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Using Virtual Assistants and Chatbots for Crisis Communication

Uso de asistentes virtuales y chatbots para la comunicación de crisis

Gema Bonales Daimiel, Ph.D.,
Associate professor at the department of Applied Communication Sciences, Complutense University of Madrid
gbonales@ucm.es
https://orcid.org/0000-0003-2085-2203

Eva Citlali Martínez Estrella, Ph.D. student,
Complutense University of Madrid
evacmart@ucm.es
https://orcid.org/0000-0001-6599-1050

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ABSTRACT

Purpose: To study the role of bots and the main virtual assistants as communication tools and support for citizenship. The goal is to observe if this type of technology achieves the designed objectives, if it is useful for the users and to know how they have contributed to the communication crisis strategies of the government and other institutions in the context of the Covid-19 pandemic.

Design / Methodology / Approach: The current study therefore pursued a mixed method: a qualitative fieldwork whit a quantitative assessment by adding an additional measurement from user's interest. In order to achieve the objectives, the research has a comparative analysis that contrasts the data collected in surveys, interviews with experts and in the fieldwork done on the selected platforms, which have been analyzed from seven different dimensions: predetermined questions, initial greeting, privacy policies, languages, data on the health center, health recommendations and a diagnosis option.

Results: The result of this work shows that 30% of the analyzed sample uses bots, and that those who have used this type of assistants during the health crisis have done so mainly for informational purposes, being the months of April and October the ones that have reflected the greatest activity in this regard; while 38.3% claim to use virtual assistants, Google is the virtual assistant most used in Spain.

Limitations / Implications: The study is focused on the Spanish environment in specific time during health crisis.

Originality / Contribution: Chatbots and virtual assistants are considered as a communication channel that can help to strengthen sanitary measures.

JEL Classification:
M31
Key words:
communication channel,
chatbot,
virtual personal assistant,
technology,
usability

RESUMEN

Objetivo: Estudiar el papel de los bots y los principales asistentes virtuales como herramientas de comunicación y apoyo a la ciudadanía. El objetivo es observar si este tipo de tecnología consigue los propósitos pensados, si es útil para los usuarios y conocer cómo han contribuido a las estrategias de comunicación de crisis por parte del gobierno y de otras instituciones en el contexto de la pandemia de la Covid-19.

Diseño/Metodología/Enfoque: El presente estudio ha seguido un método mixto: un trabajo de campo cualitativo con una evaluación cuantitativa, añadiendo una métrica adicional a partir del interés de los usuarios. Para lograr los objetivos, la investigación cuenta con un análisis comparativo que contrasta los datos recogidos en las encuestas, las entrevistas a expertos y en el trabajo de campo realizado en las plataformas seleccionadas, que han sido analizadas desde siete dimensiones diferentes: preguntas predeterminadas, el saludo inicial, políticas de privacidad, idiomas, datos sobre centros de salud, recomendaciones sanitarias y opción de un diagnóstico.

Resultados: El resultado de este trabajo señala que el 30 % de la muestra analizada utiliza bots, y que quienes han utilizado este tipo de asistentes durante la crisis sanitaria lo han hecho con fines informativos, en este sentido, fueron los meses de abril y octubre los que han reflejado mayor actividad; mientras que el 38,3 % afirma utilizar asistentes virtuales, siendo Google el asistente virtual más utilizado en España.

Limitaciones/Implicaciones: El estudio se centra en el entorno español en un momento concreto de crisis sanitaria.

Originalidad/Contribución: Los chatbots y asistentes virtuales se consideran un canal de comunicación que puede ayudar a reforzar las medidas sanitarias.

Clasificación JEL:
M31
Palabras clave:
Canal de comunicación,
chatbot,
asistente virtual,
tecnología,
usabilidad

1. Introduction

During the last years and specially with the lockdown established in Spain, as a consequence of the state of alarm decreed in March 2020, the new information technologies have played a relevant role thanks to their immediacy and coverage possibilities. These have emerged in the field of health communication, as in other areas, providing a change in the way of conceiving medicine and, consequently, new terms have emerged such as eHealth or telemedicine.

In this context, conversational platforms have become one of the most used tools by institutions in order to alleviate the lack of resources in telephone and face-to-face attention when dealing with the first consultations made by citizens who suffer from symptoms, or by those who request some other type of urgent information related to the disease. This demand for agility was attended to by different companies that offered the development of bot services in record time. "Chatbots are a solution that allows for the rapid implementation of an immediate response to users" (Aguilar et al., 2020). This article analyzes the level to which conversational platforms have had the decongestion of health services in Spain and whether their availability has been useful for citizens. For this purpose, a sample of eight conversational platforms has been taken: four virtual assistants and four chatbots in order to review their particular characteristics and contributions. It also integrates the data obtained through a survey to users and from several interviews with experts.

The result of this research shows that the level of use of specific health chatbots for the Covid-19 currently reaches about 30% of the sample analyzed and that people who have used this type of assistance have done so for information purposes, reflecting greater activity in this regard during April and October. Previously chatbots were present for ecommerce activities, but now conversational attendees have gained strength in the Covid-19 pandemic. In this way, they are no longer just a technological development, because they are transforming into another communication channel that works for the dissemination of important information for citizens, helping to decongest the health system and with a possibility of taking a step towards "telemedicine".

The role of technology in crisis situations has been shown to be fundamental and even more so when it affects health on a global level, as is currently the case. Technological developments in the area of communications technology and, in particular, the implementation of bots can contribute significantly to improving health care and optimizing its resources, solving problems of communication and information and mitigating other problems of various kinds, including psychological problems or those arising from isolation. However, conducting the literature review for this study, it has been observed that there is no research focused on the effectiveness and real scope of these applications (Zarouali et al., 2018, Brandtzaeg and Folstad, 2017). Nor any studies have been found that relate the role of conversational platforms in health emergencies or during the collapse of health systems.

Consequently, it seems entirely relevant that the experience acquired in this extreme situation should serve to stimulate the development of studies related to the evolution on digital technology, and, specifically, on the use of different conversational platforms, which will be very useful for the development and improvement of tools related to the communication processes between men and machines, promoting a prevention culture.

2. AI application in the communication between human-machine

When talking about the human-machine topic, especially about Artificial Intelligence, it is important to take into account the Restless Valley Theory, which assures that the degree of preference of the human being for an artificial intelligence will depend on whether the latter becomes more human. If this is not the case, the inclination for it diminishes. There is a great affinity of systems that use avatars with human forms, because it is easier for the user to identify with the technological development in question (Mori, 1970; Wilks, 2010).

Bots, according to Ferrara (2016), are computer robots that operate online and remotely. However, depending on the specific function for which they have been designed, they adopt one name or another and the term chatbot refers to a "machine conversation system that interacts with human users through a natural conversation language" (Shawar and Atwell, 2005, p. 489).

Since the creation of human-computer interface applications, the use of social keys in the interaction with the computer has had a continuous development (Prendinger and Shizuka, 2004). In this sense, it is important to go deeper into the functions of bots and virtual assistants in communication acts or processes in a period as serious as the current one. Intelligent machines have appropriate computer programs to solve some problems and not others, and although they use the syntactic elements of the language, they do not use semantics (Malpica, 2016, p.9), and this is where their main difficulty lies in communicating with man and imitating him one hundred percent. Their algorithms are logical, they are not human; so they do not form part of the conscious reasoning process of the machine. Consciousness is the capacity of the human to debate, reflect and realize his own existence.

In recent years, studies about communication and technology have focused on finding more advanced ways to measure the usefulness and effectiveness resulting from human-computer interaction, and at the same time, to know how the user responds. Through different studies such as those of Lind and Salomonson (2006), Brandtzaeg and Folstad, (2017), Van den Broeck et al., (2019), among other researchers, it has been proven that conversational robots can improve the experience of online customers, especially because they enhance the feeling of being attended to at the precise moment, they need it. Currently, however, it is difficult to analyze the degree of interaction that exists between these assistants and consumers as well as the level of real understanding that users have of the information provided by this media.

One of the main advantages of conversational platforms is that they can be used by different organizations for individual communication with the consumer, achieving —despite an automated process —optimal levels of personalization and interaction (Van den Broeck et al., 2019 and Kunse, 2016). This is possible because chatbots are specifically designed to be able to have highly personalized conversations with users, using pre-programmed dialogue schemes where the client can make use of natural language or use certain buttons with proposed options and thus obtain particular recommendations and relevant information.

The interaction between the user and the bot is framed within conversational genres, based on direct communication with the audience through dialogue (Trillo-Domínguez et al., 2017). Due to this connection, a relationship of trust is sought to be established in order to respond to their

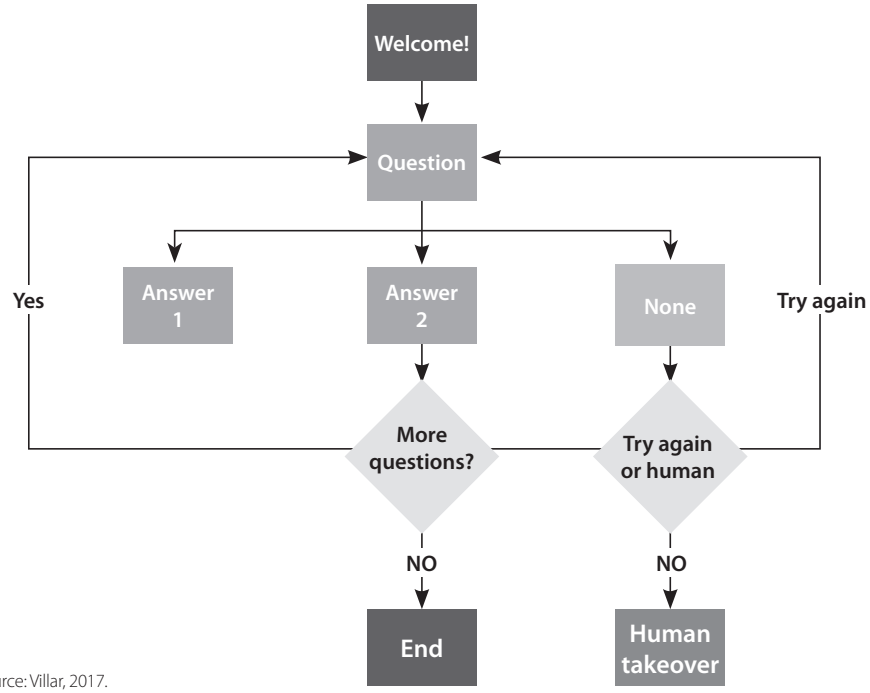
preferences and concerns. These conversational media dominate digital rhetoric through natural language, which should be as close as possible to that of a human being: "the potential of bots lies in their personalized distribution and in their conversational power with audiences, through instant messaging applications" (Sánchez-González et al., 2017: 67).

Chatbots embody four fundamental characteristics that detail their form and behavior: the ability to act autonomously, full or partial automation, which require initial orientation, and are used through online media (Grimme et al., 2017, Hofeditz et al., 2020). In addition, its operation system is very simple, and anyone is trained to operate it as the program is ready to answer your questions (Dahiya, 2017). Overall, part of its appeal lies in the fact that these bots are instantly available 24 hours a day, 7 days a week. The chatbot can make information available on a larger scale and also improves customer service by providing a quick response to the interested party (Van den Broeck et al., 2019 and Herriman et al., 2020)

When a user inputs any question the program employs artificial intelligence (AI) to give the answer immediately, presenting the text in a conversational way. This facilitates the collaboration with researchers and help centers, because thanks to the set of information collected in human-computer conversations, it is possible to have a high level of automation and enrich the databases.

The conversational flow of chatbots based on a linguistic model, as shown in Figure 1, is

Figure 1. Chatbot working: conversational flow



Source: Villar, 2017.

designed to be based on a linear block-structured dialogue. These diagrams always begin with a welcome message and a default answer. However, the answers they provide are limited to answering frequently asked questions (FAQs). The possibility of generating more intelligent and versatile answers that go beyond that predefined script would require constant updating. This automatic learning is achieved by robots that use AI in their design, requiring, therefore, a greater investment. There are also hybrid models, which have the advantage of allowing solutions to be developed even in the absence of data and which can go beyond the scope of linguistic rules to make intelligent interferences in contexts where it is complicated, or impossible, to use language tools exclusively (Artificial Solutions, 2020). An effective chatbot provides results by helping patients to do something without human intervention.

A virtual personal assistant in technical terms, it is a software go-between that interacts with individuals through voice, and can perform tasks or services for us. The process is the result of a merger of artificial intelligence (AI), linguistics, and computer science (Heneveld, 2018). So, these tasks or services are based on user input data, location recognition, process human speech, as well as the ability to access information from a variety of online resources.

"Combining NLP with machine learning, personal assistants' home on who we are, what we like, and deliver personalized responses" (Heneveld, 2018). The interaction that occurs between a virtual assistant and a person should be natural.

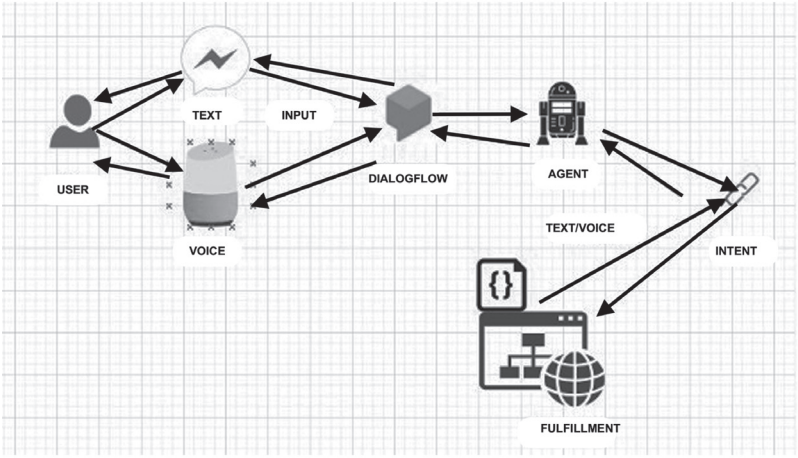
A person communicates using voice and the virtual assistant processes, interprets and responds in the same way. One of the key aspects of an intelligent personal assistant is its ability to organize and maintain information. organize and maintain information. This includes the management of emails, calendar events, files, to-do lists calendar, files, to-do lists, etc. Having virtual assistants on smart devices is now commonplace. The assistant interacts with the user using the device through a speech-based interface to answer questions, make recommendations or perform actions in other digital services to which it is able to connect on demand, providing results in an individualized and targeted way to the user with whom it interacts (Guzman, 2017).

Some examples of personal assistants are Apple's Siri; Google Assistant and Google Now; Amazon Echo; Microsoft Cortana; Voice Mate from LG; Silvia and Hidi from HTC; Bixby from Samsung and Braina. Siri is perhaps the best-known and most popular of the virtual assistants, along with Cortana, Cortana virtual assistants, along with Cortana, Alexa and Google Assistant. These are used in tablets, smartphones, cars, speakers' smartphones, cars, speakers and electronic devices of all kinds. Their function is to help users with certain tasks to users. By means of a simple voice command, they can carry out certain open a certain application, making life easier. People just have to give them the order of what is needed. "Many believe consumers will increasingly become more dependent on smart speakers and their ilk, because they will offer news in a much more interactive manner than traditional news sources and even query the assistant for specific topics and further customize and personalize the experience over time", (Martin, 2017).

An example of the workflow of these virtual assistants is shown in Figure 2. Its computational characteristic is that they respond to a specific user's intention, which is the main purpose that the each virtual assistant has.

Thus, virtual personal assistants are innovations that allow the user to interact with a computer

Figure 2. Virtual assitants's workflow



Source: Paul, 2018.

textually and/or verbally and whose interactions are digitized to be subsequently stored, analyzed and processed through various AI techniques (Tabarés, 2020). This opens up a natural path to add more smart home products, enhance the customer experience, and build customer loyalty through the empowerment of voice control (Heneveld, 2018). Currently this technology uses female voices -so present in IOT technology nowadays- as authority, referring us to gender stereotypes (Piñeiro-Otero, 2011). Therefore, it is of interest to study why only female voices are used in these technologies and what is the scope they have.

Nevertheless, virtual assistants do not yet have the ability to recognize a certain illness through voice analysis; however, technological developments are working on it to achieve the application of "telemedicine". "Chatbots will play a leading role by embodying the function of a virtual assistant and bridging the gap between patients and clinicians. Powered by AI and machine learning algorithms, chatbots are forecasted to save healthcare costs when used in place of a human or assist them as a preliminary step of helping to assess a condition and providing self-care recommendations" (Fadhil, 2018).

Additionally, it offers a simple, low-friction experience (Jenkins et al., 2007). Thus, this digital development transforms the alternatives in the communication processes and speeds up the delivery of information. In this context, it can be said that bots avoid the congestion of communication networks and health system facilities, especially in care centers, and consequently contribute to minimizing the risk of contagion by contact. Furthermore, the development of these platforms based on artificial intelligence can also collaborate in the health education of the population, for example, reducing the possibility of spreading false information about Covid-19. Similarly, the presence of this type of technology helps institutions to have a friendlier and closer approach to concerned citizens (Ahuja et al., 2020).

So, we are facing a techno-social ecosystem, extended by various platforms, devices, protocols, algorithms and interfaces that seek at all times to digitize and enhance the interactions of its users with the environment. Therefore, both conversational assistants have unique possibilities to strengthen general well-being, because they can mitigate the emotional burden that infectious diseases cause in the short and long term in pandemics and thus, promote an active communication between health authorities or managers with each individual.

3. Use of virtual assistants and bots

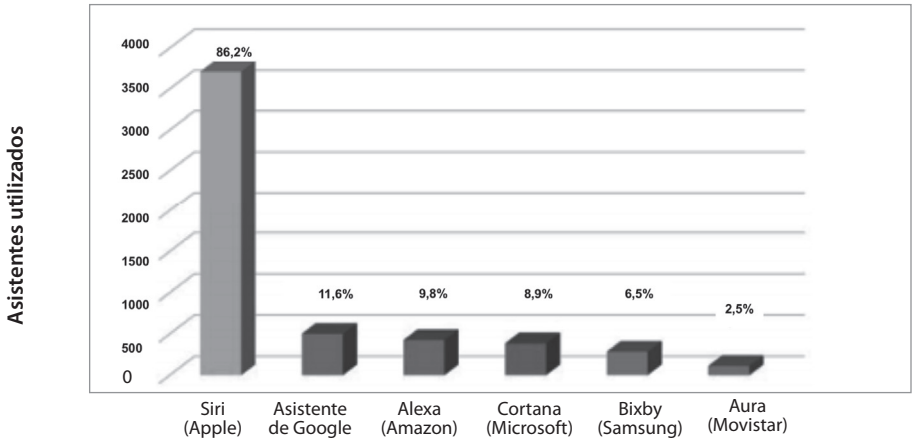
According to a study conducted by HubSpot (2019), the 48% of consumers would instead connect with a company via live chat than any other means of contact; besides, 63% of people would consider messaging an online chatbot to communicate with a business or brand (Joseph, 2019). So, the chatbot can give the opportunity of boosting a brand perception, because the consumer has a friendly experience that offers a visual interaction.

With Statista's 2019 results, 78% of service organizations are taking advantage of chatbots in simple self-service scenarios. Just in second place with 77% is the use of bots to evaluate the type and difficulty of a query before passing it on to the commercial agents. It should be noted that this communication channel has surpassed the use of social networks between brand and consumer.

In Spain there are 43 million internet users, of which 52% use social networks and 62% make online purchases, with product and travel inquiries being the main information sought to be answered by a chatbot (We are social, 2019).

As for virtual assistants, around 4.3 million families use them on a daily basis, which is equivalent to 10.7% of the Spanish population, according to the results of the 1st Wave of the General Media Study 2019 (EGM) and the Association for Media Research (AIMC). The leading virtual assistant is Siri, owned by Apple, while the assistant of Google, Alexa (Amazon), Cortana (Microsoft) and Bixby (Samsung) have an average share between 7% and 12%. Aura (Movistar) is beginning to be used.

Figure 3. Virtual assistant insertion in Spain



Source: Estudio General de Medios (EGM).

Furthermore, during 2020, only 8% of the Spanish population said they use virtual assistants several times a day; while almost 20% said they use conversational platforms a couple of times a week (Statista, 2021). Virtual assistants become an important channel for generating two-way communication in emergency management (Bird et al., 2012), in which there is a need to disseminate accurate information to combat rumors, give warnings and recommendations for action; as well as communicate data on specific situations (Hofeditz et al., 2020).

Another benefit of a virtual assistant is that it can be used in text or voice format, thus helping people with disabilities, or elderly people without sufficient knowledge to search manually for the required information on the web. According to a study carried out by the Digital Marketing Agency Trend (2020) in Spain, assistants are used mainly to ask questions, check the weather, find places or listen to music and their presence represents 4.3 million homes in this country.

For these reasons, the conversational platforms have been a key piece in this crisis because they have provided information, follow-up, monitoring and health control to the citizen in the first phase of the detection of the contagion, when the health system was especially saturated with sick people and people who presented some symptoms compatible with the Covid-19 infection.

4. Influence of conversational platforms on a crisis communication

Natural disasters and pandemics are unforeseeable and pose unique challenges to health care delivery; as a result, the Covid-19 pandemic has been a huge undertaking for both researchers and technology developers, as technical teams around the world have sought digital solutions to help relieve the pressure on medical issues in healthcare facilities.

Researchers Miner, Laranjo and Kocaballi (2020) believe that pandemics have three unique characteristics that make them susceptible to personalized interventions through these robots. First, individual actions can significantly worsen outcomes in these crises, as a single individual can infect more people, depending on their behavior. Second, there is a fear of infection and a "stigma associated with the disease, as a result, people may feel personally responsible for poor outcomes during a pandemic and also hide symptoms" (Miner, Laranjo, & Kocaballi, 2020). The third feature is that during such a situation, many people should avoid physical gatherings, which may worsen the risk of future mental health problems.

For this reason, several government organizations and health institutions have used social media platforms such as Facebook, WhatsApp, Instagram and Twitter to provide specific information about Covid-19 to the population. WhatsApp is one of the main methods of providing information about Covid-19 in many countries (Hutchinson, 2020). An example is the governments of Australia, India, Singapore and the United Kingdom.

The creation of all Covid-19 applications has served to collect and register data related to the user's health. The first to be developed and widely distributed were the contact tracking applications, which were created to notify users if they had crossed paths with another person infected with the coronavirus. The first of these was developed in Singapore (Baharudin, 2020). Later, applications were developed to monitor the compliance of citizens with the lockdown, as well as conversational assistants that answered the frequent questions of the population.

The applications of symptom surveillance have been useful in identifying disease trends

Table 1. Conversational robots in Spain.

Company	Media	Chatbot	Institution
1. 1millionbot	Web and WhatsApp	Carina Bot	Ayuntamiento de Alicante y Elche
2. Hubtype	WhatsApp and Telegram	gencatBot	Generalitat de Catalunya
3. Chatbot Chocolate	Web	Maia	Servicio Vasco de Salud
4. CARTO, ForceManager y Mendesaltaren, con el apoyo de Telefónica, Ferrovial, Google y Googo.	Web and WhatsApp	CoronaMadrid	Comunidad de Madrid

Source: Own elaboration.

and possible areas of high transmission. Most countries made the applications and chatbots based on the disease symptom manual and on the questionnaires that users were answering (Hanson et al., 2020).

Table 1 lists some of the bots that emerged in Spain (2020) to join the health struggle in the pandemic corresponding to the institutions contacted for this study.

Carina has been developed by 1Millionbot in Spain. It is a free conversational platform about coronavirus based on AI that uses official sources such as the World Health Organization (WHO) and official government sources. This technology, launched in the first half of March 2020, has been inserted by different entities in their web pages. Like Carina in Spain, this company developed a month later for the Republic of Ecuador, the Catalina chatbot. The United Nations Development Programme (UNDP) awarded this Alicante-based company the development of Catalina to provide an urgent response to the demands of the citizens of Ecuador. This bot is hosted in 79 official pages, and in three months of operation had an interaction of 135,000 users (Torre Juana, 2020).

Hubtype has created, along with the Ministry of Health, a conversational robot on the coronavirus for the Generalitat through instant messaging applications such as WhatsApp. This company defines itself as a company that "creates quality conversational experiences" (Hubtype, 2020). The bot, available since June 2020, shares content on health and civil protection, as well as data on those affected, advice, lockdown measures and information on the evolution of the pandemic for free.

Chatbot Chocolate is "the leading agency in the design, development and training of chatbots and voice apps" (Chatbot Chocolate, 2020). Maia, conversational assistant launched by this company in early April 2020, is capable of answering more than 125 different questions asked in more than 50,000 different ways in Basque and Spanish (Planeta Chatbot, 2020).

The Community of Madrid decided to create a platform inspired in South Korea, which was launched at the end of March 2020. The function of CoronaMadrid is to evaluate through a series of questions the clinical situation of the citizen. So, the user can know the magnitude of his symptoms and is guided on the procedure to follow in each

case. The evaluation can be done again every 12 hours to incorporate the new developments that could have happened in his evolution. In addition, this system allows to obtain epidemiological data and to offer personalized information, and to offer the best preventive and evaluation measures, it includes a geolocalization system" (Pérez, 2020).

5. Methodology

The technologies from the virtual assistants need massive amounts of data, which include algorithms to learn from data input and become each time even better at predicting the user's needs. The current study therefore pursued a mixed method: a qualitative fieldwork whit a quantitative assessment by adding an additional measurement from user's interest. The main goal is to find patterns of usability and to know which virtual assistant has the higher human speech understanding. Also, the collected data was used to determine the content quality of the answers and to know if the virtual assistants and bots could provide a diagnosis of a possible Covid-19 infection.

A field work was made to obtain firsthand information from four virtual assistants with the largest market share in Spain: Siri, Alexa, Cortana and Google; as well as four conversational platforms that emerged during the Covid-19 and were used by Spanish people. This work consisted of making a list of generic questions about the virus information, then the answers of this AI technologies will show the understanding level and its ability to help in a health crisis. For these reasons, the following parameters were used to explore both kind of platforms:

- Privacy Policy.
- The initial greeting.
- Languages that have.
- Information: battery of questions and answers you have.
- Recommendations about the disease.
- If there is a diagnosis of Covid-19.
- Information about health centers.

These criteria were chosen because through them, it was possible to determine its functionality, whether it was possible to have a fluid conversation between the program and the user and also, to know if the information provided by the virtual assistants was useful and helped the user's doubts. With the language criteria, the inclusive possibilities provided were established, while the initial greeting and privacy policies are important elements for building trust with the user. These parameters have provided the necessary data (qualitative and quantitative) to make a comparative analysis between virtual assistants and chatbots.

Then, an in-depth interview was conducted with four experts representing the above-mentioned companies, which took place during July and August (2019). This type of interview is defined as a "social technique that puts into a relationship of direct face-to-face communication a researcher/interviewer and an individual interviewed with whom a peculiar relationship of knowledge is established that is dialogical, spontaneous, concentrated and of variable intensity" (Canales, 2006, p. 219). This research technique produces information of a qualitative nature, seeking to generate greater richness in the linguistic material collected.

And finally, in order to complete the analysis, a survey was carried out, because it was important to explore if both programs achieve their initial objective. So, the survey participants added validation to the data collected in the fieldwork. The purpose of any survey is to

measure the degree or the way in which the subjects possess certain variables and concepts of interest for the research. In order to facilitate the process of carrying out and later measuring, the questionnaire had closed answers. This was conducted online in September and October (2020). The sample universe (n=100) was 18 to 65 years of age and was intended to be simple random to minimize the probability of bias. Participating people were from five Spain's Autonomous Communities: Madrid, Valencia, País Vasco, Castilla la Macha and Andalucía. All people participating in the study have a smartphone. This ensured that they are familiar with some type of AI technology.

Then, six categories were reviewed by the survey: use of specific chatbots during covid, evaluation of their performance, usability, handling, usefulness to replace face-to-face assistance and proposed improvements to the platforms; as well as a general assessment of the tool used during the pandemic and possible suggestions for improvement. In this way, the aim was to contrast the experts' point of view about the bots with the users' own assessments.

Throughout research described, the study aimed to examine the complex interaction between the strengths and weaknesses of current AI conversational technology. Through the use of both quantitative and qualitative data, this text provides a comprehensive examination of user's interest experiences of usability and health information quality.

6. Results

The following tables show the most relevant results of the experiments carried out on the four virtual assistants used in the study.

Table 2. Comparison of the conversational robots

	Carina Bot	gencatBot	Maia	CoronaMadrid
Privacy Policy	no	no	yes	yes
Initial greeting	yes	yes	yes	yes
Languages	Spanish and English	Catalan	Spanish and Euskera	Spanish, English, French and German
Questions	preset	preset	preset	preset
Answers	preset	preset	preset	only yes or no
Recommendations	yes	yes	yes	yes
Background/Profile	yes	no	no	yes
Diagnosis	no	no	no	yes
Information about health centers	no	no	no	yes

Source: Own elaboration.

Table 3. Comparison of virtual assistants

	Siri	Google	Alexa	Cortana
% Preset Answers	69 %	56 %	49 %	38 %
% Complete answers	75 %	32 %	25 %	20 %
% Humor	0,8 %	0,3 %	0,1 %	0 %
Recommendations	Yes	NO	Yes	NO

Source: Own elaboration.

Table 4. Comparison between bots and virtual assistants

	Bots	Virtual Assistants
Privacy Policy	Yes	no
Initial greeting	Yes	It only has it if the user requests it.
Languages	Several	Depending on the programming.
Questions	Preset	No questions asked
Answers	Preset	Preset
Background/Profile	Yes	no
Diagnosis	Yes	no
Information about health centers.	Yes	It only has it if the user requests it.

Source: Own elaboration.

Table 5. Functionality of chatbots

Question	Answer
Did the chatbots help in the health crisis?	100 % - Yes
Which is the advantage of a chatbot?	100 % - Accessibility of information
When was it used the most?	50 % - at the peaks of the pandemic. 50 % - at the beginning of the lockdown
Do you think that in time this technology will be implemented?	100 % - Yes
Possible improvements	Adapted for people with disabilities. Transactional capacity.

Source: Own elaboration.

According with the Table 2, CoronaMadrid is the more complete chatbot, because it has several languages and also provides health centers information.

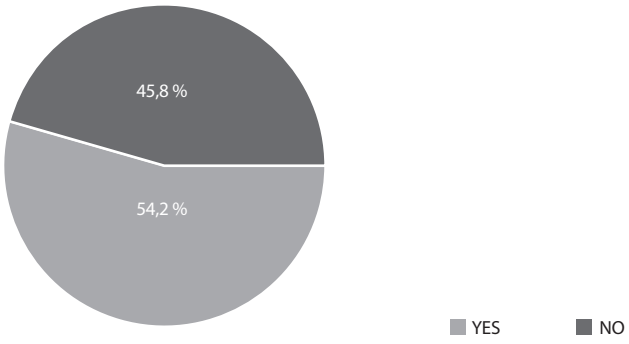
As shown in Table 3, Siri is the virtual assistant that has the highest understanding of language, because it can provide answers with a more complete grammatical structure and even adds some humorous phrases.

The following table shows the main differences between bots and virtual assistants in terms of the criteria that had been evaluated.

Later, From the interviews conducted with experts, the following answers can be highlighted:

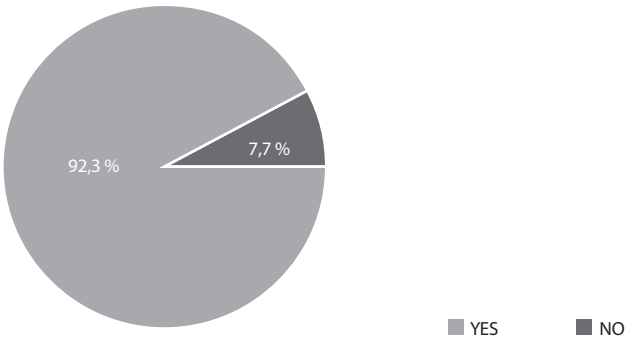
The survey measures the user's interest about Covid- 19 chatbots. More than half of the participants answered that these technologies have helped them with "useful" information about the Covid- 19 sickness. While, a 15% answered that with the chatbot they knew which health protocol have to follow. Only a 4% mention that the chatbot was useful to identify the infected people who were nearby.

Figure 4. Percentage of responses to the question Did it help?



Source: Own elaboration.

Figure 5. Usability of Covid-19's Chatbots



Source: Own elaboration.

In terms of usability, almost 100% of the sample found easy to use the Covid-19 chatbot.

Following, 30,8% indicates that this kind of chatbots were very useful to provide information on the disease. Only the 15,4% replied that it was "not useful at all".

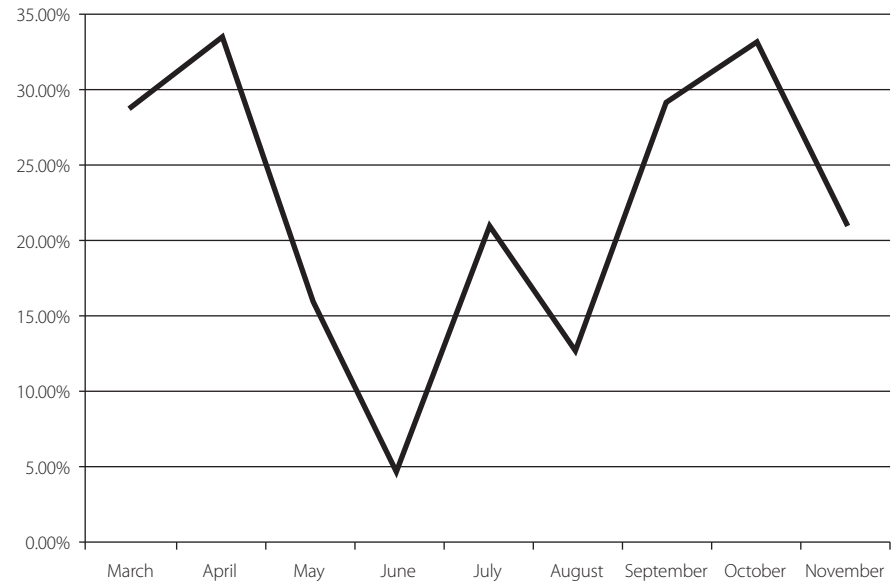
The next figure shows how the bots were used in relation to the request for information on covid during 2020. We can appreciate the peaks during 2 months: April and October.

Then, 38.3% of the participants said they use some virtual assistant, usually that of their own cell phone.

In general, there is a closed relationship between the age and the interaction with any AI programs, because people in their 20s and 35s are the ones who use them the most.

Afterwards, once the results are analyzed, the paper will be closed showing the usability

Figure 6. Bots usage curve (2020)



Source: Own elaboration.

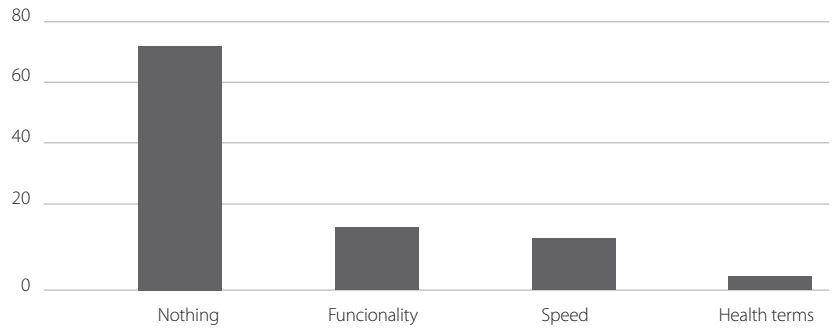
According whit the participants, the chatbots are just fine, because the 70% of the sample answered that the do not make changes in the platforms. A 2% said that may will be a good option to review the health terms and use some less complex for having an easy understanding.

patterns of the platforms and the main conclusions.

7. Discussion and Conclusions

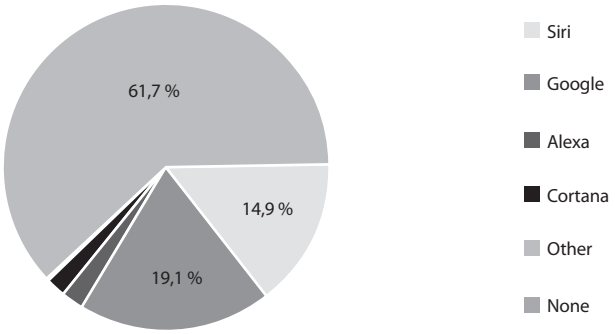
This study has yielded several conclusions. Firstly, it has been observed that all the bots analyzed coincide in several of their

Figure 8. Changes in Covid-19 chatbots



Source: Own elaboration.

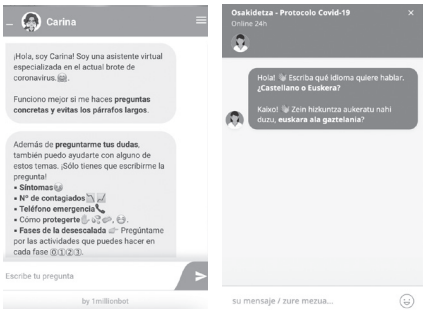
Figure 9. Use of virtual personal assistants



Source: Own elaboration.

characteristics. Two of the platforms studied -Carina and Maia, which do not belong to the same company, have a similar look & feel (green and white color) and bot use a female voice and name, coinciding with the research made by Piñeiro-Otero (2011), which stablished that female voices are used as an authority reference. The rest of the platforms have an assistant that is not based on the virtualization of a human being. However, this fact doesn't make a difference for the users.

Figure 9. Use of virtual personal assistants
Figure 10. Conversational robots that have the look of a woman



Source: Carina y Maia, 2020.

On the other hand, the interview carried out has been fundamental to know the opinions of the professionals who are behind the development of this technology. This study's results provide a picture of the importance of the chatbots in this health crisis and the first thing that can be deduced, once the answers have been analyzed, is the informative nature that most of these conversational robots have, in addition to the fact that all the interviewees emphasize the importance of their work during the first weeks of the state of alarm. It has been detected through this analysis that the systems incorporate a low degree of Artificial Intelligence, especially when it comes to the use of natural language in the interaction between chatbot-user; in several cases it happened that the bot did not understand the questions asked, which means that the options in the conversational flow are limited.

Other conclusion derived from the in-depth interviews with the experts and protagonists of the design of these platforms is that the 96% were satisfied with the fulfillment of the objectives that had been proposed in their design, specifically those of being a reliable informative tool that would collaborate to create new communicative channels that would manage to decongest the traditional ones. In contrast, as reflected in the user surveys, only 29% of the participants stated that they did not contact their health center after making the consultations through these means. Despite the fact that these tools were designed to decongest a health system that was beginning to collapse, the reality is that they have not significantly prevented people from going to their health centers, since these tools -still in the first phase of development in terms of Artificial Intelligence (AI)- are not prepared to respond to certain complex questions or to do so with the security that person-to-person contact provides when explaining their problems in detail.

Likewise, the surveys have helped to complete the study and to get the perspective of the citizens' use experience. In this sense, it is clear the main reason why the respondents have come to these platforms and that is the search for information. Specifically, there are two peaks of use corresponding to the months of April and October, which also coincide with the two waves of infections in Spain so it can be deduced that the worsening of the figures of infections and deaths is related to the demand for access to such sources of information. Additionally, experts agree that these periods were the ones when the platforms were most used.

It is also found that the lockdown —released in March 2020, as a result of the state of alarm— accelerated the adoption of this technology in health care area. During these months, the bots have improved; for example, they have included: recommendations, profile information and data to contact health centers. However, they still follow a tree of answers and one of their clearest limitations is that they only answer certain predefined questions.

The information provided by the sample about the most used platform places CoronaMadrid in first place, a fact that is in agreement with the origin of most of the respondents, although others said they do not remember the name of the chatbot used. It is noteworthy that some people pointed to RadarCovid as the platform. Nevertheless, this is an app that requires downloading and is primarily intended to register infected people to warn users of having been in contact with a positive case, but it is not a chatbot. This indicates that users are unaware about the difference between AI technologies and the services offered by each one. Currently, most people install different applications on their cell phones for entertainment, professional and even educational use, but one of the things that distinguishes conversational robots from other apps is that they do not need to be downloaded, as they work online through websites or social networks.

Then, as a summary of the results obtained in the series of questions asked to the four assistants, it can be concluded that the answers of Alexa and Cortana are the most elaborated grammatically. Therefore, they are more advanced in terms of intellect. Alexa, especially, is one step ahead in terms of natural language. Siri is the only one who calls you by your name when answering. Alexa has order information, has the bank details, address and name, but does not address the user by name, as Siri does. And none of the four attendees includes invasive advertising of the type of conventional advertising such as spots or banners on the Internet.

Subjectively, assistants fall short in intellect because they give very primary answers to the most open or complex questions. Their artificial intelligence, despite appearing complex, is still very simple and leaves a lot of margin for improvement. It can be said that the level of language comprehension is basic. Occasionally, they do not respond to questions formulated in natural language that have an average level of complexity because they do not understand them or know how to process them, in addition to not distinguishing properly between statements and questions. Their intonation is simple, and they should work on using it to communicate the results more effectively. Likewise, they do not process the information in a logical way, their answers are determined; therefore, they limit themselves to giving standard answers, since they respond in the same way to different questions and say the same thing to some and to others, there is no difference between interlocutors. Virtual assistants can perform voice recognition awkwardly. In addition, they do not remember whether they have been asked the same question five or ten times. So, this lack of memory may make the virtual assistant less useful for people with disabilities.

So, it can be concluded that all these conversational platforms have collaborated to disseminate the preventive measures established by the health authorities such as the promotion of the famous "Stay at home", a recommendation that all include. Furthermore, due to the type of language used and the structuring of the programmed responses, they are a reinforcement tool that emphasizes the messages regarding how to act in case of contagion and, by maintaining an informative tone, they also manage to transmit a reassuring sensation, preventing users from panicking and acting in a chaotic way that is not very effective for their interests and those of the rest of the citizens. For these reasons, the analyzed conversational assistants are positioned as another useful means of communication to be used in communication strategies in case of crisis.

In general, and for all that has been mentioned, it seems pretty evident that a transformation is taking place in the semiotic patterns of culture and of advertising in particular around this technology. A transformation that has only just begun, since such motivations have not yet completely taken. At his moment, there is a lot of space for innovation and development of these assistants. We are very close to the real transformation. However, as devices become more interconnected to the social network profiles of each user and can collect more data, privacy and security concerns will increase. The way companies choose to balance their customers' privacy with this abundance of data will be a crucial factor in maintaining user confidence and may even be marked as a competitive advantage among conversational platforms.

While it is true that the processing of natural language in virtual assistants and chatbots still has much to improve, what nobody doubts is that the great opportunity they will provide to advertising, since through a conversational business you can establish a relationship with a more personal level with the brand. The future, without a doubt, is going that way, where the stars of the ads are not the celebrities who star, but the product being promoted. The brand itself is mutating, because in this case, the conversational assistants will talk about their values and their advantages to the consumers, providing more credibility.

A possible scenario for these AI tools is that they will be used to enhance human capabilities even further and that they can spend more time on strategic rather than operational activities. With these technological developments, a path is being promoted in flow automation projects, especially within the health sector, since thanks to the user experience and data collection, there is a constant improvement in software performance. In the long term, when this crisis is over, it is likely that chatbots will become digital portals for interactive health care, helping patients and doctors and thus facilitating the first care in a health emergency. Consequently, monitoring the development and implementation of conversational robots in the health area and their application in crisis situations is still a very new field that undoubtedly invites researchers to remain alert and open new avenues of research.

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