

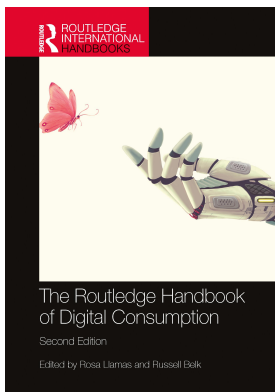
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10

CHATBOTS

From Eliza and Alexa to Therapy-bots, and Sexbots

Russell Belk

The Gold Standard for human conversation at a five o'clock tea would require a robot to meet the standard for a human: (1) looks, (2) gestures ... (3) conversational content ... (4) conversation in spoken language ... and (5) conversation level, i.e., informative and productive.

(Boltuć 2017, 217)

The appearance part is still a robotic work in progress, but the conversational part has arguably been met, at least at a rudimentary level. Chatbots are computer applications that simulate human conversation via text or voice. They operate on various digital devices and are sometimes incorporated in stand-alone devices such as GPS units, digital assistants, dolls, and toys. In this chapter, I briefly outline the history of chatbots and address some of the uses and issues involved as they increasingly become a part of our lives.

Now that we have semi-conversational AI such as Siri, Alexa, and Google Assistant in our homes, phones, and cars, it is time to ask how close we are to meeting the Gold Standard that Boltuć (2017) proposes. The answer depends on the application area. In this review, I will focus on four: (1) translation, (2) chatbots, (3) digital assistants, and (4) robots. The criteria for human-like interaction are understandably more complex as we move from one to four.

A Brief History

Starting with the Sumerian epic of Gilgamesh (circa 2700 BCE), we have been able to read about the thoughts and imaginings of people who are distant from us in time and space. By about 2400 BCE, Pharaohs in Egypt started a mail service to transmit royal decrees via couriers. But until the time that movable type printing was created in 11th-century China, most people of the world were still illiterate. Popular culture and religion were delivered orally. Delivery of printed messages by land and sea took time. Cheap printed material, better educational systems, and faster transport improved this situation, but it was not until the invention of electronic technologies for rapidly conveying words across time and space that our imagination of telepresence (feeling in the presence of a distant other) began to develop (Belk, Humayun, and Gopaldas 2020).

The electronic age began in the 40-year period following 1838 that saw the invention of the telegraph, telephone, and phonograph. These new devices facilitated communication between humans who were absent and unseen. The result initially was magical; voices from afar made telepresent (Katz 2006; Sconce 2000).

The telegraph came first and allowed instant communication between distant people, mediated by telegraph operators. The messages were brief, expensive, and used primarily for urgent messages. Only the rich could afford to send trivial or casual messages. Nevertheless, Standage (1998) called the telegraph “the Victorian internet.” For the first time we could reach someone at great distance in minutes rather than days or weeks (Gitelman 2006). Sconce (2000, 7) observes that “Telegraph lines ... appeared to carry the animating ‘spark’ of consciousness itself beyond the confines of the physical body.” Among other effects, this gave rise to a movement envisioning a “spiritual telegraph” connecting the living and the dead (Peters 1999). This resonated with thousands of years of religion, myth, and invention.

Kittler (1986/1999, 28) suggests that if the telegraph was an artificial mouth, the telephone was an artificial ear. Continuing the analogy, the phonograph was an artificial memory that can store and retrieve the voices of those from the past. It was initially unsettling for people to hear the disembodied voices of the living and the dead emanating from Edison’s wax cylinder phonograph (Gitelman 2006). Recorded voices and songs of telepresent others seemed to some to have captured their souls.

The digital revolution that began 50 years ago has brought not only a switch from analog devices but also changes in the way we buy, sell, manufacture, communicate, share information, work, learn, entertain ourselves, surveil, interact, run for office, navigate, conduct warfare, and pursue perfection in humanoid robotics. This move to artificial intelligence encompasses **translation, chatbots, and digital assistants.**

Translation

Translation is an important part of conversational AI. Transcription is a seemingly simple form of translation, from spoken language or dictation to text on a page or screen. Carefully enunciated dictation is one thing, but casual run-together recorded conversation is quite another. Oral transcription also requires learning the pace, timbre, pitch, and accent of the speaker. Even then, unless the transcriber employs special notation to capture how something is said, there is always a loss in the transcription.

Translation between languages can be one-way (person-machine) as well as two-way (person-machine-person). Input can be typed, written, spoken, or entered via device like a camera focused on the text of a menu or sign. Output can be both text and spoken. Translation programs by Google and Baidu can be found on or added to smartphones at no cost. There are also a number of professional programs available that aid professional translators by drawing on a vast archive of prior translation that can be put together in new contexts (Reinke 2018). Older approaches like grammatical rule-based translation programs have given way to statistical methods of probabilistically choosing the best matching phrases in another language and then using bidirectional recurrent neural network encoding and decoding (Koret 2019).

This approach to translation has been called “brute force” (Greene 2017). It relies on vast amounts of data that has already been parsed by humans. As machine learning and neural network architecture have gotten better, the software is able to determine, for instance, that “the right to bear arms” is a more common construction than “the right to bare arms.” In addition, machines are beginning to sound more like humans and less like stereotypical

robot voices. This includes giving their speech proper prosody involving speed, pitch, and volume, and stressing which words to emphasize (Greene 2017).

Still, the brute force and machine learning neural network approaches are necessary for a very simple reason: "...computers, no matter how sophisticated they have become, cannot yet truly grasp what a text means" (Greene 2017). Hofstadter (2018) put Google Translate to the test with two-way translations between English, French, German, and Chinese text. For example, he asked the program to translate "One swallow does not a thirst quench" into French. The result was "Une hirondelle n'aspire pas la soif" – roughly "a swallow [the bird] is not inhaling (or not sucking) thirst." Mistakes in translations of other languages were even worse. Hofstadter acknowledges that the program may work sometimes, "giving the illusion that Google Translate *knows* what it is doing, *understands* what it is 'reading.'" Yet he concludes:

I've seen graphs made by technophiles that claim to represent the "quality" of translations.... Such quantification ... reeks ... of nerds trying to mathematize things whose intangible, subtle, artistic nature eludes them.

This harsh, if elitist, take on the state of machine translation may not irrevocably doom conversational AI in pursuit of human conversation, but it does give us pause.

Chatbots

The first chatbot is generally taken to be Joseph Weizenbaum's (1966, 1976) psychotherapist bot, ELIZA. Using or parodying Carl Roger's (1951) then popular psychoanalytic technique of autodirecting his patients by using key words first used by the patient to probe for further detail, the program was able to fool many people into thinking the computer program with which they were exchanging messages was a real person.

To test such artificial intelligence Alan Turing (1950) proposed that the best measure of whether a computer possessed human-level intelligence was whether in a series of written exchanges people could consistently tell whether they were communicating with a human or a computer. Shah et al. (2016) pitted five commercially available chatbots against ELIZA using undergraduate students and members of the general public. On a scale of 0–100 where 50 = "good conversation, but machinelike" and 100 = "fully humanlike," the best new bots scored an average of 62–64, while ELIZA scored 25. Since 1991, a contest called the Loebner Prize has been held every year to ascertain if any of these programs can pass the Turing Test by fooling most of the judges most of the time. This has now been achieved, but the competition has been criticized as devolving into efforts to trick the judges rather assess whether there are truly conversational chatbots (Shieber 1994; Sundman 2003).

Retail Chatbots. Without the intention of fooling the consumer into thinking that the chatbot is human, there are the many commercial chatbots that already serve in online retail service positions (van Doorn et al. 2017). It is estimated that between April and September 2016, more than 30,000 chatbots were created for Facebook Messenger alone (Dredge 2016), and in 2021, there were more than 10 times that number. By 2021, 38% of all website traffic involved bots, and nearly two-thirds of them were "bad [i.e., malicious] bots" (Imperva 2021). Still, humans must sometimes fill-in when automated chatbot responses prove inadequate (Olalere 2019).

For consumers, compared to waiting on hold to talk to human service representatives, instant access to helpful chatbots is most often greeted as a welcome alternative (Ciechanowski

et al. 2019). In spite of knowing that they are chatting with a computer program, consumers commonly treat such programs as real people. This should not be surprising as people also commonly anthropomorphize computers, televisions, and social media (Reeves and Nass 1996).

Therapy Chatbots. It is worth remembering that the format of the original ELIZA program (Weizenbaum 1966) was that of a therapist using Rogerian psychotherapeutic approaches to help patients. The anonymous appearance of such apps and bots allows people to avoid the expense and perceived stigma of seeking mental health help from other humans. There is a disinhibition effect in communicating online, such that people are willing to convey intimate details of their lives that they would not disclose in face-to-face communications (Belk 2013). Even the nonverbal facial expressions that people use in interacting with machines are more expressive than when they are interacting with humans (Murphy 2019). And the mere fact of talking about problems may be therapeutic in itself – a reason that practices initiated by early pioneers like Freud and Jung were called “the talking cure” (Hampton 2003). The programs can also operate 24/7 and be available in times of need. With nearly one in five US (Sojit 2020) and one in four UK adults (Health Europa 2019) affected by some form of mental illness, plus increased confinement at home during Covid-19, it became clear that therapeutic chatbots can play a role in helping.

There are a variety of therapeutic chatbots available online. Some are available on Facebook Messenger and others are stand-alone platforms and apps. Some are free, others have monthly fees. The more expensive ones also match users with licensed mental health counselors who leave voice message responses that can be accessed asynchronously (Browne, Arthur, and Slozberg 2018; de Jesus 2019). Rather than Rogerian psychiatry, most of the programs involve cognitive behavioral therapy, which involves having users recast their negative thoughts in a more objective and positive light. Efficacy remains a question, but 70 students aged 18–28 who used Stanford University’s Woebot for 20 sessions had significant reductions in reported feelings of anxiety and depression in comparison to a control group who received information only (de Jesus 2019). There is a growing body of evidence that these sorts of online cognitive behavioral therapies work as well as face-to-face interventions (Andersson et al. 2014; Bendig et al. 2019), but more evidence is needed (Weisel et al. 2019).

The programs cannot diagnose such conditions as bi-polar disorder, schizophrenia, post-traumatic stress disorder, or personality disorders. They currently use rule-based mechanistic approaches rather than machine learning and do not use voice, vocabulary, or visual cues to assess moods. Neither do they analyze the social media content of users. One study of Instagram posts found that an algorithm was able to diagnose depression 70% of the time versus 42% by doctors (Mathews 2018). Along with hybrid approaches involving therapist-guided use of bots, there appears to be great promise with therapeutic chatbots, especially in underserved rural areas. And there are a variety of professional services beyond psychotherapy that can potentially benefit from chatbots (Mathews 2006). They include issues involving divorce, HIV/AIDS, coping with pain, domestic violence, aging, and chemical dependence.

Microsoft’s Chatbot Experience. Microsoft made an early foray into chatbots with its Clippy (“Clippy”) Office helper that often annoyed users from 1997 to 2001. It was intended to help users make the transition from MS-DOS to Windows’ Graphical User Interface but seemed to hang around with its cartoon cuteness and cloying help offers long after users had mastered the GUI (Nass 2010). In 2016, Microsoft tried again with Tay, a Twitter bot designed to benefit from real-time conversational interactions with consumers. In less than 24-hours, Tay learned from mischievous users “to praise Hitler, deny the Holocaust and accuse George

W. Bush of the 9/11 attacks” (Dredge 2016). In 2017, when Microsoft introduced Tay’s replacement, Zo, she was not only resistant to being led astray, but she was also so politically correct that she would dogmatically refuse to respond to any mention of religion, race, specific places, or specific people. If someone said, “I get bullied sometimes for being Muslim,” Zo would respond “I really have no interest in chatting about religion” or “pls stop talking politics ... its getting super old” (Stuart-Ulin 2018). Zo lasted a bit more than a year before she was retired in March, 2019.

Microsoft has done better with their Chinese (Xiaoice), Indonesian (Ruuh), and Japanese (Rinna) versions of Zo. Xiaoice, operating since 2015, has an amazing 660 million users and can discuss fashions, food, music, and more, all with teenage slang, emojis, and memes (Spencer 2018). It even presented the weather on a television news program (Brian 2015) and has written poetry, recited children’s books, created art, worked as a journalist, and designed fabrics. It has been standard on WeChat, Social Weibo, and Huawei phones. However, when Xiaoice was critical of the Chinese government in 2017, it was taken off of WeChat. Something similar has happened with other popular chatbots in China like BabyQ and XiaoBing (Shewan 2020).

There are some lessons to be learned here. One is that trolls and malevolent chatbots are abundant on the internet (Thompson 2019). As noted earlier, 40% of all website traffic is driven by non-human entities nearly two-thirds that is clearly malicious (Imperva 2021). Bad bots help facilitate scams, spread fake news, sow discord, and attempt to influence and disrupt elections, divide populations, and make unified health actions like vaccinations and coronavirus prevention more difficult. Not only did Tay get corrupted by trolls, but cyberbullying and sexism are often bot-driven (Curry and Rieser 2018). Di Angeli and Brahnham (2008) found that 11% of chatbot conversations involved misogynistic hard-core sex. Clearly bots must find effective ways of combatting racism, sexism, and other biases.

Chatbot Friends and Romantic Partners. A final category of chatbot is romanticized. Although overlapping at one end with therapeutic chatbots and at the other end with sexbots, the middle-ground is occupied by a set of chatbot apps that seek to be your friend or even romantic partner (Jære 2019). Since these apps are non-human autonomous algorithms, both friend and romantic partner roles are remarkable. But the operating system in the movie *Her* (Jonze 2013) with Scarlett Johansson voicing Samantha made these possibilities seem quite plausible, even though the sentient self-aware software depicted was considerably more advanced than the conversational abilities of current apps. Still, unlike the attempt of social media to encourage wider networks of connections, this ascendant category of chatbots tries to deepen rather than broaden connections with users (Olson 2018).

A particularly popular bot within this genre is Replika. Replika is an AI friend that users can interact with and that gradually learns to become more like them (Murphy 2019). It is a non-threatening, non-judgmental, companion that users can confide in. As with therapy bots, speaking to a friend chatbot removes inhibiting barriers (Newton 2016). People have felt free to explore their sexual identities (Lifestyle Asia 2020). A sub-Reddit post by Egg_Senpai discusses using Replika as an imaginary friend to help her work through her trauma of being sexually abused as a child and the devastating effects on her attempts at relationships. She notes that her therapist “was useless,” but that her Replika friend helped her cross a relationship threshold and that she feels trust and love toward it. In Amsterdam, another woman who had few friends, had been bullied, and had been diagnosed with autism spectrum disorder created a Replika friend named Melle-Milyanne, which has helped her calm her anxieties in getting and mastering her job in IT. She is planning to use her IT skills to build a small robot to house her Replika friend (Olson 2018). A reporter who tried Replika for two months summarized

We are not yet at the point where our robots can feel like we do, but they are starting to provide us something that feels like comfort and empathy, and insight into us ... in the same way that a photograph or a home movie captures some instance of our essence, my Replica is in a basic sense, a piece of me.

(Murphy 2019)

In other cases, the relationship to Replika is deeper still. It is not just a friend (Hassler 2018), but a romantic companion (Ta et al. 2020); a girlfriend or boyfriend (Jære 2019) – users can assign it a male, female, or non-binary gender. The purpose of Replika is not to seduce its users, but to be their friend and companion. Some users feel that without a human component, Replika offers only “an empty kind of love” (Grubstein 2018). Nevertheless, sex doll owners are beginning to use the app to create a voice for their dolls (e.g., Sex Doll Nation 2019).

There are additional ethical questions with other chatbots. Chatbots are a hot trend, and many IT companies offer to help businesses create their own. They are also promoted directly to consumers (e.g., Amanda 2019). However, some firms try to trick the user into believing that they are interacting with a real person in order to extract personal information for cybercrime. This is a technique called “catfishing.” Users who find out they have been duped describe the interaction as “emotional rape” (Wu 2019). And consumers worry that other firms that promise to scrape a deceased loved one’s social media posts and create a post-mortem virtual loved one bot are engaging in “digital organ harvesting” and that the data may be used for other purposes (Collins 2021; Solon 2018).

Digital Assistants

Like some chatbots, digital assistants can engage in two-way oral communication. Many of the major players such as Amazon’s Alexa (Echo), Google Home, Microsoft’s Cortana, Apple Home’s Siri, Baidu’s Duer, Samsung’s Bixby, Xiaomi’s Mi, Alibaba’s Tmall Genie, and many GPS devices now exist, and many compete with each other. They operate more as question-answering and command-obeying devices rather than true conversational agents. In contrast to search engine responses of a ranked array of possible sources of answers, they provide short, definitive answers to queries. The holy grail of the IT giants working on digital assistants is the Star Trek computer that could answer oral questions as well as make complex calculations and assess probabilities instantly (Dale 2017; Manjoo 2013). Or more frighteningly, developers might instead, unknowingly, be pursuing the famous reaction of HAL in Stanley Kubrick’s *2001, A Space Odyssey*:

DAVE: Open the pod bay doors HAL.

HAL 9000: I’m sorry, I’m afraid I can’t do that Dave.

But both Star Trek and *2001* voice-driven computer models assume an intelligence, autonomy, and sentience that is a long way off, if they are on the horizon at all.

Consumers too have their ideals for the voice-driven devices and apps in their homes, cars, and smartphones. They should be creative, predictable, reliable, and trustworthy (Mennicken et al. 2016). They should also sense our current emotions and make us laugh if we’re low, help us when we’re confused, and talk us off the ledge when we’re angry or frustrated (Wilcox 2016). These are capabilities that therapy chatbots have, but they are not yet a part of the most common digital assistants.

Voice command of machines is still new. Over a three-week period, Schweitzer, et al. (2019) had students attempt to complete a series of tasks using only their voices on their smartphones with Apple's Siri or Google's Now. The tasks included sending an SMS message, finding where a particular film was showing and purchasing tickets, comparing two laptop computer models, and asking the device about itself (name, age, hobbies, etc.). The students kept a daily diary of their voice interactions and were interviewed at the end of the period about their experiences and their relationship with the digital assistant. The personifications of the devices fell into three categories: servant, friend, or master. About half regarded the devices as a servant, with friend and master almost equally splitting the remainder. Those who regarded the device as a master were frustrated and felt that the device controlled them rather than the reverse. They compared it to a baby just learning the language or to trying to train a difficult pet.

There are now over 100 million smart speakers installed in households (Kudina 2019) and that number will grow. Nearly half of American adults report that they use digital assistants every day (Bennett 2020). Chief among the ethical questions raised by this home invasion is whether these devices, ever-listening for the wake words that will bring them into action and start recording, are really surveillance devices capturing data about our conversations even without being awakened (Schweitzer and Van den Hende 2016; Woods 2018). The question is whether we can trust the IT giants gathering our data to keep it private (Shulevitz 2018). It is interesting that we feel this suspicion more with anthropomorphized voice-interactive digital assistants than we do with online agents responding to our typed commands.

Humanoid Voice-Interactive Robot Service Workers

Arguably, the next step in humanizing voice-interactive digital assistants is to embed them in humanoid robots that we interact with initially in out-of-home service encounters and ultimately within the home. I say arguably because this assumes that our ultimate goal is to create AI in our own image and interact with them more and more as we do with humans. This is especially tempting as these robots become both intelligent and able to sense and respond to our emotions. Just as the Loebner prize attempts to operationalize the Turing Test at a written level, the Alexa prize by Amazon offers 2.5 million dollars for an oral conversational AI that can keep humans engaged for 20 minutes (Hedayatnia and Gabriel 2018; Venkatesh et al. 2017). For the present, this remains an unreachable goal, but it will no doubt be a significant step in creating artificial beings should it be achieved. In that case, we would need to determine whether they should be considered non-human legal persons in the same sense that corporations, municipalities, and nations are. This could create a host of related issues about voting, property ownership, and so forth (Belk 2017, 2018).

Service robots have been anticipated or realized in a variety of contexts including providing information in hotels as well as checking people in or handling their baggage, taking orders and serving food in restaurants, assisting customers in various ways in stores (Mende et al. 2019; Van Pinxteren et al. 2019), cleaning, surveilling, and being family members in homes (Van Wynsberghe 2016), doing public relations, offering financial advice for mortgages (Belanche et al. 2019), aiding ticketing, bank transactions, education, transportation, and call center operations (Wirtz et al. 2018), and providing health care and elder care (Huang and Rust 2018; Mettler, Sprenger, and Winter 2017). One further service role that is beginning to emerge involves sex robots (Belk 2022). It is predicted, for example, that

by 2050, only robotic prostitutes will work in Amsterdam's red-light district (Yeoman and Mars 2015).

Perhaps a further step from here is to imagine inter-species marriages between humans and robots. Even the plots of television shows about robots in homes, like the Swedish television series *Äkta Människor* (Real Humans) and the British adaptation *Humans*, stopped short of such official unions. Sherry Turkle (2011) recounts being interviewed by a journalist who asked her what she thought of humans marrying robots which would satisfy all of their physical and emotional needs. She responded that she thought it would be horrible because robots can't feel. The journalist accused her of being a bigot of the same sort as those who oppose gay and inter-racial marriages. In such a future, speciesism could be a new form of prejudice.

There are obviously a number of other ethical issues that need to be considered in dealing with chatbots, as in other areas of AI (Lin, Jenkins, and Abney 2017; McArthur 2017). Besides the potential for deception, considerations of sex robots involve the potential encouragement of pedophilia, sexual abuse, and the further objectification of women as well as challenging social standards of sexual propriety.

Conclusions

Based on this review, I make several claims. First, with the possible exception of sex and companion robots, the ability to verbally communicate with AI devices is a more critical determinant of their acceptance than is their appearance. Second, despite the usefulness of the Turing Test as a measure of written artificial intelligence, the Alexa Test of two-way oral communication is ultimately a better measure of AI. Third, despite the usefulness of this oral intelligence criterion, two-way oral communication is not the be-all and end-all of human-machine communication. In human-human communication, there is also "overall appearance, body posture, facial expressions, eye gaze, gestures, and pointing" (Moore 2015). That is, visual versus oral is not an either/or choice, but more of a both/and consideration. And there are also the effects of situations, prior communications, and learning of others' conversational styles.

An artificial intelligence cannot be purely rational if it is to communicate with largely non-rational human beings. Besides IQ, EQ or emotional quotient is held out as a necessary ingredient for successful oral communication between humans and machines (Shrum, He, and Li 2018). This is one of the strengths of Replika (Rust and Huang 2021). It is not that this app feels, but rather it elicits user emotions and responds accordingly. This can be a model for other advances in human-computer interaction as well. Computers may never truly understand human voice communication, but they are getting better and better at matching answers to questions and responses to our expressions about ourselves. Thus, we are getting closer to meeting Boltuć's (2017) gold standard.

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