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1. Content creation for voice assistants and smart speakers: A challenge for non-English language media

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Abstract—In the last decade, voice assistants are becoming more and more popular. First with smartphones, artificial intelligence driven voice assistants become common for many persons. But with the launch of Amazon’s Alexa home devices, and then Google Nest, a new category of smart speakers started to invade our homes, always ready to answer their owners voice commands. In the last two years the use of smart devices almost doubled, showing this is a trend to watch, and the Covid-19 pandemic caused an increase in its use.

These new interactive devices created new opportunities and challenges for content creators. In one hand, this is one of the most natural interfaces available – the user just has to speak – but to sort out what kind of answer he expects from the device is not straight forward.

Media outlets are no exception in the discovery and exploration of these voice interfaces, which pose new questions and rules, making content creators to go deep into new challenges, first trying to sort out how to interact with users, then to discover what contents should be

tailored to each user and, finally, the format of the news stories more adequate to voice.

Through the analysis of the Portuguese language countries – with focus in Portugal and Brazil – we will try to sort the main challenges and problems that non-English media can face to create and deliver news through smart assistants.

Keywords—smart speakers, voice assistants, artificial intelligence, algorithms, journalism.

1. Introduction

This paper provides a preliminary approach to the challenges of producing content for smart speakers for non-English speakers. To achieve these initial goals, we made an extensive review of the available academic research and international industry reports relating voice assistants, smart speakers, artificial intelligence, and algorithms. The current research will serve as a basis for a second phase, with empirical research applied to Portuguese speaking consumers and producers.

Speech was human's first great tool for communication. By developing sounds capable of creating meaning for a group, human beings were able to exchange important information, such as threats to the group. Writing has emerged very recently in human History: about 5,500 years ago. (Harari 2019)

In the History of the Internet, we can say that it was the opposite: first came writing, then sound. The first voice recognition tool was created by IBM in 1961. It was the IBM Shoebox. It recognized 16 words and digits¹. It was an experiment, which was never marketed.

In the following decades other companies made progress in word recognition. But the big leap, in fact, only arrived in the first decade of

¹https://www.ibm.com/ibm/history/exhibits/specialprod1/specialprod1_7.htm

the 21st century, with Apple's launch of Siri in 2011². From then on, these voice tools gained the definition of voice assistants, as they were able to listen, respond and perform tasks through voice command. Since then, voice assistants became popular and easily accessible to the population.

Currently there are 7 voice assistants and Smart Devices in the western market: Siri and Apple HomePod by Apple, Alexa by Amazon, Google Now and Google Nest (formerly known as Google Home) by Google, Cortana by Microsoft, and Bixby by Samsung. Siri, Google Now and Bixby are part of the smartphones. Cortana is a voice assistant for those who have Windows 10 installed on a PC. Alexa and Google Nest are devices, known as smart speakers.

There are almost eight billion people in the world. Around 66% of them have a smartphone, and most use a device with Android or IOS, i.e., have the availability to use voice assistants. According to some of the most recent surveys, considering all the devices, 45% of Internet users worldwide use voice commands and voice search. In Brazil, the percentage is 38%, and in Portugal, 21%³.

A total of 147 million smart speakers were sold in 2019, representing a 70% growth compared to 2018⁴. Sales of smart speakers are growing steadily, with market revenues estimated at \$15.6 billion by 2020, and market revenues projected at \$35.5 billion by 2025⁵. In the Newman & McClimans (2019) survey to more than 1,000 consumers, executives, marketers and technology professionals from 23 countries in EMEA (Europe, Middle East and Africa), 62% say they expect to use smart assistants to engage with brands, organizations, and governments by 2025, and the expected percentage by 2030 rise to 80%. According to

² VoiceBot.ai (2018). Voice Assistant Timeline. Retrieved in July, 05, 2020.

Available at <https://voicebot.ai/voice-assistant-history-timeline/>

³ <https://wearesocial.com/blog/2020/04/digital-around-the-world-in-april-2020>

⁴ <https://marketingland.com/more-than-200-million-smart-speakers-have-been-sold-why-arent-they-a-marketing-channel-276012>

⁵ <https://www.statista.com/topics/4748/smart-speakers/>

the report, 37% of the households in EMEA have 2 or more smart devices, and that percentage must rise to 56% in 5 to 10 years.

1.1 How they work

Despite different devices and brands, the operation of voice assistants is similar. A keyword or question activates the system that turns voice into text, then into data, and then returns the path to answer the user's request in voice⁶. Voice assistants use artificial intelligence, machine learning and algorithms to accurately meet the user's request.

In a summary, we can discover that AI is a “theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages” (Oxford Online Dictionary 2020)⁷. Machine learning “addresses the question of how to build computers that improve automatically through experience” (Jordan & Mitchell 2015, p. 255). And an algorithm “is a procedure that takes any of the possible input instances and transforms it to the desired output” (Skiena 2008, p. 3).

But the technology is not available for all languages. By September 15, 2020 we had Alexa available in 8 languages (English, French, German, Hindi, Italian, Japanese, Spanish and Brazilian Portuguese). Google Assistant supports 44 languages on smartphones and 13 languages on Google Nest: Danish, Dutch, English, French, German, Hindi, Italian, Japanese, Korean, Norwegian, Portuguese (Brazilian), Spanish and Swedish. Siri is available in 21 languages: Arabic, Cantonese, Danish, Dutch, Finnish, English, French, German, Hebrew, Italian, Japanese, Korean, Malay,

⁶[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/831180/Snapshot Paper - Smart Speakers and Voice Assistants.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/831180/Snapshot_Paper_-_Smart_Speakers_and_Voice_Assistants.pdf)

⁷ Retrieved from <https://en.oxforddictionaries.com/definition/artificialintelligece>

Mandarin, Norwegian, Portuguese (Brazil), Russian, Spanish, Swedish, Thai and Turkish⁸.

According to the Reuters Institute Digital News Report (2019), the usage for any purpose of these smart speakers have risen from 9% to 12% in the United States, between 2018 and 2019. In the same period, in UK the number rose from 7% to 14%, in Canada from 5% to 11%, and from 4% to 8% in Australia⁹. The numbers seem small but, if you look closely, the use of these devices has doubled in a year.

Amazon still has a dominant position in the US, UK, and Germany, but Google leads in markets where it launched first, including Australia and Canada. Devices with screens like the Amazon Show and Spot made little impact so far.

In Portugal, 21% of people use a voice command assistant. The market for home devices, such Alexa and Google Home, grew 36% in one year. In Brazil, the interest seems to be greater: 36% of people use a voice command assistant. The market for home devices grew 4,4% in one year¹⁰. The figures for the Portuguese-speaking countries in Africa are insignificant.

1.2 Voice assistants for news

Research shows that entertainment is the main topic of access in voice assistants. By looking at the figure 1.1 (below) you can see that there is a potential for media outlets.

⁸ Globalme (2020). Voice Assistants Compared. Retrieved in October, 26, 2020. Available at: <https://www.globalme.net/blog/language-support-voice-assistants-compared/>

⁹ Digital News Report (2019). Executive Summary and Key Findings of the 2019 Report. Retrieved in February, 24, 2020. Available at <http://www.digitalnewsreport.org/survey/2019/overview-key-findings-2019/>

¹⁰ We Are Social (2020). Digital in 2020. Retrieved in February, 25, 2020. Available at <https://wearesocial.com/digital-2020>

PROPORTION THAT USED A SMART SPEAKERS FOR ANY PURPOSE/FOR NEWS IN THE LAST WEEK

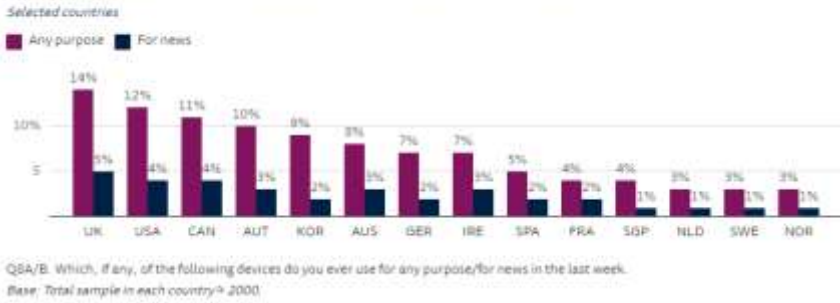


Figure 1.1: Proportion that used smart speakers for any purpose/ for news in the last week. Source: Executive Summary and Key Findings of the 2019 Digital News Report.

The usage of voice-activated speakers doubles once again, but news usage remains disappointing, as the proportion using smart speakers for news is declining as the devices become more mainstream. Less than four in ten access news via their device in the US (35%) and UK (39%), and just a quarter in Germany (27%) and South Korea (25%).

The issue of platform power is likely to become an increasingly important issue for publishers over the next years as Google and Amazon look to provide more aggregated news services in voice. But many publishers may not be interested to invest in new services, building value for platforms without any path to self-monetisation. It is becoming more common to find research to explore the ways Artificial Intelligence (AI) can help communication professionals find and tell better stories. (Prodigioso Vólcan 2020)

Media outlets know how to safely develop products to be shown on TV, listened on radio, or read on Internet websites. But what is the best news product to be activated by voice assistants? How to present your

news stories to be considered relevant and to appear as the first search result of these voice assistants?

The adoption of artificial intelligence in newsrooms, either in reporting, production, or distribution of content, requires training, resources, and ethical debate. Train journalists and editors in general concepts related to artificial intelligence and subsequently in specific technical skills is crucial to promote a organizational culture open to the use of this technology.

Implementing AI-based solutions also requires the development of a strategic vision, economic investment, interdisciplinary team building and the search for alliances with educational and technological organizations. The processes developed with AI should be auditable, adjustable, transparent, and traceable, and respond to ethical standards of journalism; the latter is perhaps the most critical aspect of intelligence implementation in the media industry.

One of the first companies to experiment with the use of Artificial Intelligence through voice assistants was “The Evening Standard” in London, in 2017. In the same year, the BBC launched, in partnership with Amazon, their first full voice skill for Alexa. The following year “The Guardian” launched, together with Google, the Guardian Voice Lab.

The algorithm is fundamental in the voice assistants’ companies. When a person searches by writing in a search engine, a list with several websites appears. The algorithm defines a list of websites and the reader has the option to choose from all the options that appear on the various results pages. But in the case of smart speakers, voice assistants would take a long time to present the same results. So, what happens is that the algorithm defines a single result for the user.

Using voice adds new layers of complexity: we tend to speak in unstructured text. One of the things that makes resolution especially complicated for a large AI system like Alexa is that different Alexa services use different names — or slots — for the same data (Webb 2020). Also, as voice interfaces proliferate in people’s lives, publishers and other organizations face a new strategic consideration: Is our content

optimized for voice search? And, looking further into the future, how should we index our content for future forms of interaction? A new marketing discipline is already growing: Voice Search Optimization (VSO) is the new Search Engine Optimization (SEO), as companies will need to consider how their content is delivered via conversational interfaces.

Media outlets therefore need to sort out several key elements: the logic of the algorithm, and the keywords for search, to become relevant, and thus be presented as a result to the user. In the case of Portuguese-speaking companies there is still another challenge: language.

English is, so to speak, the official language of the Internet. It is also the native language of these voice tools. Only in 2019 Amazon and Google made their products available in Portuguese, and only in its Brazilian way.

Experts say that while in English the commands are understood perfectly, in Portuguese, even when the assistant is made available in the language, there is no lack of flaws and errors of interpretation.¹¹ Portuguese is no exception, with problems also encountered in other languages, such as Japanese¹², many times with hilarious results. On reason for this to happen is the voiceprint problem. Our voiceprints are what enable smart speakers like Amazon's Alexa to recognize different people within the same space. (Webb 2020, p. 71)

1.3 Concerns

There is also another issue to be resolved by the companies that create voice assistants: privacy. There are numerous reports on the

¹¹Latin America Business Stories (2019). *A promissora ascensão das assistentes de voz no Brasil*. Retrieved in July, 05,2020. Available at <https://labs.ebanx.com/pt-br/artigos/tecnologia/a-promissora-ascensao-das-assistentes-de-voz-no-brasil/>

¹² Ata distance (2018). Siri's Strange Japanese. Retrieved in October, 26,2020. Available at : <https://atadistance.net/2018/10/11/siris-strange-japanese/>

Internet of cases in which voice assistants have activated themselves¹³. Researchers in Germany have also discovered more than a thousand other words and phrases that can unintentionally trigger Google Assistant, Alexa, Siri and other assistants, in addition to their traditional activation words¹⁴.

A survey of the Smart Speaker Consumer Adoption Report (CDEI 2019) points out that, in the USA, 1-in-3 consumers cite the concerns about privacy as the main reason to avoid smart speakers, and in the Voicebot.ai report (2020), we can confirm that more than 50% US adults state to be moderately or very concerned with privacy, and with those rising from 2019 to 2020.

¹³Incrível (n/d), *20 Internautas relatam histórias bizarras protagonizadas por assistentes virtuais*. Retrieved in July, 05, 2020. Available at https://incrivel.club/inspiracao-historias/20-internautas-relatam-historias-bizarras-protagonizadas-por-assistentes-virtuais-1088910/?utm_source=tsp_pages&utm_medium=fb_organic&utm_campaign=fb_gr_incrivel&fbclid=IwAR1_to7GTq4Un9URbwJnufwUZEtxsad9ZZvJQswZVd409uo7RrbAszaTNzw

¹⁴NewVoice (2020), *Assistentes: mais de mil frases de ativação involuntária*. Retrieved in July, 05, 2020. Available at <https://newvoice.ai/2020/07/03/assistentes-mais-de-mil-frases-de-ativacao-involuntaria/>

Concern About Smart Speaker Privacy Risk

All U.S. Adults

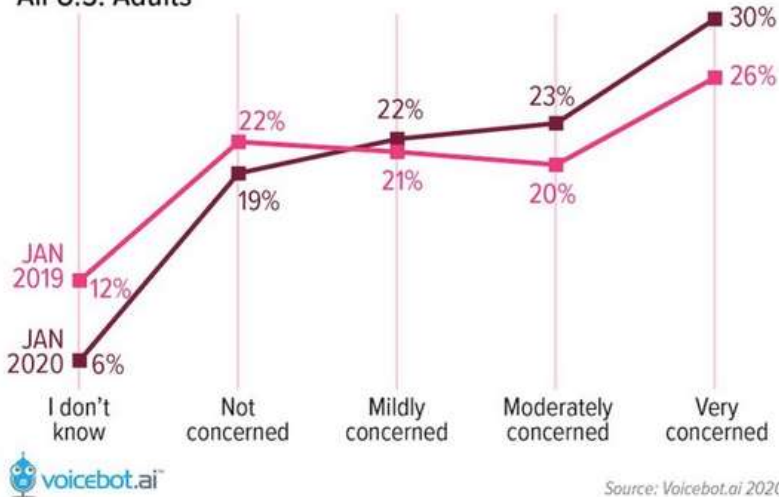


Figure 1.2: Concern about smart speakers privacy risk in U.S. adults.

Source: VoiceBot.ai (2020)

So, it is also very relevant to try to understand the reasons why consumers do not have yet a smart speaker (figure 1.3). Even if in 2020 one third say they are not interested, for no reason, other 33% states as main reason not to have a smart device the fact they are “concerned the device will record what I’m saying”. One fourth are happy with their smartphone functionality, 11% considers price too expensive, and 7% hope to get one, most of them in the next 12 months.

Reason Consumers Don't Yet Have a Smart Speaker

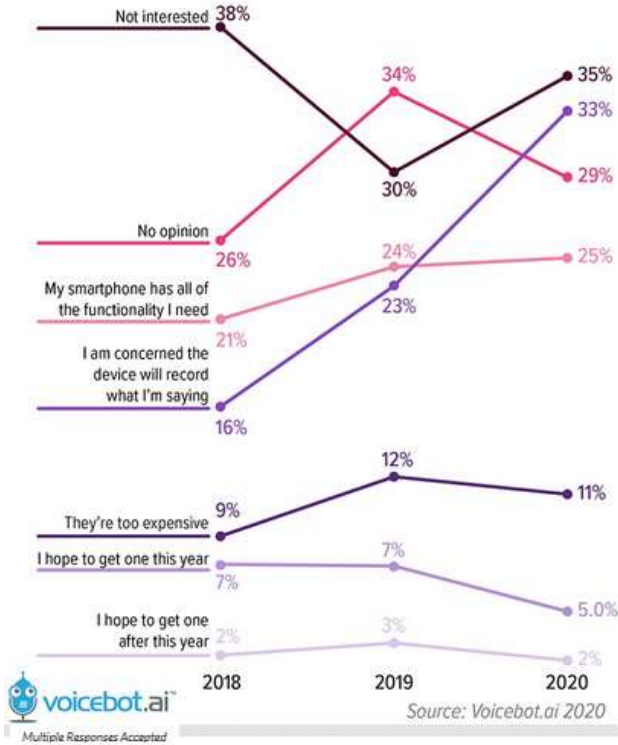


Figure 1.3: Reason consumers do not yet have a smart speaker. Source: VoiceBot.ai (2020).

1.4 The impact of Covid-19

The Covid-19 pandemic seems to have caused an increase in the use of voice assistants. A survey by We Are Social and Hootsuite¹⁵ (2020) published in July, shows that, during the pandemic, the time spent using

¹⁵ <https://wearesocial.com/blog/2020/07/digital-use-around-the-world-in-july-2020>

smart speakers grew by 14%. In general, 45% of internet users aged 16 to 64 use voice interfaces each month (see figure 1.4 below). Asian countries like India (60%), Indonesia (56%) and China (55%) are the ones with higher percentages. The Portuguese speaking countries are below average, with Brazil's use staying at 40%, and Portugal just 22%.

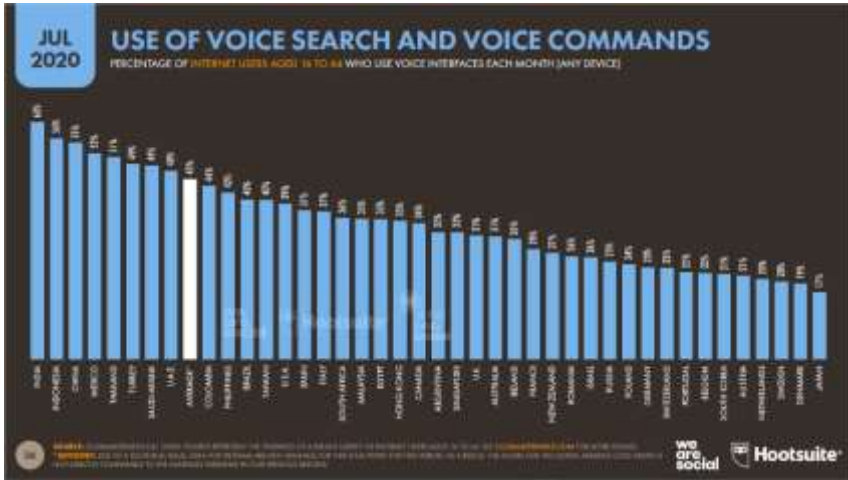


Figure 1.4: Use of voice search and voice commands. Source: Digital 2020: July Global Statshot Report (2020)

And, according to the new Smart Audio Report¹⁶ (2020), published by NPR and Edison Research (see figure 1.5 below):

- 36% of U.S. adult smart speaker owners say they are using their device more to listen to music and entertainment since the outbreak, and 52% of 18-34-year-olds say the same.

¹⁶ <https://www.edisonresearch.com/the-smart-audio-report-2020-from-npr-and-edison-research/>

- 35% of U.S. adult smart speaker owners are listening to more news and information since the Covid-19 outbreak, and 50% of those aged 18-34 say the same.
- Usage of voice commands, in general, has increased slightly since the Covid-19 outbreak, with 52% of voice-assistant users saying they use voice tech several times a day or nearly every day, compared to 46% before the outbreak.

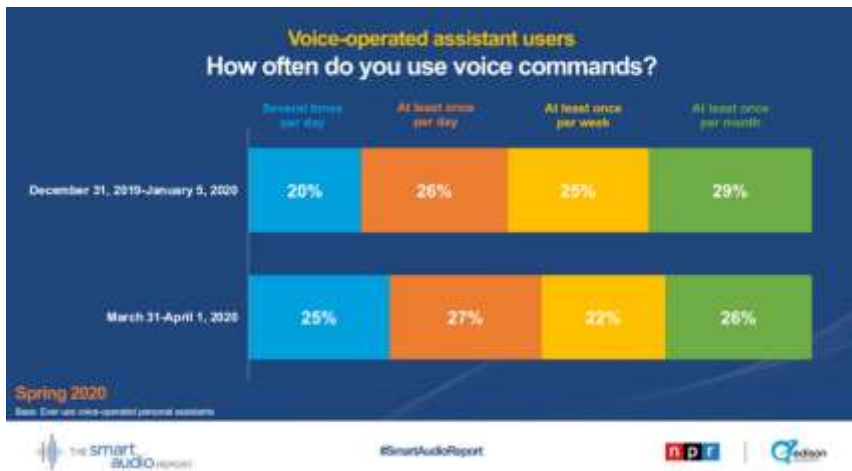


Figure 1.5: How often do you use voice commands? Source: The Smart Audio Report (2020)

1.5 So, what's next?

This is a preliminary research on the challenges content producers for non-English speakers face when developing contents to smart speakers, based on reports and secondary data. The next step in our research is to collect data directly from consumers and content producers

in Brazil and Portugal, with the goal to identify the challenges for producers and the desires from consumers.

From the research, it is clear that companies that develop voice assistants, especially for smart speakers, need to make it evident to the consumer what kind of data they store, and how companies use consumer's information. This can be an attempt to increase confidence in these devices.

Figures from the pandemic period show that interest in voice assistants, especially smart speakers, has grown. This can lead to the understanding that users can overcome fear of privacy at the expense of the usefulness of these tools.

The beneficial side of voice assistants is the inclusion of people who may have difficulties to access the Internet, as visually impaired people or persons with low technology literacy skills (these just because voice is one of the most natural interfaces for humans). These tools also have a special appeal to people who do not want to waste time typing or like/need to do various activities at the same time and need their hands free. Finally, some languages (like Chinese or Japanese, i.e.) use alphabets more complicated to type, so voice would simplify the interactions.

There is data which indicates that most users prefer to speak rather than type. But often, users have the need to correct by writing the result that was presented by the voice assistant. Experts indicate that as language learning by voice assistants improves, the use of these tools will increase even more. (Olson & Kemery 2019).

For Portuguese speaking media outlets, the evolution of technology and the improvement of the understanding of the Portuguese language, with both European or South American accents and norms, is added to all the challenges described above.

And this is a challenge that needs the support of the companies that develop voice assistants. Without the improvement in the communication system, these tools can be restricted to English speaking countries, generating one more type of digital divide.

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