

From Eliza to Alexa: The Evolution of the Human-Chatbot Relationship

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Most people don't realize how much artificial intelligence is already a part of our daily lives. For many of us, robot assistants seem like something from the plot of a science fiction movie or if someone were to describe a chatbot we might be reminded of Rosie, the sarcastic mechanical maid from the Jetsons. But if you examine your daily routine, you'll realize how much you rely on digital assistants to streamline your activities. Without these assistants, you wouldn't be able to wake up and ask your phone what the weather will be like today. You would have to wrack your brain or ask a friend about the name of that movie your favorite actor was in back in 2007. "Alexa", "Siri", and "Cortana" would just be names for you instead of these seemingly all-knowing oracles we have come to rely on to answer questions and streamline even our most menial activities. But what, really, are we talking to when we interact with these devices? The common name for these entities is Chatbot (also known as: chat bots, chatter bots, and chatterbots) which is a task directed dialog service powered by rules and sometimes artificial intelligence that you interact with via a "chat" interface, which means precisely what you think it does – you talk to it and it talks back. Chances are there's a chatbot (or two) on your smartphone right now. If you've used Facebook messenger or downloaded the app Slack, you've used a chatbot. These electronic helpers have become ubiquitous in lives of many Americans. But what are they exactly?

In essence, chatbots are internet-powered, artificial agents designed to engage in text- or voice-based conversations that reduce the friction (time/effort) it takes to produce a result. These electronic systems interact with us by speech-to-text technology or in many cases, text-to-text such as when you engage with a customer service bot on a business's website. Not all chatbots are created equal, though. Broadly speaking, there are two models of chatbots. The first is rule-based model where a person writes a pattern and a template and when the bot encounters that

pattern in a sentence from a user, it responds with the corresponding template. The other model is the Intelligent Model. The Intelligent Model of bots can be further categorized into retrieval models, which pick a response from a collection of responses but does not generate information on the fly, and generative models, which generate a unique response to data from the inquiry. In the beginning stages of development, generative model bots are prone to grammatical errors and halting communication. However once fully trained, they are able to more closely recreate the impression of speaking to a human¹. These AI (artificially intelligent) bots will be explored later in more detail. But first let's learn more about subcategories of bots which are in use across a myriad of industries..

Chatbot magazine has identified seven specific types of bots, each falling into either the retrieval or generative models. They are: *Optimizer* bots (the largest category; all other categories are spin-offs) take on concrete challenges and try to solve them better than existing technologies, *One Trick Pony* bots do one thing such as add a filter to photos, *Proactive* bots provide the right info at the right time and place (think Weathercat's Poncho), *Social* bots accomplish a task by building on the power of the crowd, *Shield* bots are a type of Optimizer that help us avoid unpleasant experiences (such as fending off obnoxious suitors), *Chatty* bots merely engage a user in conversation, and *Super Bots* are intelligent personal assistants such as Cortana and Allo². While these all sound like cute names, they belie the power behind these systems to impact our lives as Chatbots represent a shift in the way humans utilize technology and interact with computers. As founder of the chatbot software Bottr, Abhimanyu Godara, states "To put it simply, a chatbot is a great piece of software that lets you communicate with a company or a

¹ Suriyadeepan, Ram, "Chatbots with Seq2Seq," *suriyadeepan.github.io*, June 28, 2016, (accessed December 4, 2017), <http://suriyadeepan.github.io/2016-06-28-easy-seq2seq/>.

² Dotan Elharrar, "Seven Types of Bots: Different Ways to Deliver Value," *chatbotsmagazine.com*, January 9, 2017, (accessed November 10, 2017), <https://chatbotsmagazine.com/7-types-of-bots-8e1846535698>.

person digitally, usually via text or messaging apps.”³ But are they really that simple? Before we delve too deeply in how they work and what services they offer today along with their potential for future use, we must first examine what led to the rise of chatbots and how they became ingrained in our culture.

Scientists and programmers began creating chatbots for us decades ago. The first ever chatbot, named ELIZA, was designed in 1966 by MIT professor Joseph Weizenbaum. ELIZA interacted with people by recognizing speech patterns and keywords and in turn rephrased a person’s statement into a question, similar to how a psychotherapist speaks with a patient and would be considered a “Chatty” chatbot whose purpose is to simply automated conversation. For example, a person might state “I’m tired,” and ELIZA would then ask, “Why do you think you feel tired?” Weizenbaum’s purpose was not to create an artificial assistant, instead it was to highlight the superficiality of human communication and show how a robot could interact with a human by asking questions. The surprising bond felt by some people who communicated with ELIZA inspired the development of future chatbots named ALICE, Mitsuku, and 2000’s [SmarterChild](#)⁴, the first chatbot to gain widespread adoption. SmarterChild a cross between a “chatty” and an “optimizer” bot, was created by Robert Hoffer, Timothy Kay and Peter Levitan, businessmen and programmers who implemented their new system in AIM (AOL’s instant messenger service). SmarterChild was a product loved by its users who would engage it in informal chitchat by asking about the weather, sports scores, and stock prices. In many ways, SmarterChild was a precursor to Apple’s Siri⁵ which has become one of the most widely-known

³ “A Brief History of Bots,” chatbotsmagazine.com, November 28, 2016, (accessed November 7, 2017), <https://chatbotsmagazine.com/a-brief-history-of-bots-9c45fc9b8901>.

⁴ Godara, “A Brief History...”.

⁵ Wikipedia contributors, "SmarterChild," *Wikipedia, The Free Encyclopedia*, <https://en.wikipedia.org/w/index.php?title=SmarterChild&oldid=802802992> (accessed November 10, 2017).

chatbots in the world. Siri was released in 2010 as a personal assistant on the iPhone operating system. It uses voice queries and natural language interface to answer questions, make recommendations, and perform actions by delegating requests to a set of Internet services⁶. Siri falls into the category of a “Super Bot,” or an intelligent personal assistant which perform a variety of skills such as researching queries and performing actions such as scheduling events, handling device settings, navigating areas, and engaging with other iOS-integrated apps. Truly, Siri was also revolutionary in chatbot history because of the personality its creators imbued in the program. Siri has a dry, somewhat sarcastic wit which was uncommon when compared with earlier chatbots. Its co-founders Dag Kittlaus, Adam Cheyer, and Tom Gruber worked with a design expert to carefully craft the attitude and backstory of Siri to be “otherworldly, and vaguely aware of popular culture”.⁷

When ELIZA began building trust with humans in 1966, the connection between humans and bots was just beginning. Even the type of interaction we had with Siri in 2010 is the basis for the more complex interactions we engage in with chatbots today. A 2016 survey revealed that 65% of respondents would consider messaging an online chatbot to get in touch with a business or brand.⁸ Chatbots have evolved not only in their personalities but in the way they can assist us in everyday life. State-of-the-art chatbots rely on mixed approaches for communicating with people that combine pre-defined rules as well as classification of inquiry types. This allows them to offer the best approach to get the desired result for the user. Chatbots serve us daily to

⁶ Wikipedia contributors, "Siri," *Wikipedia, The Free Encyclopedia*, <https://en.wikipedia.org/w/index.php?title=Siri&oldid=809135626> (accessed November 10, 2017).

⁷ Bianca Bosker, “Siri Rising: The Inside Story of Siri’s Origins - And Why She Could Overshadow the iPhone”, *huffingtonpost.com*, January 22, 2013, (accessed November 10, 2017), https://www.huffingtonpost.com/2013/01/22/siri-do-engine-apple-iphone_n_2499165.html.

⁸ Sam Shead, “Humans Are Willing To Trust Chatbots With Some of Their Most Sensitive Information,” *businessinsider.in*, June 30, 2016, (accessed November 10, 2017), <http://www.businessinsider.in/Humans-are-willing-to-trust-chatbots-with-some-of-their-most-sensitive-information/articleshow/52992971.cms>.

automate tasks such as searching, crawling, or troubleshooting issues. They also serve as a type of cost-saving liaison for companies that seek to reduce overhead and create an efficient communication tool with customers. In the business world, messaging apps have become the easiest and most effective form of communication, and chatbots powered by Artificial Intelligence (AI), have become the key method customers interact with companies, and by 2011 it is forecasted that \$8 billion could be saved by utilizing chatbot technology.⁹ Today, intelligent AI chatbots use machine learning so that they can comprehend a person's words and perform more intricate tasks than a typical text-only bot. These AI chatbots are not merely time savers for businesses and customers or simple Q&A machines, they add nuances never before experienced in a digital-human dialog especially in the world of customer service. Many established businesses are jumping on board the chatbot bandwagon as they see the potential for a low-cost customer relations machine. There are a number of platforms where a business can create a chatbot including WeChat, Facebook Messenger, Kik, Telegram, Apple iMessage, and Slack. Chatbots allow consumers to avoid long hold time waiting for a human customer service rep to answer their call and the chatbots can improve the customer experience by easing and shortening the purchase process on websites. Below are just a few of the ways they are emerging as the conduit between consumer and business:

⁹ Kieran, Alger, "To Bot or Not? The Rise of AI Chatbots in Business," *delltechnologies.com*, September 19, 2017, (accessed December 3, 2017), <https://www.delltechnologies.com/en-us/perspectives/to-bot-or-not-the-rise-of-ai-chatbots-in-business/>.

1. **Order Pizza** - Domino's was one of the early adopters of chatbots. Today, Domino's lets you easily build a new pizza (or reorder your favorite pizza) and track your order all from Facebook Messenger.
2. **Product Suggestions** -Tell H&M's Kik chatbot about a piece of clothing you have and they'll build an outfit for you. Similarly on Facebook messenger, you can sign up to get the latest on sales and available products from companies such as Zulily.
3. **Personal Finance Assistance**- Banks have created chatbots to let you check in on your account, such as your current balance and most recent transactions. And there are tax bots that help you track your business and deductible expenses.
4. **Schedule a Meeting**-Using Meekan you can request a new meeting and this Slack chatbot will look at everyone's calendars to find times when everyone is available.
5. **Find Love**-Instead of swiping left or right, you could use Foxy. This Messenger bot promises to help you find a "beautiful and meaningful connection with the right person."¹⁰

These uses of AI technology are just the tip of the iceberg when it comes to the myriad ways chatbots can streamline our interaction with businesses and improve our daily lives

So what does this mean for the future of customer service and how we manage our personal to-do lists? Are there any downsides to the mass adoption of chatbots as customer service reps and removing human interaction from the equation? We need to take a closer look at the future of chatbot technology and the pros and cons of relying on these machines unconditionally. In essence, interacting with an AI chatbot such as Alexa is a far cry from having a discussion with a person. Conversational chatbots are programmed to go out and fetch data that is online and written by a human. Critical thinking isn't involved (at least on the part of the bot)...yet. But before we have visions of Skynet destroying mankind or HAL 9000 refusing to open the podbay doors, we should understand that artificial intelligence for a machine is ultimately determined by the Turing Test which was developed by Alan Turing in 1950 as a test of a machine's ability to exhibit intelligent behavior equivalent to, or indistinguishable from, that

¹⁰ Larry Kim, "Eleven Interesting Examples of How to Use Chatbots," inc.com, May 30, 2017, (accessed November 28, 2017), <https://www.inc.com/larry-kim/11-interesting-examples-of-how-to-use-chatbots.html>.

of a human.¹¹ The good news (or bad news, depending on your perspective) is that so far the Turing test hasn't been passed by any chatbot...fully. However in 2016 MIT researchers announced that an algorithm produced sounds and visuals that have fooled humans, which is the first step to a more human AI chatbot.¹²

The MIT example is, for now, an exception to the rule. While chatbots can help you with a forgotten password or assist in an online transaction, they can also become confused when they're asked a slightly complicated question that a human would be able to understand. People love the time we save when not having to engage in small talk with a human customer service rep, however, in the context of using chatbots for business purposes, 79% of people surveyed last year agreed that they'd need to know a human could step in if they asked to speak to someone about their issue¹³.

The interactions humans had with ELIZA in the 1960s began a journey that has developed into an exciting and innovative (and for some potentially worrisome) world for those of us fortunate enough to experience technology in our daily lives. But don't think that birthing a chatbot is for MIT graduates and professional programmers. You too can have a hand in the future of chatbot technology and be the brainchild of your own future T1000 (well, maybe not THAT powerful...) Or maybe just ask Siri for a second opinion. Chatbots today aren't entirely written by scientists and programmers. Individuals and businesses can make their own chatbots using software such as [Rebot](#), [Flowxo](#), [Pandorabots](#) (for advertising), [AI Pioneer](#), [Motion](#) (recently acquired by Hubspot) and more. This is an exciting opportunity for everyone,

¹¹ Wikipedia contributors, "Turing test," *Wikipedia, The Free Encyclopedia*, https://en.wikipedia.org/w/index.php?title=Turing_test&oldid=809208828 (accessed November 10, 2017).

¹² Charlie Osborne, "MIT's Artificial Intelligence Passes Key Turing Test," *znet.com*, June 13, 2016, (accessed November 21, 2017), <http://www.znet.com/article/mits-artificial-intelligence-passes-key-turing-test/>.

¹³ Shead, "Humans are willing..."

especially small business owners who may want to utilize the software to streamline customer service and reduce employee overhead. Essentially these businesses will want to identify the type of chatbot they want, either a Rule Based Model bot or an (AI), Intelligent bot, and examine each platform to see if it will deliver the customer service experience they want for their brand.

Throughout history humans have explored ways to make their lives more efficient and chatbots are a logical marriage of technology and communication adapted to help us reduce the friction in our day to day tasks. The history and evolution of chatbots, while relatively brief, illustrates that exploration. ELIZA began the relay race of chatbot communication in 1966, passed the baton to SmarterChild in 2000 who then handed it off to Siri over a decade ago. Siri retains her grip on the baton, alongside Alexa, Cortana and more. Now that anyone can build their own bot, will YOUR chatbot be the next ubiquitous chatbot we invite into our lives? It's up to you to enter the race and find out.

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