience members. Another noteworthy finding of this study was that the CBC brand is strong and well known by the millennial demographic. This initially became evident during our recruitment stage as there was a strong interest in participating in a study that was associated with the CBC. This finding became more evident at the end of the study, as many participants asked if they would be mentioned in CBC news content or featured by the CBC in any way due to their participation in the study. Participants were seemingly proud of their association with the research being done in for the CBC.

Based on all of our findings from both the study results and background research, the following recommendations have been developed:
RECOMMENDATIONS

- On-going trend discovery studies should be conducted annually to stay on top of accelerated rate of trend change (see page 6).

- Make use of ‘opinion leaders’ to aid new-skill promotion, to combat discovery rate drop-off seen after the first few days of use (see page 7).

- Create a CBC Canadian music skill to fill the gap in free access to music skills (see page 9).

- Give defined “local” and “global/international” news content options, allowing users to personalize the content and length featured in a CBC news skill (see page 10).

- Create skills that are short and organized, as millennials have a self-proclaimed lack of time to engage at length with skill content, or to figure out nested content skill structures (see page 11).

UPCOMING CONTENTS

The following report begins by reviewing overarching value propositions disclosed by our participants, along with subsequent recommendations in Chapter 1. Following that, Chapter 2 takes a closer look at how the Echo Dot and Alexa interface were adopted by our participants. We then go into Chapter 3, which takes an in-depth look at skill and content preference trends discovered during our study. Chapter 4 outlines the method developed by the Audience lab and used in this study. Our final chapter, Chapter 5, summarizes our background research and gives an overview of existing research conducted in the fields of smart speakers, voice assistants, and millennial adoption trends of these technologies.
Value Propositions & Recommendations

Value Proposition 1: Alexa Simplifies Existing Media Silos
Value Proposition 2: The Echo Dot Allows for More Efficient Use of Time
Value Proposition 3: The Echo Dot Allows for Efficient News Listening
Value Proposition 4: Alexa is Quickly Adopted into Existing Routines, to a Fault
Value Proposition 5: Millennials Love Music
For this study, we defined “value” as any benefit that the Echo Dot provides users, i.e. any aspect of the Alexa and Echo Dot ecosystem that makes the device wanted or needed among participants. These value propositions help to explain why and how the Echo Dot fits into our participants’ daily media diet and routine. Echo Dot use was measured from participants’ daily survey responses, and we further contextualized these usage patterns through focus groups to determine what exactly participants valued.

One significant theme across the board was that participants felt that they generally lacked time. Therefore, they valued any aspect of the Echo Dot that made tasks within their daily routine more efficient or convenient (i.e. quick internet searches for weather), or which allowed them to hear desirable content (i.e. news updates, music) while multitasking. Their biggest concerns with the Echo Dot involved a desire for convenience; many participants complained about the device’s software issues and showed disinterest in learning new skills and device functions after the first few days of adoption. They also voiced desires for more customizable, on-demand, and streamlined content and functionality from the Echo Dot, particularly as most participants did not have access to cable television (many of our participants had moved out of their childhood homes and had not subscribed to cable after moving) and looked to the Echo Dot as a substitute for news programming.

**Value Proposition 1:**

**ALEXA SIMPLIFIES EXISTING MEDIA CONTENT SILOS**

When asked to name radio stations they listened to, participants often confused news and information sources (such as CNN and TSN) for radio stations. It appeared as though they classified any talk-based audio content as radio. Therefore, to our participants (and perhaps millennials more broadly) there are two, possibly three, categories of audio content: music, talking (which includes news, sports, etc.), and podcasts (although focus group participants differed in opinion as to whether or not podcasts constituted their own category of audio content or not). The confusion about what audio content qualified as radio content and what did not is in part due to the fact that Alexa does not categorize audio content in such a way. As the Echo Dot is a smart speaker without a screen, it solely plays audio content. When one browses the skills section on the Alexa mobile app or Alexa.Amazon.ca, all skills (which are all audio-based) are categorized by the genre of content they provide to the user. Therefore, skills developed by The Globe and Mail (a Canadian daily newspaper) are seen as being in the same category as NPR (an American public radio station), or the CBC. All of these skills are

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4 For more about our method, please see the Methods section, page 25.
categorized as news content. By categorizing content by genre rather than medium, the Alexa interface follows current trends of technological convergence\footnote{Henry Jenkins defines media convergence as having two aspects, where media content is shaped by technological innovations and also by increasing concentration of mainstream media ownership \cite{33}. This report sees the Amazon Echo/Alexa as a technological innovation that contributes to media convergence.} \cite{33}.

**RECOMMENDATION 1:**
**STUDY THE RECEPTION OF MEDIA PRODUCTS**

Millennials’ inability to accurately define types of audio content points towards new cognitive conceptions, or at least changes in existing definitions of audio content. Lines that previously defined media outlets are now blurred in both how content is offered, and how it is understood by users. These new cognitive conceptions call for a different approach to understanding generational segments and sub-segments, and ultimately how personas that represent these segments and sub-segments are developed. Our recommendation is to continue studying how people perceive and respond to different audio products, as well as other media products. Adopting a continuous study approach, where trend discovery studies are conducted annually, will help the CBC to stay on top of what is clearly an accelerated rate of changing trends.

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**Value Proposition 2:**
**THE ECHO DOT ALLOWS FOR MORE EFFICIENT USE OF TIME**

This study found that millennials have a self-proclaimed lack of time, which affected their preferences and usage patterns of the Echo Dot. This feeling of lacking time is echoed in existing research that labels millennials as having little patience for long or slow experiences, and having a strong ability to multitask \cite{34}. In our study, survey data showed many participants were multitasking \textit{76\% of the time}\footnote{For more information, please see Table 1 in Appendix A.} while listening to their Echo Dot. Additionally, participants preferred short interactions and content, with \textit{80\% of all interactions with the Echo Dots lasting 5 minutes or less}\footnote{For more information, please see Table 2 in Appendix A.}. Multitasking often involved listening to a news briefing while performing household tasks like cleaning and cooking. Both multitasking and quick internet searches also frequently came up when participants discussed their morning routine, which was when participants used their Echo Dots most. Popular uses, listed in Figure 1 below, included quick and daily tasks like checking the weather or time, setting an alarm, or adjusting smart lights (home control). These small tasks were more efficient with a voice assistant than typical manual modes, such as...
actually setting an alarm on a clock or phone, or manual web searching.

Figure 1. Skills most used for less than 1 minute periods.

RECOMMENDATION 2:
KEEP IT SIMPLE

Due to their lack of time, millennials expect content to be readily available to them as they cannot offer a lot of time to engage with content. As a result, they did not spend a lot of time searching for new skills or discovering nested content within skills. In light of this, we recommend short, one-level skills. Skills that are well structured in a simple manner make content easier to discover, whereas too much depth of content embedded within skills is difficult for millennials to navigate. Ultimately, if it takes too much time for millennials to discover content, they will give up.

Value Proposition 3:
THE ECHO DOT ALLOWS FOR EFFICIENT NEWS LISTENING

The “morning routine” (i.e. before work or school) was the most popular time for listening to news briefings. As one participant stated, “I’m like ‘oh okay, that’s what’s happening today’… opposed to like, I would never like go on… the news… unless I actually have time- which I never do. So it was… kind of convenient in a way, that was one thing I liked about [Alexa].” Many other participants echoed this interest in using the Echo Dot to streamline access to the news given their lack of time. Flash briefings were popular with most participants, with some discussing that they in fact prefer audio news (via the Echo Dot) to television because it is allowed for multitasking. For example, one participant mentioned, “what I like most about Alexa is the fact that I can do stuff just by listening.” They went on to discuss that television, on the other hand, invites more sitting and focused watching. This fits into the larger narrative among participants about their lack of time; almost all participants associated convenience and multitasking with the value of the Echo Dot. Their uses reflected this desire for quick and convenient solutions to daily needs and tasks.
Additionally, all participants expressed a desire to be informed by the news, because most of them had limited or no access to cable television (e.g. only had cable at their parents’ house, or only had very basic cable packages). As a result, they tended to look to the Echo Dot as a substitute for news and information. During the focus groups one participant mentioned, “because I don’t have cable… it’s kind of weird to like, not know what’s going on,” while another participant noted that the flash briefings made them feel “more present in the world.”

When it came to skill improvements, participants primarily expressed a desire for personalized and on-demand content. Some preferred local news, while others preferred global news, but consistently stated that news was important to them. When asked to describe their “ideal skill” during an exercise in the focus groups, the number one content chosen was “in-depth news” (see Figure 2 below). They prefer short content, but also want the option to choose news content that interests them and to hear more about it. Specifically, some users complained about the inability to skip certain stories within a flash briefing skill. Others suggested a skill that could read out a ‘menu’ of headlines that they could then select a story from to hear more about. Participants expressed a desire for specific content related to personal interests, such as certain news content or sports teams. Additionally, these participants enjoyed having the ability to organize the order of their news briefings.

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*Figure 2. Top categories participants listed when asked to “build their own skill.”

*Note: Many participants had a skewed understanding of what Lifestyle content is: some likened the category to content about everyday things such as weather, while others simply categorized it as “what vloggers do.”*
desire for customizable content and menus also came up in discussions about cable cutting, again pointing to the Echo Dot as a substitute for cable television content, and particularly news content from cable television.

RECOMMENDATION 3: INNOVATE THE NEWS SKILL

Despite millennials being sometimes stereotyped as social media and entertainment obsessed, political-based news are important to them. Preference between “local” and “global/international” news varied, but participants consistently stated that they wanted more choice and control over what news they heard, and less general overarching content. They prefer shorter content, but want to have the option to ask for more information on topics that interest them. Because news matters to millennials, we recommend giving them a news skill that is highly interactive, and allows users to ask for more information about certain headlines, while being able to skip through others. Additionally a news skill that can be personalized to highlight “local” or “global/international” news options, or industry specific news would give millennials the option to customize their news to their preferences.

Value Proposition 4: ALEXA IS QUICKLY ADOPTED INTO EXISTING ROUTINES, TO A FAULT

Many participants noted how using the Echo Dot became incorporated in their daily, specifically morning, routines. This is an extremely important finding of this study, as it shows how open our participants were not only to trying out a new technology, but also how seamlessly use of this new technology fits into their daily lives. This quick adoption into daily routines has a downside, however, as participants noted that if they did not learn a skill in the first few days of use they would not routinely use it. This may be why some participants stopped using the Echo Dot altogether or forgot that they had it; if the device did not become a part of their routine during the first few days of use they forgot about it.

![Figure 3. Total number of new skills used within a 24-hour period, over time](image)

For all remaining graphs in this report that compare responses to surveys over time (Phase 1, Phase 2, Phase 3, Phase 4) it should be noted that there was not an equal amount of time between each survey that asked about a particular topic. Surveys were
Participants also seemingly gave up on searching for new skills within the first week of use (as is demonstrated in Figure 3 above). Additionally, some participants had difficulties finding skills and voiced a desire for specific content already available on the Alexa interface. For example, one participant mentioned that they wanted to hear more about the Raptors when looking up sport news on ESPN or The Score, but never discovered the Raptors’ specific flash briefing skill. Others complained that they could not skip flash briefing skills, but never looked up a function for skipping these. These experiences reflect a lack of time and patience for exploring new skills after the initial adoption period of the Echo Dot.

RECOMMENDATION 4: ENCOURAGE DISCOVERY VIA OPINION LEADERS

During our focus groups (after the study period was done), there was an overwhelming sentiment from participants that they felt they should go home and check out more new skills. Participants were inspired by the skills discovered by their peers. Word of mouth and opinion leaders\(^9\) could be a major way to get the word out to friends (as over 50% of participants used their Echo Dots in group settings) and family (as many participants noted being heralded as the “tech advisor” for their parents). Our recommendation is to find a way to best inform these opinion leaders about CBC skills (the content they host and how to use them) in a forum such as a design jam or MROC (Market Research Online Community).

Value Proposition 5: MILLENNIALS LOVE MUSIC

Our research found that music was the top preferred skill (see Figure 4 below). Participants listened to music on their Echo Dot devices through various different sources such as Spotify, Apple Music (through a Bluetooth connection from their phones), Amazon Prime Music, etc. However, not all music sources were freely available to listen to on the Echo Dot which was a drawback for some. Additionally, Amazon Prime Music was not well received as it was described as not having “current” music options. In order to play the music on their phones, participants discussed how they had to hook their phones up to the Echo Dot via Bluetooth, as they could not access their music libraries directly through the device. This was an additional step that was seen as frustrating to some.

\(^9\) The term opinion leader comes from the work of Katz and Lazarsfeld, and can be defined simply as “the individuals who are likely to influence other persons in their immediate environment” [37]. We have loosely adopted the term opinion leaders, and have suggested that within groups of friends, family, or other contacts, some individuals act as opinion leaders who hold the potential to influence those around them to discover new Alexa skills.
**RECOMMENDATION 5:**
**CREATE A CANADIAN MUSIC SKILL**

We recommend creating a music specific skill that users can access directly on the Echo Dot. A music skill that is separate from streamed radio music will allow users to directly access on-demand music without the added step of attaching their phones via Bluetooth, or having to pay for premium versions of music subscription services. Specifically, due to CBC’s position as a public broadcaster, a Canadian music specific skill could be an interesting way to expose users to more Canadian content or to reinforce their love of popular, independent, or up-and-coming Canadian artists (e.g. Drake, Born Ruffians, Jessie Reyez). This would strengthen Canadian cultural awareness while supporting the discoverability and success of Canadian artists.

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*Figure 4. Top 10 most used skills*
Adoption & Appropriation
Adoption and appropriation of Amazon’s Alexa: How do users adopt and use the Echo Dots and Alexa Interface?

The Echo Dot, a hockey puck-shaped smart speaker, is the smallest device in the Echo smart speaker family. The Echo Dot, along with the rest of the Amazon Echo smart speaker line, acts as an access point to the Alexa voice assistant, which is Amazon’s conversational user interface\(^{10}\). Adoption trends of the Echo Dot (hardware) mainly were discovered during our study’s focus groups, while adoption trends of the Alexa voice assistant (software) mainly were discovered in the data collected from the daily short surveys. Overall, the Amazon Echo ecosystem was adopted into participants’ daily lives, with the Echo Dot blending into participants’ kitchens or bedrooms, and with Alexa becoming an integral part of morning routines.

HARDWARE

Because the Echo Dot needs to be plugged in to a wall outlet in order to work, some participants found that it was not as portable as they wanted. For example, one participant stated: “I didn’t know that it had to be plugged in, so I unplugged her and I talked to her and was like ‘why isn’t she listening’ until I realized she’s not plugged in, like I didn’t even think that had to be a thing.” However, some participants noted that the small size of the Echo Dot made it portable. “It’s a really small size and I was able to move it very easily from my room to my kitchen if I wanted to.” Many participants kept the Echo Dot in their room (especially if they lived with roommates who may have had reservations about the technology) or in their kitchen or living room. However, there were some instances where the Echo Dot was moved around, such as when “playing music on a bed” (in this case a participant noted that the Echo Dot speaker did not work so well on soft surfaces such as bedding) or when it was “stolen” by a sibling.

USE IN GROUP SETTINGS

Siblings were not the only people, other than our participants, to interact with the Echo Dot. As university students living on or near campus, some participants brought the device “home” to their parents’ houses on weekends to “see what [their] parents would do with it.” Additionally, over 50% of participants noted that they used it with friends, to show off and test out the voice assistant technology, play games, or change music at parties.

However, not everyone that engaged with our participants’ Echo Dots were impressed. In particular, some roommates

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\(^{10}\) For more information on Conversational User Interface, please see page 34.
refused to have the Echo Dot setup in common areas, stating “you’re bringing in this technology and it’s gonna kill us.” In another instance, siblings and parents of one of our participants asked “why are you adopting this thing,” and made it clear that they would not be “talking” to Alexa.

INTERACTIONS & DISCOVERY

Vocal interactions with Alexa can occur through an Echo device (such as the Echo Dot smart speaker) or through the Alexa application (i.e. mobile app) where users can tap a button in the app to talk to Alexa from their cell phone, just as they would through the Echo Dot. While vocally interacting with the Alexa voice assistant can be done through the Echo Dot and on the Alexa app on their smartphones, 100% of our participants vocally interacted with Alexa through a smart speaker Echo device (Echo Dot or Echo Plus). Participants were also given the option to select “Alexa app,” however none reported that they typically talked to Alexa via the Alexa App.

The Alexa App is an access point where users can vocally talk to the Alexa voice assistant. The Alexa App can also visually show users a list of all available Alexa skills, which allows users to discover and enable skills for Alexa to “do.” Even though participants did not “talk” to Alexa (interact with her voice assistant capabilities) through the Alexa App, they did use the app to discover new skills, as can be seen in Figure 5. During our focus groups, one participant noted that they also used the app to adjust alarms, while another noted they used the app to view the shopping list they created while using the Echo Dot. In summary, the Alexa app was used by our participants manually (i.e. with their fingers) to discover skills and adjust settings, rather than vocally interact with the Alexa voice assistant.

Instances of discovering new skills decreased over the course of the study period. This trend was also seen in the number of new skills used over time mentioned in above sections, and interactions over time (Figure 6 below). Although the total interactions with Alexa did decrease over time, our survey data noted that participants still interacted with Alexa between 1 and 2 times per day, when averaged across all of our participants.
Figure 6. Average interactions with Alexa within a 24 hour time period

Note: For the purposes of this study, we defined “interactions” as follows: An INTERACTION starts when you ask Alexa a question (for example, when you ask Alexa about the weather, or when you ask Alexa to play the radio). The INTERACTION ends as soon as the voice stops (for example, when Alexa finishes telling you about the weather, or when you ask Alexa to stop playing the radio). An INTERACTION can also include when Alexa says “Sorry, I don’t understand.”

ROUTINE USE

While including skill discovery in daily routines was reportedly difficult for some participants, it is an extremely important finding of this study that many noted how using the Echo Dot became incorporated in their daily, specifically morning, routines. This finding shows how quickly our participants adopted the smart speaker and voice assistant technology into their daily lives, and how open they were to adding new technology to their daily routines, especially when these new technologies allow for more efficiency. The most popular response to the questions “what were you doing while listening to [your most used skill] on your Echo Dot” or “what were you doing while listening to the radio on your Echo Dot” was “Getting Ready,” (see Figure 7 below). One participant mentioned that they use their Echo Dot “right before [they] go to work, so usually [they would] ask for the flash briefing to get an idea of what was going on in the news, sometimes... for the weather.” Another participant noted that they “used it at the exact same times, before going to work or before going to school, or while cleaning.”

One participant explained how their decrease in skill discovery was because searching for new skills was not built into their daily routine. “For the first two days maybe I looked up skills, and then after that I didn’t. Which - now I'm realizing there were so many more things I could have done... that's just typical me like I do two days - I look at it like 'oh it's all great' and then I kinda forget about it if it's not included in my daily routine.”

Another participant noted that while they discovered new skills, in particular games, they found it difficult to remember that the games were there and forgot to play. There were also instances where participants forgot to use the Echo Dot altogether.

MULTITASKING

The top three reported activities that participants took part in while engaging with their Echo Dot were “Getting Ready,” “Housework” (cooking and/or cleaning) and various forms of “Relaxing” (which include but
are not limited to lying in bed, “chillin’” or sitting on the couch). Participants generally agreed that engaging with Alexa through the Echo Dot allowed them to do things “hands-free,” with some even saying it was easier to engage with Alexa wirelessly than using a [smart]phone - “Like I’d use her a lot when I was cooking or … cleaning or something, and it was just so easy to ask her cool things while listening, while doing something at the same time… I mean, I’m not that technology savvy, so I would like, put my phone away, you know? It wouldn’t be so annoying. I could clean, and it’s just so much easier to do it wirelessly.”

A full breakdown of the top 10 activities participants reported doing while engaging with their Echo Dot is available below in Figure 7 (a breakdown of all activities is available in Appendix A, Figure A1).

**CBC & FLASH BRIEFINGS**

According to focus group discussions, the most routinely used skills are flash briefings. Participants added an average of one to two skills to their flash briefing in total over the course of the study. Of the 20 Echo Dots that were given out to participants, 16 were bought in Canada and came with the “CBC News Hourly Updates” flash briefing skill as the default flash briefing skill. Figure 8 shows the average number of times participants listened to their flash briefing (either the CBC flash briefing specifically, or just their flash briefing in general) within a 24-hour period, over the course of the study. While there is not a clear trend that indicates participants use the CBC flash briefing skill more or less than other flash briefing skills, there is a minor trend that shows a decrease in flash briefing use overall. This could be explained by the discovery phase only occurring during the early days of having a new technology, which then decreases and becomes more routine.

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11 The other 4 Echo Dot devices were American and thus did not have the CBC News hourly updates as the default flash briefing.
Figure 8. Average number of times participants listened to a flash briefing, either in general, or the CBC News Hourly Updates flash briefing skill specifically, within a 24-hour time period.

Note: Participants were asked about number of times they listened to a flash briefing in general, and the number of times they listened to the CBC News Hourly Updates flash briefing skill on different days of each survey cycle.

A more interesting breakdown of participants' engagement with flash briefings can be seen in Figure 9 (below). This graph separates out participants based on their self-reported engagement level with CBC content, which was disclosed at the beginning of the study. It is interesting to note that (pre-study determined) daily CBC users are more likely to listen to their flash briefings multiple times within a 24-hour period.

Figure 9. Average number of times participants listened to a flash briefing (both in general, and the CBC News Hourly Updates flash briefing) within a 24-hour period.

Other CBC content available on the Alexa platform includes a CBC Skill and CBC Radio (accessible via the CBC Skill and through other radio skills such as TuneIn Radio). Of the 20 participants in our study, 16 listened to CBC Radio on their Echo Dot at least once over the course of the study. Figure 10 outlines how how these CBC Radio listeners accessed CBC Radio on their Echo Dot.
Figure 10. How CBC Radio listeners access CBC Radio through their echo dot.

*Note: One respondent who answered “Other” clarified their answer by stating they listened to CBC Radio through the flash briefing. This demonstrates our findings (to be explained further in the Preference Findings section below) that millennials may have a skewed understanding of what “radio” is.
Feature & Content Preferences
Feature and content preferences:
What features and content do users prefer and want?

User preferences refer to the Amazon skills and Echo Dot features that users desire. Naturally, preferences will vary based on the individual, however certain trends appeared throughout the study. Primarily, respondents preferred short skills/content that permitted multitasking – specifically skills/content under 5 minutes. The top preferred skills were music, weather and news; with music usage increasing throughout while other skill usage decreased. Radio, however, was often confused with other audio content and was not a desired skill. Participants also reported using their Echo Dot devices for home control functions, such as controlling lights. Although preferences varied, respondents consistently reported wanting more agency over the content they listen to.

LENGTH OF INTERACTIONS

Generally there was not a big distinction between short and long interactions to users. Participants were asked separately about the skills they used during their longest and shortest interactions with Alexa. Survey responses indicated, however, that certain skills were used more than others, regardless of length of time spent engaging with the Echo Dot. As can be seen in Figure 11, most preferred interactions were short\textsuperscript{12}. Therefore, unless it was for music, preference was for skills that gave shorter lengths of content. More specifically, skills under 5 minutes were the preferred length as most responses to our surveys indicated that both longest and shortest interactions were largely under 5 minutes.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure11.png}
\caption{Total responses of top 6 skills engaged with at different lengths of time.}
\end{figure}

As there was not much difference between long and short interactions, user satisfaction (see Figure 12) levels were similar for both. The similar levels of satisfaction is indicative of the reported preferred length of interactions/skills,

\textsuperscript{12} For a full breakdown of which skills were used for different lengths of time, please see Appendix A, Figure A2.
that was generally the same for short and long interactions.

**Short Interactions**

- Very Satisfied: 19%
- Satisfied: 56%
- Neutral: 10%
- Dissatisfied: 1%
- Very Dissatisfied: 1%
- N/A: 1%

**Long Interactions**

- Very Satisfied: 14%
- Satisfied: 31%
- Neutral: 14%
- Dissatisfied: 1%
- Very Dissatisfied: 1%
- N/A: 8%

*Figure 12. Satisfaction levels for both short and long interactions.*

This suggests that the preferred length of interactions/skills was short (under 5 minutes), and users were generally satisfied with these interactions. This fits with research suggesting that millennials have short attention spans.

**RADIO**

Generally, participants do not prefer to listen to radio content and have difficulties distinguishing what constitutes a radio program. Although the top radio stations listened to (other than CBC) were Chum FM, Indie 88, KX96 and Pride FM (to name a few), participants also listed other non-legacy radio sources such as CNN, TSN, CTV and New York Times as “radio stations”. In fact, 50.8% of sources that participants listed when asked what radio stations they listened to were non-legacy radio sources (CNN, TSN, etc.), while 49.2% of sources listed would qualify as legacy radio stations (Chum FM, Indie 88). This suggests that perhaps they categorize “radio” as any audio content that presents them with information and news. It appears that the distinction was not clear for them given that all Alexa content is audio.

Participants who pre-reported (in the demographic survey) that they were CBC users had the highest responses of radio use (see Figure 13). Furthermore, when listening to radio for 1-10 minutes, these participants preferred CBC radio over “other” radio content. Whereas when listening for a longer period of time (11-30

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13 This research is outlined further in the Wider Lens section, page 32.
14 For more on the blending of audio categories, please see the Value Propositions section, page 4.
minutes), “other radio” content was preferred over CBC radio content\textsuperscript{15}.

Figure 13 suggests that participants who engage with the CBC on a daily, weekly, or monthly basis are the most active radio users. This being said, Figure 14 suggests “0 minutes” (not listening radio at all) was still the highest response, indicating that millennials do not have a very strong interest in radio (it is not a preferred skill/content). The second highest response rate for listening to radio as indicated in Figure 14 is for the 1 to 10-minute length of time, indicating that what interest our participants did have was in shorter content (in keeping with above length of interaction findings).

Figure 13. Number of instances where participants listened to, or did not listen to radio within a 24-hour time period, separated by level of CBC engagement.

\textsuperscript{15} For a further breakdown of radio listening by CBC vs other radio stations, please see Appendix A, Figure A3.

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure13.png}
\caption{Number of instances where participants listened to, or did not listen to radio within a 24-hour time period, separated by level of CBC engagement.}
\end{figure}

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure14.png}
\caption{Number of responses indicating the length of time spent listening to the radio within a 24-hour period.}
\end{figure}

\section*{CONTENT}
Content preferences involve what skills millennials used or preferred the most. The preferred content throughout the duration of the study was music, followed by weather and news. Music generally increased throughout and was consistently the most used skill genre, with weather consistently being the
**second most used skill.** The use of weather and news skills generally decreased throughout the study. In fact, other than music, skill usage generally decreased for all skills. Music remained the preferred skill throughout.

Interestingly, the skills participants searched for were not always in line with what skills they used—perhaps indicating that there is an absence of desired content available on the Alexa platform. It should be noted that although weather is a top preferred/used skill (as Figure 15 below indicates) it is not a skill that is “searched for”, likely as it comes pre-enabled on the Echo Dot so users do not need to search for it. Despite the absence of weather searches, the top used skills and the top searched skills were the same (music, weather, news).

**CONTENT 2.0: CBC SKILLS**

Although the CBC Skill has both radio (local stations and other stations) and news content included, as stated above in the value propositions chapter, the distinction between radio and non-radio content is not clear to millennials. Generally, as can be seen in Figure 16, respondents did not prefer CBC content as 65% did not use the CBC skill at all (with 28% of responses indicating news use and 6.3% of responses indicating local radio use).

![Figure 16](image)

**Figure 16.** Content typically accessed through the CBC Skill.

*Note. Participants were also given the option to select “Another CBC Radio station” however nobody reported that they typically used the CBC Skill to access “Another CBC Radio station.”*

When those who used the CBC skill were asked about their usage in the focus group, there was a general consensus that they may have only used the CBC skill because it came pre-enabled.

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16 For skill use over the course of the study, please see Appendix A, Figure A4. For a more detailed breakdown of the most popular skills, please see Appendix A, Figure A5.

17 For a full breakdown of all skills used vs. all skills searched for, please see Appendix A, Figure A6.
on the (Canadian) devices, and/or because they were aware CBC was part of this study. However, those who did use CBC content were generally satisfied with both interactions and content, as Figure 17 indicates.

![Average level of satisfaction](image)

**Figure 17.** Average level of satisfaction (1 is Very Dissatisfied, 5 is Very Satisfied) participants noted when using the CBC Flash Briefing Skill and CBC Skill for both interactions and content.

**OTHER USAGE (FUNCTIONAL FEATURES)**

Despite the above skill and content preferences, two users reported using their Echo Dots for home control, stating that they used it most to control their lights. Alarms were another preferred function, indicating that the Echo Dot is used as a functional device and not simply for its content playing abilities.
4

Methods
The “Living Labs” Approach

The nature of this study called for an approach that is able to consider both quantitative data (how users adopt the Echo Dot and Alexa, and what skills they are using, and how this changes over time) and qualitative data (why users prefer certain skills, and why they value the Echo Dot and Alexa). In order to fulfill our research objectives, our study combined a period of experience sampling, where participants answered a total of 800 surveys over the course of 20 days, with follow-up focus groups that gathered context and clarification about the data gathered during the survey period. Pairing the experience sampling surveys with focus groups follows the Living Lab framework; a method involving an ideal mix of qualitative and quantitative data collection. The combination of focus groups and experience sampling is a new and unique method developed by the Audience Lab, and the CBC should be commended for their intrepid commitment to discovery and innovation, in both the skill and content creation area, as well as at the research and development area.

The most unique benefit to the Living Labs approach is that it prioritizes experimentation in a real world setting [1]. Real world settings are argued to be a more accurate testing ground, as some believe the results of experimentation found in traditional or virtual lab settings are difficult to replicate in real life [27]. As our study inquired about millennials’ use of Amazon Echo Dot and Alexa, discovering their use in a real world setting, namely in their own homes rather than in a lab, was paramount.

Contemporary methods such as Big Data analytics answer the questions: what, where, and when, but not how and why [22]. For example, analyzing Twitter data can show the location and time of tweets, but it cannot tell us why certain people chose not to tweet at all [22]. Those who did not tweet are then invisible altogether [22]. In our study, instances where participants choose not to interact with Amazon Alexa through their Echo Dot are necessary findings which may indicate millennials’ usage trends. Because of this, we chose a data collection method called Experience Sampling (described further in the section below). This method requires participants to actively fill out short surveys multiple times a day over the study period. Our surveys included questions that ask participants to self-report their usage, for example, asking participants how many times (from 0-5+) they have interacted with Alexa in the past 24 hours.

It has been suggested that using a Big Data approach to analyze someone’s phone or tweets may give some trace accounting of their affinity for a place or spatial process, leading to valuable contributions to geographic knowledge
[32]. However, taking a Big Data approach cannot provide the depth and detail that comes with qualitatively learning about someone’s standpoint by actually asking them about their personal feelings and motivations (see for example [49], [50], [51], [52]). The Living Labs approach then becomes a beneficial approach, as it involves participants by encouraging them to actively share their own thoughts and opinions through qualitative methods, such as focus groups or interviews. At the end of our study participants were asked to attend a focus group where qualitative data was collected to contextualize the quantitative data collected during the Experience Sampling period-- thus blending both qualitative and quantitative methods.
The Experience Sampling Method

The Experience Sampling Method (ESM) is a data collection method that asks participants to actively record their experiences throughout the duration of a study. This method was developed during the 1980s, and uses a mobile device (ranging from basic stopwatches to smartphones) to prompt participants to record their experience everyday, for the length of the study. This method was particularly suited to our study as it actively prompted our participants to record their daily experiences with their Echo Dot. By prompting participants daily, ESM reduces participant recall issues and increases the likelihood of capturing authentic experiences [21]. This method was also chosen as it lends itself well to the Living Labs approach, collecting data from participants as they move about their everyday lives, in their own real world settings.

ESM has become a more efficient data collection method, due to the increasing prevalence of smartphone technology [4]. In particular, millennials (the target demographic of our study) show a high adoption rate of smartphone technology. In 2014, individuals under the age of 30 (millennials), spent more money on mobile wireless services, in comparison to other telecommunications services (cable and direct-to-home, internet, wireline telephone), and in comparison to other age groups [20]. Millennials spent $114.42 per month on mobile wireless services, while the next highest spending age group of 40 to 54, spent $106.83 per month [20]. Millennials are often thought of as difficult to reach, so choosing ESM took advantage of their high smartphone adoption rate as we were able to reach our participants through a technology they always have on hand (smartphones).

Additionally, we tailored our ESM approach to fit the millennial trend of having little patience for long or slow experiences [34]. Our study sent participants links to short surveys twice a day (once in the morning and once at night) via SMS text message. The links were texted to the participants via a “burner” cell phone, which was factory reset after the study’s completion. The links took participants to a survey where they were asked to submit a unique “Participant Code” (for anonymity) before completing the questionnaire. Each questionnaire was kept to a maximum of five survey questions, both keeping in mind millennials’ lack of patience for long experiences, and also to fit the premise of the Experience Sampling method where participants repeatedly fill out a short survey [19]. A total of ten unique short surveys were developed in collaboration with the CBC for the study. The ten unique surveys were then randomized and sent out over the course of five days; once in the morning and once at night.
This process was then repeated four times to reach a total of 20 days, with participants answering each of the 10 unique surveys four times in total.

**SURVEY FORMULATION**

Our survey questions incorporated a structure of 2-5 questions each, which enabled concentrated questioning on a frequent basis, while keeping potential participant fatigue (due to the high amount of surveys being presented) to a minimum. The topics of these short surveys highlighted the themes of user activity on the Amazon Echo Dot platform, what the platform delivered, and how users appraised the platform. The short surveys included questions about general user activity, the results of said activity and, where appropriate, asked the participants to rate their satisfaction of the activity and results. The short survey question topics included:

- General questions (e.g. how many times did you talk to Alexa in the past 24 hours?),
- Length of interaction (e.g. how long was your shortest (or longest) interaction with Alexa in the past 24 hours, and what was the interaction about?);
- Using skills (e.g. what Alexa skill did you use most during the past 24 hours?);
- Amazon purchases (e.g. how many purchases did you make from Amazon using your Echo Dot?).

In addition to these topics, the short surveys were also based on a previous research study executed by the Audience Lab\(^{18}\). This research study analysed users' attitudes, expectations and opinions toward Amazon’s Echo Dot and Alexa by scraping and analyzing comments from Amazon reviews, Facebook posts and comments, and a selection of YouTube videos. Notable findings from this analysis include:

- Frequently cited uses and commands were “play”, “news” (flash/briefing), “calendar”, and “weather”, which were all noted as being used daily.
- Users commented most frequently on Alexa’s ability to play music (jazz, song, album, stereo, radio, Spotify, etc.), and facilitate games (Jeopardy, 20 Questions, etc.).
- Skills were discussed with regards to their variety, with users being split as to whether there were enough skills and if they were developed to their full potential\(^{25}\).

As a result of these findings, and because of the interests of the CBC, we specifically included short surveys based on news/flash briefings and radio. The CBC currently has two Alexa skills, a general “CBC Skill” which allows users access to local radio stations and news broadcasts, and a “CBC News Hourly Updates Skill” which is a flash briefing skill that is updated with CBC News reports hourly. Understanding how, when and why participants accessed skills such as CBC or CBC News Hourly Updates, or similar skills, will

\(^{18}\) For this report, please see Appendix D, page 63.
allow the CBC to strategize content for their skills based on the interests of millennials.

It is also important to note that when studying online platforms it is difficult to access data as it is typically proprietary to the platform and not available to the public in a raw and unfiltered state: “Even if such unrestricted platform data collection were possible, it still lacks valuable information as it is generally limited to behavioral data” [19]. Skill developers have access to analytics that can determine how often, when and where their skill has been used. However, they do not have data concerning if and how users multitask while interacting with the Echo Dot (e.g. asking Alexa for the weather forecast while getting ready in the morning), or if they are simply listening in bed before starting their day. To this end, a number of our short surveys included questions such as, “What were you doing when you were listening to the CBC Skill.” A complete list of survey questions is available in Appendix A.

RECRUITMENT & PARTICIPANTS

Recruitment letters were sent out to students across all faculties via email. The response rate was overwhelming, with more than 155 respondents asking to participate. The high response rate can be attributed to two factors. First, as was expected, respondents were interested in the Amazon Echo Dot (which we allowed participants to keep in exchange for their time and commitment to the study). Second, there was a particular interest in partaking in a study that was associated with the CBC. This was evident as at the end of the study, when many participants asked if they would be mentioned in CBC news content or featured by the CBC in any way due to their participation in the study.

Of the 155 responses, we randomly selected 20 using a random number generator. Our selected participants were students from various faculties, including Social Sciences, Arts & Humanities, and STEM (Science, Technology, Engineering, and Math) faculties. During the study orientation, participants were asked to fill out a short demographic survey outlining their general demographics, technology habits, and broadcaster preferences. Of our 20 selected participants, 75% identified as female, while 25% identified as male. A total of 95% were aged 18-24, while 5% were aged 25-34. In terms of highest level of education achieved, 75% of participants had a high school diploma, while 10% had a college diploma, and 15% had an undergraduate degree. In terms of technology, 65% of participants listed that their smartphone was the most used technology in comparison to 30% saying their most used technology was a personal computer, while 5% favoured tablets. Figure 18 outlines participants’ answers when asked how, or what medium they use to engage with broadcasters, which shows

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19 It is typical for any research study involving participants to include a simple demographic survey at the introduction or orientation of the study to understand the “baseline” of certain characteristics that the group of participants may have.
an overwhelming preference for online engagement in comparison to legacy (Radio or TV) media.

Finally, our demographic survey data showed the level of engagement our participants had with the CBC prior to the start of the study. Of our participants, 10% said they engaged with the CBC once or more per day, 45% engaged weekly, 30% engaged monthly, and 15% said they had never engaged with CBC content before. Participants were also asked to list the top 5 broadcasters other than CBC that they engage with. The top ten broadcasters are listed in Figure 19 below, with responses separated out by participants’ level of CBC engagement.

![Figure 18. Ways in which participants engage with broadcasters.](image)

**Figure 19.** Top 10 broadcasters other than CBC that participants engage with, separated by level of CBC engagement.

**FOCUS GROUPS**

Upon completion of the Experience Sampling study period, participants were invited to attend a focus group. In total, three focus groups were held. In the focus groups (which ranged from 60 to 90 minutes), participants were asked a series of questions about general Alexa and Echo Dot impressions and use, as well as questions about the two CBC skills and their content. The focus groups ended with a co-creation ideation session where participants defined their “ideal” CBC skill by arranging cue

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20 Only one participant was unable to attend, but completed a detailed written report answering the questions we posed in the focus groups.
cards\textsuperscript{21} in order of most desired to least desired content genres.

**RECEPTION OF METHOD**

Upon completion of the study, participants commented on how they enjoyed having the surveys texted to their phones, and thought it was much better than other methods that could have been used to disseminate the surveys (i.e. email). Of all surveys issued, we had a 95.5\% completion rate, meaning only 4 surveys of the 800 surveys sent in total went unanswered. We attribute this in part to the convenience of the experience sampling method, and also to the reminders we sent participants to fill out their surveys if they had not answered them within a few hours. In total, reminders were only sent out for 8\% of surveys that were initially not responded to.

\textsuperscript{21} For photos of the cue cards exercise, please see Appendix C, page 59.
5

Through a Wider Lens
Smart Speakers, Voice Assistants, the Amazon Echo Ecosystem, and Millennials

What has remained largely under-researched until this study is understanding how younger generations (namely millennials) use voice assistants, and in particular, smart speakers. While there is a large amount of industry research on younger generations’ adoption rate of other new technologies, qualitative research on smart speaker use is lacking. The limited research that does exist has found that smart speakers are most popular among millennials, specifically those aged 25 to 34 [40]. Furthermore, from 2015 to 2016 the highest increase in voice assistant use occurred among people aged 18 to 24, indicating that millennials are comfortable with this technology and actively use it [41]. The following chapter provides a look at the core areas of interest in our study (voice assistants, smart speakers, and millennials) through a wider lens. Below you will find summaries of research on smart speakers and voice assistants, an extended look at Amazon’s Echo ecosystem including the Echo Dot and the Alexa interface, and a focused section on what is known about millennials and their adoption of such technologies.

SMART SPEAKERS & VOICE ASSISTANTS

Throughout this report, the Amazon Echo Dot has been referred to as a smart speaker, which is the common and familiar term used for such devices [7, 18]. Other terms used to describe devices like the Amazon Echo Dot include: home automation device [18], connected home device [41], autonomous technology agent [24], voice-operated assistant [40], and intelligent virtual assistant [10]. It is important to note, however, that the terminology used to describe these devices can affect how users interact with them [11]. Research has found that describing a device based on its “smart home” capabilities, i.e. its ability to control other devices in the home, limits how users understand and use the product; users tend to focus on practical tasks related to the functioning and automation of their homes [11]. On the other hand, describing a device based on its data streaming capability, i.e. its ability to provide information via internet searches, leads users to use more diverse device functions, particularly for educational purposes [11]. For the purposes of this report we will refer to the Echo Dot as a smart speaker22, underscoring this study’s overall interest in informative (i.e.

22 During this study, we often referred to the device as the “Echo Dot.” Although participants used varying terms when referring to their devices, it was interesting to note that some referred to the device as “Alexa” and used pronouns “she” or “her” when referring to the physical device and not simply the voice.
news-related), educational, conversational, and entertaining interactions with the device.

As an emerging technology, smart speakers remain largely under-researched compared to voice assistants more generally. Voice assistants, such as Apple’s “Siri” or Google’s “Assistant”, have been available to the public longer than smart speakers, as they have functioned as part of various existing technologies (e.g. smartphones, tablets, and laptops). While it has only been in the past few years that major computing companies (Apple, Google, Microsoft) have intensified efforts to include voice interaction in phones, TVs, and other devices [6], the development of conversational interfaces has been a concern of Artificial Intelligence research since the 1950s [39, 53]. A prominent recent example of how conversational user interfaces have been introduced into commercial environments is through voice assistant application technology, typically associated with smartphone or operating system brands, such as: Apple’s “Siri”, Google/Android’s “Assistant”, or Windows’ “Cortana”. These voice assistant applications have become an important selling point of smartphones because they offer users an additional way to manage their daily tasks [23].

While it is common for the terms voice assistants and conversational user interfaces to be used interchangeably, arguments have been made that voice assistants as they currently exist (such as Siri, Cortana, etc.) are not truly conversational. To expand, one central weak point of present commercial voice interfaces is their limited ability to engage in long conversations [38]. Interactions with voice assistants are limited to one-way directions given by the user, which are then dealt with independently by the voice assistants, instead of actual two-way conversations [38]. Although we recognize that technology is always improving and that true conversational user interfaces are already being developed for the consumer marketplace, for the purposes of this study we have considered Amazon’s Alexa as voice assistant. This is because at the time of this study, Alexa still lacked the ability to participate in extended conversational interactions, which users have been critical of – as discovered both in our findings, as well as in previous user studies [5].

Voice assistants have been common in smartphones for years and more recently have emerged in cars, smart televisions, wearables and connected home devices like Amazon’s Echo/Alexa [41]. A study conducted in the U.S. by MindMeld [41] examined 1800 smartphone users over the age of 18 and their attitudes towards voice assistants such as Siri, OK Google and Cortana. The study found that 62% of smartphone users utilized voice assistants and 55% of these respondents were satisfied with them [41]. Additionally, the study discovered that the number one reason (61%)

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23 For Audience Lab’s previous study, please see Appendix D, page 63.
respondents used voice assistants was for hands- and vision-free interaction [41].

Voice assistants allow for hands- and vision-free interactions that provide users with a more intuitive, convenient and efficient means of communication with spoken language applications [12]. Voice is a crucial element of human-computer interactions because it helps form credibility and trust [36]. Applying this research to smart speakers, and more specifically Amazon Echo/Alexa, is beneficial because it illustrates the benefits of voice-controlled technology and how it can be used to develop positive interactions.

Despite these positive characteristics, there are limitations of smart speakers. The MindMeld [41] study discussed above found that the number one location where respondents used voice assistants was at home (48%) and the remaining 52% of use was outside of the home (i.e. in the car, on the go, at work) [41]. While smart speakers may seem limited due to their lack of portability, being specifically designed for at-home use means if current trends continue, they are likely to become the most popular technology used to access voice assistants in the home (which according to MindMeld is the number one location to engage with voice assistants). Voice assistant ecosystems have been developed to work with both smart speakers and smartphone applications. So, while 52% of voice assistant use is outside of the home (and likely through a smartphone voice assistant application), this should not be thought of as competition with at-home smart speaker use- rather an extension of use of the voice assistant ecosystem.

AMAZON ALEXA & THE ECHO DOT

Amazon’s Echo Dot smart speaker is priced at $49.99 CAD (pricing as of April, 2018, on Amazon.ca).

Figure 20. Amazon Echo Dot’s technical details [3].

The Echo Dot houses a 3.5 mm stereo cable jack, and also offers Bluetooth connectivity so that audio can be played through an external speaker if the user desires a louder or more detailed listening experience. The Echo Dot uses a “listening system” that Amazon has coined as ESP, or echo spatial perception, which allows the Echo Dot to hear users “from across the room, even when music is playing” [3]. Most unique to the Echo Dot is Amazon’s voice assistant, Alexa. Alexa uses a Wi-Fi connection to complete voice commands such as “play music, make calls, send and receive messages, provide information, news, sports
scores, weather, and more” [3]. Amazon has called the ability of Alexa to complete these voice commands “skills.”

Skills, as defined by Amazon, are the capabilities that Alexa provides that allow users to personalize their Alexa experience [2]. Skills can be created by Amazon or by third party developers. According to Amazon, there are tens of thousands of skills available for users to enable [2]. In order to best explain the notion of skills to our participants, we likened them to an app on their smartphones, stating that a skill is something that Alexa can do. We also specified that some skills come preloaded on Alexa’s software (such as the alarm or timer functions), while others have to be physically enabled by the users via the Alexa mobile app or on Alexa.Amazon.ca, or verbally enabled using the Echo Dot itself.

AMAZON & THE SMART SPEAKER MARKET

The Amazon Echo device, which was the first player in the North American smart speaker market, was introduced in 2014 and has experienced rapid growth beginning in 2016 until present [18]. Among Amazon customers in the U.S., awareness of Amazon Echo devices increased from 20% in 2015, to 61% in 2016, and 86% in 2017 [14]. As of December, 2017, 31 million devices were installed in the U.S.; at least 10.7 million U.S. residents owned an Amazon Echo device [14] and 20% of customers reported having more than one device [18].

The Echo Dot has a competitive price point compared to the other smart speakers in the Amazon Echo line, and accounts for more than half of all Echo devices sold [18]. While data specifically regarding Canadian Echo Dot sales has yet to be collected on a national scale, the Echo Dot was the global best selling product across all of Amazon for the 2017 Black Friday weekend – from November 24 to 26 [8].

The Amazon Echo remains the leader in a growing market even after the launch of the competing Google Home device in November of 2016 [18]. It is estimated that 36 million U.S. residents will use a smart speaker device at least once a month in 2018 [40], and more than two-thirds of smart speaker devices remain Amazon products [18]. With 55% of Amazon Echo owners also owning iPhones, it appears that Amazon is “invad[ing] Apple’s ecosystem,” [15], by breaking the trend of Apple users who typically only purchase Apple products. It seems that Amazon will continue to lead the
smart speaker market even with the launch of Apple’s competing HomePod device in January, 2018 in the U.S. (a Canadian launch date has yet to be announced [44]). Already struggling to compete with Amazon and Google, Apple is only expected to sell 7 million HomePod devices this year in the U.S., compared to the expected 18 million Google Home and 29 million Amazon Echo device sales projected for 2018 [31].

**SMART SPEAKER USES & GRATIFICATIONS**

Since its introduction in 2014, the Amazon Echo Dot has largely been used for streaming music and answering questions via its voice-activated Internet search [14, 16]. A recent study with 26 first-time Amazon Echo Dot users found that they tended to use the speaker for 15 to 30 minutes per day for music, news, radio, and weather searches [5]. Only a few users deviated from this “standard content” [5], indicating a user desire for quick and easy access to information and entertainment.

MindMeld’s [41] study “Intelligent Voice Assistants – Q1 2016 User Adoption Survey Results” reported that of 1800 respondents, the percentage of those using Amazon Echo/Alexa doubled from 2015 to 2016 [41]. Despite this number being small compared to the growth of other voice assistants such as Siri, this advancement suggests that voice assistants are making a successful transition to devices other than smartphones [41]. It should also be noted that this study was conducted in 2016 when Amazon Echo/Alexa was rather new – Amazon Echo’s success grew substantially in 2016 [18].

Amazon Echo owners have also started using the device as a household controller, in conjunction with other smart home accessories like lights, appliances, security systems, or thermostats [7, 17]. Approximately 60% of all smart speaker users in the U.S. have connected at least one household accessory to their Amazon Echo or Google Home, with well over half of these owners buying smart accessories only after buying their smart speaker [18]. This indicates a consumer desire to connect and automate their homes through a single, “smart” and responsive hub like the Amazon Echo [7, 17].

This trend echoes academic findings about the Internet of Things (IoT), which is defined as an extensive network of smart objects that are connected to the internet and embedded with sensors; and that facilitate interactions and communication with people while integrating with surrounding environments [36]. The IoT research field began with the domain of ubiquitous computing in homes, rooms, etc, and then was later referred to as IoT. Ubiquitous computing is a concept whereby computing is accessible on any format, in any location, at any time – thus ingraining itself in the background of daily life [30]. Presently living in the post-pc era, handheld devices (such as smartphones and tablets) are creating more interactive and informative environments than ever before [30].
Human-IoT interactions are social in nature and occur in a similar manner to real-life, non-mediated interactions [36]. People respond more positively to computer voices that exhibit a similar personality to their own [43]. IoT devices that communicate through a unique voice are more likely to be received positively because they elicit social responses and appear intelligent rather than artificial [36]. Beyond connecting and automating their homes, Echo Dot owners may be interested in their devices due to Alexa's intelligence (as she is able to actually “do things” rather than just act as responsive speaker) and her distinct personality.

MILLENNIALS, VOICE ASSISTANTS & SMART SPEAKERS

The Millennial generation comprises of individuals born between 1980 and 2000 [34, 29]. Millennials differ substantially from the generations preceding them, primarily due to their overall comfort levels with technology. They use mobile phones extensively and believe the internet is a fundamental part of life [34]. Sometimes referred to as having an “information-age mindset”, millennials have a strong ability to multitask [34] and have been described as incredibly productive workaholics [26]. The strong influence of technology has contributed to a fast paced world, leading many millennials to have little patience for long or slow experiences [34]. Having been surrounded by digital technologies from a young age, Millennials are sometimes referred to as the Net-Generation [34]. Their need for technology-based stimulation is much higher than older generations cohorts [34]. Despite pursuing postsecondary education in record numbers [45], unstable employment and severe competition have plagued this generation [26].

It is important to better understand millennials and their use of voice assistants and smart speakers as they are early adopters of new technology and are the biggest consumer market in the United States and Canada since the Baby Boomer generation, and more than three times the size of Generation X [13, 48]. More than past generations, millennials are defined by an “accumulated, materialistic, and consumer culture” that is largely the product of technological innovation [48]. Equipped with an array of electronic technology, they have grown up in “an age of instant global communication, media saturation and material excess” [48]. They are less influenced by traditional media than prior generations and are the most probable cohort to use texting as a common method of communication [48]. Research conducted in the U.S. and Europe found that millennials do not own radios, rather they listen to their favourite content online via podcasts or streaming [28]. It then becomes imperative to discover and research innovative ways to reach millennials, such as through voice assistants and smart speakers.
6

Concluding Thoughts: A Final Recommendation
Through the course of our research, we have determined that millennials are adopting voice assistants and smart speakers. Specifically, our study data has developed an understanding of how and why millennials adopt these technologies as well as what content they prefer to engage with through these technologies. Still, continued and consistent research is imperative to better understand their perceived value of such technologies, as well as how millennials will continue to integrate these technologies into their everyday lives going forward. As adoption and usage trends are constantly and rapidly changing, it is necessary to study these trends frequently in order to create skills that will be valuable to millennial users. If smart speakers continue to increase in popularity at the rate that they have thus far, then tracking and responding to user preferences and trends becomes imperative to remain relevant in this market; trends must be actively monitored to produce content that remains current and influential. Millennials are always looking for new, innovative, and convenient technologies to add to their routines. Therefore, proactively developing content to fit their desires/needs will help keep this demographic engaged with the CBC in the future.

24 For more on millennial adoption trends, please see the Value Propositions & Recommendations section, page 4.
References


## Appendix A

### Additional Data and Graphs

Table 1. Responses indicating activities done while engaging with the Echo Dot.

<table>
<thead>
<tr>
<th>Skill used when multitasking</th>
<th>Browse social media</th>
<th>Eating</th>
<th>Getting Ready</th>
<th>Homework</th>
<th>Housework</th>
<th>Reading</th>
<th>In the kitchen</th>
<th>Work</th>
<th>On my laptop</th>
<th>Arriving home from school</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Most Used Skill&quot;</td>
<td>0</td>
<td>2</td>
<td>27</td>
<td>8</td>
<td>19</td>
<td>1</td>
<td>0</td>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Generic Flash Briefing</td>
<td>0</td>
<td>4</td>
<td>13</td>
<td>4</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>CBC Flash Briefing</td>
<td>0</td>
<td>2</td>
<td>9</td>
<td>9</td>
<td>8</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Radio</td>
<td>1</td>
<td>2</td>
<td>17</td>
<td>3</td>
<td>13</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Totals</td>
<td>1</td>
<td>10</td>
<td>66</td>
<td>24</td>
<td>46</td>
<td>2</td>
<td>1</td>
<td>17</td>
<td>17</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 2. Total responses indicating time spent on longest and shortest skill interactions within a 24 hour time period.

<table>
<thead>
<tr>
<th>Skill Used</th>
<th>Less than 1 minute</th>
<th>1-5 minutes</th>
<th>5-10 minutes</th>
<th>Over 10 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weather Update</td>
<td>25</td>
<td>12</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Alarm</td>
<td>14</td>
<td>2</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Play music</td>
<td>8</td>
<td>10</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Time Check</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Flash briefing</td>
<td>3</td>
<td>15</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Home control</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Play the news</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Set a timer</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Connect to phone</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Start my day</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Said good morning</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Podcast</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Casual conversation</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Set a reminder</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Spell a word</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Play a game</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Play the radio</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Read my Audible</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Ask random questions</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Rate music</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Sports update</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total times reported</strong></td>
<td><strong>72</strong></td>
<td><strong>57</strong></td>
<td><strong>20</strong></td>
<td><strong>12</strong></td>
</tr>
</tbody>
</table>

Total of times reported of use under 5 min. | Total of times reported of use over 5 min.

<table>
<thead>
<tr>
<th>Total</th>
<th>129</th>
<th>32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent</td>
<td>80%</td>
<td>20%</td>
</tr>
</tbody>
</table>
Figure A1. What participants are typically doing in addition to listening to their Echo Dot.
Figure A2. Total responses of skills engaged with at different lengths of time.
Figure A3. Number of times participants listened to CBC Radio versus other radio stations through the Echo Dot within a 24-hour period.
Figure A4. Most used skill within a 24-hour period, over time.
Figure A5. Aggregate tally of most used skill within a 24-hour period.
**Figure A6.** Total number of times skills from particular genres were typically searched for in general, or used within a 24-hour period.

*Note: The genres of Weather, Home control, Morning update, Productivity, and Word of the day were responses provided by participants when asked “If other, please describe.”*
Appendix B
Short Survey Questionnaires

Survey 1 - General Questions
1. How many times (approximately) did you talk to Alexa in the past 24 hours?
   MC Answer: 0, 1-5, 6-10, More than 10

2. How did you talk to Alexa?
   MC Answer: Echo Dot, Mobile App, Other

3. How many times (approximately) did you use the Alexa mobile app in the past 24 hours?
   MC Answer: 0, 1-5, 6-10, More than 10

4. How many times (approximately) did you visit Amazon.Alexa.ca in the past 24 hours?
   MC Answer: 0, 1-5, 6-10, More than 10

Survey 2 - Length of Interactions (short)
An INTERACTION starts when you ask Alexa a question (for example, when you ask Alexa about the weather, or when you ask Alexa to play the radio). The INTERACTION ends as soon as the voice stops (for example, when Alexa finishes telling you about the weather, or when you ask Alexa to stop playing the radio). An INTERACTION can also include when Alexa says “Sorry, I don’t understand.”

1. What was the duration of your SHORTEST interaction with Alexa in the past 24 hours?
   Answer: 0 min, less than 1 min, 1-5 min, 5-10 min, 10+, Other

2. What was the interaction about? (E.g. Ask for the weather, Playing the radio, etc.)
   Short Answer: _____________

3. What was your overall satisfaction with this interaction?
   MC Answer: N/A - Very dissatisfied - Dissatisfied - Neutral - Satisfied - Very Satisfied

Survey 3 - Length of Interactions (long)
An INTERACTION starts when you ask Alexa a question (for example, when you ask Alexa about the weather, or when you ask Alexa to play the radio). The INTERACTION ends as soon as the audio stops (for example, when Alexa finishes telling you about the weather, or when you ask Alexa to stop playing the radio). An INTERACTION can also include when Alexa says “Sorry, I don’t understand.”

1. What was the duration of your LONGEST interaction with Alexa in the past 24 hours?
   Answer: 0 min, less than 1 min, 1-5 min, 5-10 min, 10+, Other
2. What was the interaction about? (E.g. Ask for the weather, Playing the radio, etc.)
   Short Answer: _______________

3. What was your overall satisfaction with this interaction?
   MC Answer: N/A - Very dissatisfied - Dissatisfied - Neutral - Satisfied - Very Satisfied

Survey 4 - Discovering Skills
What is a SKILL? A SKILL is like an app on your phone- it is something that Alexa can do. Some SKILLS you have to enable (via the mobile app or Alexa.amazon.com) and some SKILLS come pre-loaded on Alexa’s software.

   1. How many NEW skills did you use in the past 24 hours?
      MC Answer: 0 - 1 - 2 - 3 - 4 - 5+

   2. How did you discover these skill(s)?
      MS Answer: N/A - Alexa Mobile App - Web Browser - Through the Echo Dot - Other

   3. What type of skills do you typically search for?
      MS Answer: News - Sports - Music - Radio - Lifestyle - Games - Podcasts - Comedy - Other

Survey 5 - Using Skills
What is a SKILL? A SKILL is like an app on your phone- it is something that Alexa can do. Some SKILLS you have to enable (via the mobile app or Alexa.amazon.com) and some SKILLS come pre-loaded on Alexa’s software.

   1. What type of skills have you used in the past 24 hours? Select all that apply
      MS Answer: News - Sports - Music - Radio - Lifestyle - Games - Podcasts - Comedy - Other

   2. What Alexa skill have you used the most in the past 24 hours?
      Short Answer: _______________

   3. What are you typically doing when you use it?
      Short Answer: _______________

   4. How often have you used a CBC skill (Either CBC or CBC News Hourly Updates) in the past 24 hours?
      MC Answer: Have not enabled - 0 -1-2-3-4-5+

Survey 6 - Amazon Purchases
1. How many purchases have you made from Amazon using on your ECHO DOT in the past 24 hours?
   MC Answer: Have not enabled - 0 - 1 - 2 - 3- 4-5+
2. How many purchases have you made from Amazon using the ALEXA MOBILE APP in the past 24 hours?  
   MC Answer: Have not enabled - 0 - 1 - 2 - 3- 4-5+

Survey 7 - Flash Briefing

A FLASH BRIEFING provides a quick overview of news and other content such as comedy and interviews. Flash briefings can be enabled in the FLASH BRIEFING section under SETTINGS in the Alexa app, or by searching for "flash briefing" in the SKILLS section of the app.

1. Have you added any skills to your flash briefing?  
   MC Answer: Yes - No

2. If yes, what skills have you added to your flash briefing?  
   Short Answer: _____________

3. If yes, how often have you listened to your flash briefing in the past 24 hours?  
   MC Answer: Have not enabled - 0 - 1 - 2 - 3- 4-5+

4. What were you typically doing when you listened to it?  
   Answer: _______________

Survey 8 - CBC News Hourly Update (CBC flash briefing)

A FLASH BRIEFING provides a quick overview of news and other content such as comedy and interviews. Flash briefings can be enabled in the FLASH BRIEFING section under SETTINGS in the Alexa app, or by searching for "flash briefing" in the SKILLS section of the app.

Note: The CBC has two skills available for Alexa: CBC and CBC News Hourly Updates. For this mini-survey we are specifically asking about the CBC News Hourly Updates (not the CBC skill).

1. How many times have you listened to the CBC News Hourly Updates in the past 24 hours?  
   MC Answer: Have not enabled - 0 - 1 - 2 - 3- 4-5+

2. What were you typically doing when you listened to it?  
   Short Answer: _______________

3. What was your overall satisfaction with this interaction?  
   MC Answer: N/A - Very dissatisfied - Dissatisfied - Neutral - Satisfied - Very Satisfied

4. What was your overall satisfaction with the content played?  
   MC Answer: N/A - Very dissatisfied - Dissatisfied - Neutral - Satisfied - Very Satisfied
Survey 9 - CBC Radio

1. Approximately how much time have you spent listening to CBC Radio on your Echo Dot in the past 24 hours?
   MC Answer: 0 minutes; 1-10 minutes; 11-30 minutes; 31-60 minutes; Over an hour

2. If you listen to CBC radio on your Echo Dot, how do you access it?
   MC Answer: N/A - Through TuneIn - Through the CBC skill - I don't know/remember - Other

3. Approximately how much time have you spent listening to radio stations other than CBC on your Echo Dot in the past 24 hours?
   MC Answer: 0 minutes; 1-10 minutes; 11-30 minutes; 31-60 minutes; Over an hour

4. What radio stations (other than CBC) do you typically listen to on your Echo Dot?
   Short Answer: ___________

5. What were you typically doing when you listened to the radio on your Echo Dot?
   Short Answer: ___________

Survey 10 - CBC Skill

Note: The CBC has two skills available for Alexa: CBC and CBC News Hourly Updates. For this mini-survey we are specifically asking about the CBC skill (not the CBC News Hourly Update skill).

1. How many times have you used the CBC skill in the past 24 hours?
   MC Answer: Have not enabled - 0-1-2-3-4-5+

2. What did you use the CBC skill for the most in the past 24 hours?
   MC Answer: N/A - Local CBC Radio Station - Another CBC Radio Station - CBC NEWS

3. What was your overall satisfaction with this interaction?
   MC Answer: N/A - Very dissatisfied - Dissatisfied - Neutral - Satisfied - Very Satisfied

4. What was your overall satisfaction with the content played?
   MC Answer: N/A - Very dissatisfied - Dissatisfied - Neutral - Satisfied - Very Satisfied
Appendix C

“Building my Ideal Skill” Cue Card Exercise

The below images were taken during the “building my ideal skill” cue card exercise. Participants were asked to place the following content genres in order of most preferred to least preferred. Participants were also encouraged to add new genres where needed, and to leave genres out of the exercise if they were particularly adverse to that genre.
Appendix D
Past Audience Lab Study: Sentiment and Content Analysis

Understanding People’s Attitudes, Expectations, and Opinions Towards Amazon’s Alexa and the Echo Dot

Introductory Notes

Amazon Echo (and the smaller version, Echo Dot) is a brand of smart speakers developed by Amazon.com. The devices connect to the voice-controlled intelligent personal assistant service Alexa, which responds to the name ‘Alexa’. In the default mode, the Echo continuously listens to all speech, monitoring for the wake word to be spoken, which is primarily set up as "Alexa". Echo's microphones can be manually disabled by pressing a mute button to turn off the audio processing circuit. Echo devices require a wireless Internet connection in order to work. Echo's voice recognition capability is based on Amazon Web Services and an Amazon voice platform. The smart speakers perform well with a 'good' (low-latency) Internet connection. While the application is free, an Amazon account is required, and setup is not possible without one. Echo devices have access to 'skills' built with the Alexa Skills Kit. These are third-party-developed voice experiences that add to the capabilities of any Alexa-enabled device (such as the Echo). Examples of skills include the ability to play music, answer general questions, set an alarm, order a pizza, get an Uber, and more. Skills are continuously being added to increase the capabilities available to the user. The Alexa Skills Kit is a collection of self-service APIs, tools, documentation and code samples that make it fast and easy for any developer to add skills to Alexa (Wikipedia, 2017).

This report describes the results of a sentiment and content analysis of users’ attitudes, expectations, and opinions towards Amazon’s Echo/Echo Dot and Alexa. It forms the first part of a broader study that aims to inform the design and planning of CBC content and device skills. As defined per contract, this first study primarily used content available through public platforms such as Youtube (including comments) and Amazon’s own website.
The following sections describe the data retrieval, cleaning, scraping and analysis processes, and present the results of our analyses. The methodological approach is described as a multi-method study, using state-of-the art instruments for quantitative and qualitative content and sentiment analyses (i.e. NLP processing approaches).

**Data/Corpora Overview**

Amazon Reviews:
- 1887 reviews collected
- 1875 reviews selected for analysis post-cleaning
- Data Collected on 2017-09-04

Facebook:
- 16300 comments and posts by users
- 12981 post-cleaning
- Data collected from 2016-08-31 to 2017-09-04
- ~2500 comments were names/tags only

Youtube:
- 115 (post-cleaning) comments taken from the following videos
  - Amazon Alexa Moments - The Visit
  - Amazon Alexa Moments - Top Ten
  - Amazon Alexa Moments - Big Little Feet
  - Amazon Alexa Moments - Owie
  - Amazon Alexa Moments - Stretch
  - Amazon Alexa Moments - The Old Dog
  - Amazon Echo - Now Available

---

25 Please note that all data was collected before the official launch of the Amazon Echo in Canada.
Data Retrieval/Cleaning/Analysis

Data Retrieval:

Comments were scraped from the above YouTube videos using the NVivo plugin NCapture. The same process was repeated for visitor posts and comments on the Amazon Echo and Amazon Alexa Facebook pages as well as visitor comments on non-visitor posts (Posts made by the Amazon Echo and Amazon Alexa Facebook pages). NCapture data was then brought to NVivo where it was saved as a .csv file and converted for analysis.

Reviews of the Amazon Echo were collected using a parsing tool, Parsehub. Due to Amazon’s policies regarding review data, a limited sample was collected (the most recent 1887 reviews). Future analysis could incorporate different, randomized sets of reviews. The data was then converted to a .csv file for cleaning.

Data Cleaning:

Each data set was manually cleaned. For Facebook data, all comments comprising solely of a “tag” (individual’s hyperlinked name) with no further commentary were removed. Similarly, text containing links to individuals’ personal pages with no connection or affiliation to the product (for personal marketing or spamming purposes) were removed. Text containing only links to videos were also removed. Amazon review data cleaning similarly consisted of removing any spam or personal promotion posts.

Data Analysis:

---

26 Facebook pages were for the American Echo Dot and Alexa as it was not, at the time of retrieval, available for purchase in Canada.
Our analysis approach contained a mixed methods design, with a triangulation model aiming to combine both qualitative and quantitative methods as well as different data sources. Mixed methods approaches are increasingly applied, particularly in social media research, given that they offer the needed flexibility to account for the complex and rich data sets retrieved from social media platforms. However, mixed methods designs only provide representative and reproducible results if they include a concrete data strategy, such as triangulation. Triangulation is described as the “combinations and comparisons of multiple data sources, data collection and analysis procedures, research methods, investigators, and inferences that occur at the end of a study” (Teddlie & Tashakkori, 2009: 27; see Zeller, 2017, for a more detailed explanation).

The content and sentiment analyses began with the Linguistic Inquiry and Word Count (LIWC) software. Individual comments/posts were analysed for word and word type frequencies. The resulting data set was then converted and analysed using SPSS software where it was further analysed for tendencies across all posts/comments the results of which can be seen below. Sentiment and particularly opinion analyses were further explored using AntConc and WordSmith text-analysis applications to determine key themes and opinions through inductive processing.27

Results

Results of the content and sentiment analysis show an overall positive response to Amazon’s Alexa and the Echo dot across Amazon reviews, Facebook posts and comments, and comments on Amazon’s official Alexa and Echo YouTube videos. The key findings from the LIWC, SPSS, and AntConc analyses are highlighted below.

27 Please refer below, section ‘Tools’, for more detailed explanations of the tools and attached instruments.
By the Numbers (LIWC and SPSS analyses)

Overall Sentiment Analysis

- Word count of responses was highest for the Amazon Reviews with Facebook and YouTube comments following. This helps to focus future research into user perceptions and opinions in terms of what platform provides most detailed reviews.

*Figure 1. Values represented as average per post/comment on each platform. Analytic: Analytical Thinking, higher values indicate formal, logical and hierarchical thinking while lower numbers indicate informal, personal, and narrative thinking. Clout: higher values indicate higher perceived expertise and confidence, while lower numbers indicate more tentative, humble, or anxious writing. Authentic: higher values are associated with more honest, personal, or high disclosure, with lower values indicating guarded, distanced language. Tone: Emotional Tone, higher values indicate positive, upbeat language, while lower numbers indicate anxiety, sadness or hostility, mid-range values (close to 50) indicate lack of emotion or ambivalent language (Pennebaker, et al., 2015).*
When writing about the Amazon Echo/Echo Dot and Amazon’s Alexa, people were found to have moderate to low confidence in what they were writing, using less definitive statements across platforms. For example, one reviewer on Amazon stated “I think I need some directions”.

Female pronouns were more often used than male pronouns (almost double across platforms) - assumption is this is due to Alexa having a “female” sounding voice.

Despite being a key target audience, family related terms or references to family members were not to be found in a large portion of reviews.

All platforms used semi-personal, informal language and had similar pronoun use.

Negative language was used significantly less than positive for all three platforms with the most significant difference being Amazon reviews in which 16% of total words used were positive, and 0.87% of total words used were negative (see Figure 2).

---

28 As names/tags were removed from the Facebook comments and posts, affiliation may be underrepresented, as may be the statistics for friends and family.
- Tone was most positive in Amazon reviews (81% of words used), ambivalent/neutral in Facebook comments (55%), and most negative in YouTube comments (28%).
- Language indicating cognitive thinking was seen to be higher in Amazon Reviews than Facebook comments/posts and YouTube comments respectively. Alternatively, interrogative language (how, when, what, etc.) was present more in YouTube than Facebook, and Amazon Reviews respectively (see Figure 3).

*Figure 3.* Cognitive processes (umbrella category) and three sub-categories Insight, Interrogatives, Comparisons showing how the technical side of the device was discussed.
Amazon Reviews

- Amazon reviews had a higher use of adjectives (11% of words used) than either of the other platforms (YouTube only had 2%), indicating a more descriptive language use for those writing out full reviews.
- Amazon reviewers were also found to demonstrate a significantly higher affect (emotional language, demonstrating positive, negative, anxious, angry, or sad, responses) than Facebook or YouTube commenters. For example, a response that was high in affect would be “I LOVE ALEXA!” said by one Amazon reviewer. A response with low affect scores would be “Because of the newness of the system, developers are still figuring out the utterances that people naturally want to say. Just give them time!” from Facebook.
- Driving factors for Amazon reviewers (more so than Facebook or YouTube commenters) were affiliation to others and rewards. An example of a comment with a reward drive would be “It’s great, I love it. It makes everything a lot easier.” with the reward being the ease added to ‘everything.’ An example of a comment with an affiliation drive then would be “Alexa is a nice addition to the family!!!! We appreciate her constant assistance”
- Reward was seen as a much larger motivating factor than risk for all of the platforms, with the most dramatic difference illustrated in the Amazon Reviews.

Figure 4. Language use involving motivational terminology
Facebook Comments

- Personal pronouns (i, we, he, she) were used over double the amount of impersonal pronouns (it, it's, those). Further inspection in AntConc found that the Echo/Echo Dot and Alexa are often referred to as “she” rather than “it,” users personified the device and software.
- Despite the removal of tags/names, Facebook comments still had the highest percentage of social language (11% of words used) compared to Amazon (9.8%) and YouTube (5.7%) (see Figure 5).

![Social Language: Mean % of Words](image_url)

*Figure 5. Overview of social language usage scores*

- Users who tagged their friends in posts or comments were most frequently doing so with “set this up”, “you have to try this”, “let’s try this when we get home”, “check this out”, “show ‘x’ this”, contributing to the social aspect of comments.
- Comments took a political turn following a post in which CNN was mentioned as a news briefing and skill for Alexa, the ensuing conversation on that Facebook post digressed immediately to only political conversation.
YouTube Comments

- Overall YouTube comments had lower averages than the other two platforms, however this may be due to the (much) smaller sample size.
- YouTube users had a disproportionately large number of swear words compared to the other two platforms.
- YouTube users also only had 51% of words recognized by the LIWC dictionary (compared to ~81% of Facebook and Amazon Reviewers).

![Negative Language: Mean % of Words](image)

- YouTube also had the highest negative emotion language use (see Figure 6).

*Figure 6. Negative emotions and language use*

- YouTube commenters were also more likely to mention “CIA”, “spying”, and mention George Orwell's novel “1984” while voicing their concerns about being spied upon by Amazon.

Themes and Topics

- “Alexa” was used most often in connection with “ask”, “app”, “help”, “phone”, and “play”.

● Frequently cited uses and commands were “play”, “news” (flash/briefing), “calendar”, and “weather” which were all noted as being used daily.

● Users commented most frequently on Alexa’s ability to play music (jazz, song, album, stereo, radio, spotify, etc.) or games (jeopardy, 20 questions, etc.).

● Music was mentioned regarding Alexa’s ability to connect to Amazon’s “music unlimited” feature that users had quite positive reactions to.

● Users referred more frequently to the Echo/Echo Dot and Alexa as their personal device (individual: my/mine) rather than a communal device (communal/family: our/family).

● Skills were discussed with regards to their variety, with users being split as to whether there were enough and if skills were developed to their full potential.²⁹

Figure 7. Overview of language use involving perceptual processes

● Users noted that the Alexa feature could answer simple and “silly” questions but that complexity was an issue.

²⁹ It should be noted that at the time of data collection the Amazon Echo Dot and Amazon Alexa features were not available in Canada, they have since been released on a more broad global scale.
Comprehension was also noted as an issue for users both on the part of Alexa understanding them and of the user understanding Alexa.

Many users stated that they were new to the device and “still learning” all the features and skills that could be used.

Comparisons to Google Home, Apple’s Siri, and Microsoft’s Cortana were made (in that order of frequency). See Figure 3.0 for comparative language use.

Overall perceptive language indicated that individuals used more language pertaining to “hearing” than “seeing” or “touching” which is to be expected from an audio-based technology (see Figure 7). These responses ranged from the previously noted frustration with Alexa not understanding user speech, to listening to music using the Echo/Echo Dot.

Executive Summary

Overall, user attitudes towards Amazon’s Alexa and the Amazon Echo/Echo Dot were found to be more positive than negative, though often users did not differentiate between the product (Alexa and Echo Dot) and the service or content it provided. The difference of the quality (language use) as well as quantity of feedback regarding the three targeted platforms provides useful insight into how to focus on future research and analyses in terms of data retrieval. Some of the most interesting results were that Alexa is indeed more seen as a ‘personal’ assistant rather than a communal assistant. Furthermore, generally Alexa was correlated with help and support, hence a rewarding addition. Nevertheless, difficulties in terms of understanding Alexa as well as being understood by Alexa were mentioned, which means that this aspect should continue to be a particular focus of user studies. Overall, the Echo/Echo Dots were often appreciated in connection with listening to music. This result brings the Amazon device in direct competition not just with similar devices by Google but also more music playing smart devices such as Sonos (www.sonos.com).
Recommendations

Users’ overall opinions were explored, and their motivations highlighted above. While the above summary offers insight into the focus of Amazon’s Alexa and Echo/Echo Dot users, further exploration into user motivations and expectations is recommended. Due to data retrieval and analysis taking part prior to Amazon’s Canadian launch for the Echo and Alexa, it is recommended that an analysis be performed for Canadian consumers a few months after the launch in Canada, as Canadian users will be the primary audience for future CBC skills.

Expectations, opinions, and attitudes towards Amazon’s Alexa and the Amazon Echo/Echo Dot will further be explored through a Living Lab user experience study. Given the results from this study, we recommend the following points to be included in the follow-up experience sampling study:

- Allowing for more in depth analysis of when, why, and how users interact with the device.
- Differentiating the overall usage with the use of the CBC skills offered.
- Looking specifically at the different skills being used, when and why.
- Paying attention to potential difficulties in terms of understanding Alexa and being understood by Alexa.
- Paying attention to what users might want from the device and Alexa (preferences for future developments).
- Investigating whether users do not see any difference between challenges using the devices and challenges interacting with Alexa.

Tools

Linguistic Inquiry and Word Count - LIWC

The sentiment analysis software tool LIWC was developed by Pennebaker and colleagues (Pennebaker et al., 2015; see also Taussczik & Pennebaker, 2010) and constantly updated. The lexicon-based sentiment analysis tool was chosen in order to be able to arrive at statistical results that go beyond a
binary distinction of positive or negative sentiments, which is the common output of machine-learning based sentiment analysis tools. So-called sentiment and opinion analyses (SOA) are being used in different disciplines, including communication studies, computational linguistics or information sciences (Bae & Lee, 2012; Grimmer & Stewart, 2013; Kennedy, 2012; Young & Soroka, 2012) and depend on a representative natural language corpus as well as statistically proven categories in the lexicon in order to measure the different sentiments in a corpus. Our collected corpus of Amazon Echo Dots’ and Alexas’ comments represent a valid corpus in statistical natural language processing analyses. The LIWC tool contains more than 70 different categories, ranging from linguistic aspects (for example pronoun usage or sentence length) to emotion categories such as anger or positive emotions and cognitive thought processes categories, which entail words that indicate thinking or reasoning. The dictionary is being assessed and tested continuously by human judges, making sure that the words aligned with the respective categories are still valid, thus taking into account constant language change. The most relevant categories chosen for our analysis and their explanations are shown below in Table 1.

**Table 1: Overview of analyses categories in LIWC (adapted from Pennebaker et al., 2015)**

<table>
<thead>
<tr>
<th>Main Category</th>
<th>Subcategory</th>
<th>Psychological Correlates/Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linguistic Processes</td>
<td>Word Count</td>
<td>Talkativeness, verbal fluency</td>
</tr>
<tr>
<td>Clout</td>
<td></td>
<td>A high result suggests that the author is speaking from the perspective of high expertise and is confident; low results suggest a more tentative, humble, even anxious style; more we-words and social words are used.</td>
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<tr>
<td>Tone</td>
<td></td>
<td>A high result is associated with a more positive, upbeat style; a low result reveals greater anxiety, sadness, or hostility. A number around 50 suggests either lack of emotionality or different levels of ambivalence.</td>
</tr>
<tr>
<td>Analytic</td>
<td></td>
<td>A high results reflects formal, logical, and hierarchical thinking; lower numbers reflect more informal, personal, here-and-now, and narrative thinking.</td>
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<tr>
<td>Authentic</td>
<td></td>
<td>Higher results are associated with a more honest, personal, and disclosing text; lower numbers suggest a more guarded, distanced form of discourse.</td>
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<tr>
<td>Affective</td>
<td>Affect</td>
<td>Emotionality, e.g. ‘happy’, ‘cried’</td>
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<tr>
<td>Processes</td>
<td>Positive Emotions</td>
<td>E.g. ‘love’, ‘nice’, ‘sweet’</td>
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</tr>
<tr>
<td></td>
<td>Negative Emotions</td>
<td>E.g. ‘hurt’, ‘ugly’, ‘nasty’</td>
</tr>
<tr>
<td></td>
<td>Anxiety</td>
<td>E.g. ‘worried’, ‘nervous’</td>
</tr>
<tr>
<td></td>
<td>Anger</td>
<td>E.g. ‘hate’, ‘kill’, ‘annoyed’</td>
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<tr>
<td></td>
<td>Sadness</td>
<td>E.g. ‘crying’, ‘grief’, ‘sad’</td>
</tr>
<tr>
<td></td>
<td>Swear Words</td>
<td>E.g. ‘damn’</td>
</tr>
<tr>
<td>Cognitive Processes</td>
<td>Insight</td>
<td>Indicate whether there were often explanations given, e.g. ‘think’, ‘know’, ‘consider’</td>
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<tr>
<td></td>
<td>Interrogatives</td>
<td>E.g. ‘who’, ‘what’, ‘where’, ‘how’</td>
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<tr>
<td></td>
<td>Comparisons</td>
<td>Where the author is comparing one entity with another, includes words like as, bigger, best, smaller, etc.</td>
</tr>
<tr>
<td>Perceptual Processes</td>
<td>See</td>
<td>E.g. ‘view’, ‘saw’, ‘seen’</td>
</tr>
<tr>
<td></td>
<td>Hear</td>
<td>E.g. ‘listen’, ‘hearing’</td>
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<tr>
<td></td>
<td>Feel</td>
<td>E.g. ‘feels’, ‘touch’</td>
</tr>
<tr>
<td>Social Processes</td>
<td>Family</td>
<td>E.g. ‘daughter’, ‘husband’</td>
</tr>
<tr>
<td></td>
<td>Friends</td>
<td>E.g. ‘buddy’, ‘friend’, ‘neighbour’</td>
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<tr>
<td>Drives</td>
<td>Affiliation</td>
<td>McClelland-like dimensions including reference to others</td>
</tr>
<tr>
<td></td>
<td>Achievement</td>
<td>References to success and failure, achievement striving</td>
</tr>
<tr>
<td></td>
<td>Power</td>
<td>References relevant to status, dominance, social hierarchies</td>
</tr>
<tr>
<td></td>
<td>Reward</td>
<td>References to rewards, incentives, positive goals, approach</td>
</tr>
</tbody>
</table>
The SOA analysis was combined with an opinion and topic analysis in order to better understand what people actually said. Using statistical text analysis methods, derived from corpus linguistics, helped to not only gain insight into the main topics and key-terms used, but also enabled us to look at some aspects in more detail, thus conduct both quantitative and qualitative content analyses. We used the AntCont Toolkit (Anthony, 2005) as well as WordSmith Tools (Scott, 2012) for the statistical analyses as well as inductive, qualitative analyses. These statistical text analysis tools generate frequency-driven wordlists and provide keywords/key-themes, concordances, collocation analyses, and cluster analyses, which are all used to conduct opinions and topic analyses. Collocation and cluster analyses, in particular, focus on key terms and their co-occurring terms, thus indicating a possible relationship between words and therefore revealing certain themes or topics (Au Duong & Zeller, 2017).

In order to gain a first impression of the corpus, frequency lists are being compiled. In fact, analyses regarding frequency patterns, keywords (in context - KWIC) and co-occurrences are the procedures mostly applied in statistical corpus linguistics (Baker, 2006; Baker et al., 2008; Mautner, 2009). This approach can be called bottom-up, since it reveals certain patterns of a corpus and the language used. Frequency analyses of text corpora can then show, for example, that certain terms/words are used comparatively less often in one sub-corpus that might relate to a certain group in the online community, than in the other groups. Subsequently, KWIC analyses can provide more evidence and contextualization onto these first results by showing the direct vicinity or sentence in which these key-words are being used. These statistical calculations can also reveal, for example, that keywords are being used in different contexts, hence point towards differing understandings and associations of words that are important or dominant in a community.

Another interesting approach to gaining empirical/statistical insights into the nature of an online community integrates discursive aspects. For example, in order to analyse the existence of certain power relations - one sub-group appearing to be more dominant than the other - the usage of strong modal verbs such as ‘must’ in contrast to ‘should’ or ‘could’ is an important indicator. These triangulated results can be achieved by using the sentiment analyses results for certain key-terms or

| Risk | References to dangers, concerns, things to avoid |
linguistic patterns.

**SPSS**

SPSS is a widely used program for statistical analysis in social science. It is also used by market researchers, health researchers, survey companies, government, education researchers, marketing organizations, data miners, and others. Statistics included in the base software:

- Descriptive statistics: Cross tabulation, Frequencies, Descriptives, Explore, Descriptive Ratio Statistics
- Bivariate statistics: Means, t-test, ANOVA, Correlation (bivariate, partial, distances), Nonparametric tests
- Prediction for numerical outcomes: Linear regression
- Prediction for identifying groups: Factor analysis, cluster analysis (two-step, K-means, hierarchical), Discriminant

Since LIWC offers a result output format which allows for import to SPSS, this statistical software platform was used for frequency, cross tabulations, and descriptive analyses, triangulated with the above mentioned SOA results.

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30 From https://en.wikipedia.org/wiki/SPSS
References


