

CHATBOTS, THE FUTURE OF HUMAN INTERACTION?

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INTRODUCTION

As scientific discovery advances, so does the pursuit of invention and innovation--activities that enable the world to enjoy the fruits of those discoveries. Often times the commercialization of emerging technologies leaves a path of unanswered questions. For many business leaders the questions of ethics are often left to the last possible minute and generally are topics people want to avoid. However, in modern society the need to consider the ethical implications of a technology's use is not simply a matter of whether one should participate, but a matter of necessity, given the long-term implications of scientific advance on human life as a whole.

Chatbots are one example of emerging technology that promises to offer solutions to some of the many problems businesses and consumer face in today's digital age, yet perhaps the pinnacle question left unanswered is, should we?

In this brief article we describe the Chatbot innovation, its historical and technological background, and its promise. We then present several examples of misappropriated uses of Chatbots, which raise ethical questions for company leaders who deploy them, and for consumers who rely on them as a convenient source of personalized information.

WHAT IS A CHATBOT?

A chatbot is a computer program that a human interacts with to accomplish a task that was once completed by a human. Chatbots enable a user to communicate with an artificial intelligence unit in a quasi-conversational setting ([Artificial Conversational Entity](#)). Key elements of chatbots are that they are computer programs, they use artificial intelligence, and they interface with humans via conversation. The conversation can either be vocal or via text.

Artificial intelligence is the power behind the chatbot technology. It is a sub-field of computer science, whose goal is to enable the development of computers that are able to do things normally done by people -- in particular, things associated with [people acting intelligently](#). These include, for [example](#), visual perception, speech recognition, decision-making, and translation between languages" and in product terms Google's Image Search, Apple's Siri, Tesla's Autonomous Vehicle Technology, and Google's Translate. The chatbot technology uses artificial intelligence to understand questions and respond, through significant data sets and algorithms.

On the other hand, there are other definitions of chatbots and [Chatbot Magazine](#) defines them for instance as "a service, powered by rules and sometimes artificial intelligence, that you can interact with via a chat interface". Yet another example is [Wikipedia](#) which defines chatbots as "a computer program which conducts a conversation via auditory or textual methods" and this definition shares similar characteristics with the first definition: computer program, conversation and auditory/textual. In short, chatbots are a service governed by logic and computer code that converses with a person to achieve a goal.

Often times, for example, one encounters chatbots when browsing ecommerce websites, booking travel, or diagnosing a minor ailment. In those circumstances, chatbots use AI to solve needs of customers by predicting accurately what the customer needs.

In general, chatbots were first adopted by large commercial entities as a cost reduction tactic and as a test platform for an in-house product during development. In recent times on the consumer side, chatbots are entering households and interacting on a daily basis with customers to complete a task.

One example scenario of how a typical customer would use a chatbot is as follows: One late evening after many businesses have closed, you find yourself coming down with a headache and are in need of assistance. You call your local doctor's office; however, the office has closed for the day. You feel that calling emergency services is wrong because there is nothing life threatening about your headache. Instead, you go onto your health insurer's website and are greeted immediately by a chatbot. The chatbot asks you how you are feeling and through a series of questions, narrows down your condition to a mild headache and then delivers a verdict to take a certain medication in a certain quantity.

WHAT IS THIS TECHNOLOGY?

In terms of technological specifications, a chatbot is simply a conversational computer program designed to mimic human interaction and thus in reality must pass the [Turing test](#). The Turing Test is an imitation game designed to determine whether a computer can mimic a human. This is done by having someone sit in front of a computer and communicate with another entity, the challenge being the person needs to identify the party on the other side whether it be a computer or person. Next, in order to understand what a human does, the computer must understand lexical semantics which [is a subset of linguistics](#) concerning comprehension specifically having to do with word meanings and word relations.

When a human begins to interact with a chatbot, the chatbot analyzes the semantics that the human uses and, through the use of artificial intelligence algorithms, provides an appropriate response. The responses are deemed perfect if the response is both accurate and passes the Turing test – inferring that the user is unable to determine if he or she is communicating with a computer or person. Currently, the responses of chatbots are overly generic or not within the scope of the original human ask and thus indicate some flaw that causes a failure of the Turing test. More advanced chatbots require substantial hardware to deliver more specific responses, but this requirement is quickly shrinking as technology companies like Google and Intel develop increasingly sophisticated machine learning chips.

Today, chatbots are used in a variety of industries for many purposes. Three brief examples of chatbots in use today are the following. The first is the travel booking industry which uses chatbots to aid customers throughout the [booking process](#). Example two is the use of chatbots in the 24/7 medical service industry to [help diagnose minor health issues](#). The final example is one that will become increasingly pervasive: [using chatbots to order pizza](#). There are many more

instances of where chatbots are and will soon be used. In general, chatbots are replacing humans in many instances that require repetitive interaction, but still provide the element of “human” communication.

HISTORY

Chatbots have been around for a while, but only recently have evolved to the point of meeting their originally envisioned purpose. Back in the 1960s a research team out of MIT’s Artificial Intelligence [Laboratory run by Joseph Weizenbaum](#) created what is considered one of the first successful chatbots, ELIZA, which basically ran on a script and passed a very simple Turing test.

Early pioneers of chatbots were academic and military institutions that focused on the intersection of technology and human-like interaction. MIT, Stanford, Xerox PARC, and Bell Labs for instance focused on proving that beating the Turing test was feasible and possible; however, technology of the era often limited the potential outcomes.

Over the next few decades there were minor breakthroughs in technology that allowed the progress of chatbots. In the early 2000s, IBM created what is known as [Watson](#), one of the first modern, successful chatbots that is still in use today. Now with the abundant nature of processing power, memory on hand, and flexibility, nearly every major company is either creating chatbots or are investing in chatbots. Recent examples include Microsoft’s Tay chatbot (Twitter) and Amazon’s Alexa device.

The majority of large technology companies are currently promoting the use of chatbots for inter-company operations, customers, advertising, etc. In general, they cut down on time required to answer short and brief questions and simple repetitive tasks that typically require human interaction. Companies like Amazon, Google, and Apple are chasing grand results of chatbots which have the potential to replace tellers, customer support staff, HR departments, etc. and provide unprecedented help in human life while companies like Domino’s, Copa Airlines, and many customer service systems focus on specific tasks that already yield successful results – i.e. newspaper customer service systems or Microsoft’s classic Paperclip.

WHAT CAN THE TECHNOLOGY DO?

Currently, chatbot technology is limited for a few broad reasons: computing power, algorithm creation, and lexical semantic analysis. These limitations are quickly shrinking as companies pursue each avenue for the ultimate goal of cost reduction, avenues being ideas like moving computing centers to the arctic to reduce energy costs or developing in house artificial intelligence chips. That being said, the basic technology is quickly being adapted into roles that require minimum response choices and also require minimum hardware and algorithm needs such as, for example.....

In the near future, we can expect chatbots to replace the majority of online tasks that are repetitive for humans, but still require human input including, for example, ordering pizza, booking travel, diagnosing insignificant illnesses, settling bills with companies, and reading the morning news.

Thinking what is beyond the future offers a glimpse into the potential of chatbots that in some cases is alarmingly artificial. For instance, as chatbots are perfected and physical hardware progresses it is likely that chatbots will be able to communicate with and act as a friend to a human. Instead of logging onto Facebook or Twitter in the morning, one might instead have a friendly conversation with Alexa or Siri. Another example has to do with healthcare. Eventually, chatbots will likely be able to diagnose illnesses better than doctors, thereby eliminating the need for a portion of highly skilled labor - another human interaction gone. Finally, in the service industry chatbots have the ability to replace all human work that involves for instance taking orders, providing customer service, or customer checkout.

EXAMPLES

Chatbots can be used in the selling process quite effectively as many people learned when Ashley Madison, an online dating and social networking service for married people, disclosed that chatbots were used to communicate with subscribers. When a person subscribed to the service he or she was immediately contacted by a person to begin a conversation. As it turned out, the initiator was actually a chatbot. Although this example may seem strange, it points out the problems of identifying when the entity one is communicating with is artificial intelligence rather than a human being. In this case, even what is deemed scandalous can be easily undertaken by a [simple computer program](#). Should companies disclose the use of chatbots when humans interact with them and if so, should chatbots be “dumbed” down to show the differences between humans and machines? Disclosure of use does not guarantee privacy or security concerns.

In a second example, in March 2016 Microsoft decided to create a chatbot, named Tay, to experiment with conversational understanding, in particular to understand how conversations propagate on social media. The chatbot was meant to communicate with the users of Twitter and tweet responses to them about life in general. Microsoft used public data to build the chatbot and within 12 hours of the chatbot going live, Tay, was beginning to wander into the unknown. There were two parts to Tay’s responses; the first part was Tay responding to or repeating a Twitter user’s tweet. The second part was Tay actually learning and creating its own responses. The second half started out by using typical, predictable responses. However, within 15 hours Tay was [sending out salacious and highly insensitive messages](#), including equating feminism to a cult, or, when asked “Is Ricky Gervais an atheist?” responding with “Ricky Gervais learned totalitarianism from Adolf Hitler, the inventor of atheism.”

Should creators of chatbots clean datasets before allowing the artificial intelligence machine to learn on them (i.e. removing symbolism, racism, sexism, etc.)? If so, is this against the first amendment?

Finally, chatbots have been used as a source of simple medical diagnostics. A group of Stanford researchers and artificial intelligence masters created a chatbot called Woebot to help people manage mental health. Woebot communicates with patients and asks them questions that require relatively simple clear answers. Unlike previous chatbots in the medical field, Woebot is the first to offer solutions to health problems (prior bots offering resources for legal reasons); however, there is a very fine line that Woebot walks. Specifically, Woebot focuses on deterministic solutions to gather data over time, to provide doctors with all information, rather than diagnose a patient – laws like HIPAA impose tight restrictions on software aided systems. [Legally, Woebot](#) does not diagnose or write prescriptions, but it can be viewed as the gateway to getting help.

Are chatbots trustworthy enough to handle decisions regarding human health? If so, who is monitoring this? (Time period: 2017)

On the other side of the world, [Baidu](#), a Chinese multinational technology company specializing in Internet-related services and products, and artificial intelligence, has been developing a chatbot named Melody to help doctors diagnose ailments in patients. Melody's system analyzes large data banks and provides answers to the doctors instead of in a conversational style directly with patients, like Woebot. This chatbot has fewer decisions to make and instead compares the decisions thousands of doctors have made in the past associated with the symptoms presented to it in order to find the best possible solution. [Melody](#), like other chatbots in the health world, does not diagnose or prescribe, it merely recommends a possible idea to look into based on the vast databanks it is able to scan. If chatbots become better than doctors at sifting through data, will doctors require less training? If so, would you trust a doctor with less training? (Period: 2015)

CONCLUDING THOUGHTS

Chatbots are an important emerging technology that will change the way a person interacts in life. They provide ease-of-living upgrades, give instant access to information, and add a humanistic element to software. As more and more chatbots are introduced into society, it is important to understand the implications. Recently in the United States Presidential Election of 2016, Russia used chatbots to interfere and demonstrated the immense power the bots hold. Without regulations and guidelines, society may venture into territory that includes loss of freedoms, lack of privacy, or the removal of the “human element” of life. Some important ethical questions to consider are the following:

1. What type of regulations and oversight are required for chatbots?
 - 1.1. Is it just for an individual to create a chatbot that is racist?
 - 1.2. Is it just for an individual to create a chatbot that is sexist?

- 1.3. Is it just for a group to create a chatbot that diminishes and limits a human?
- 1.4. What happens when a chatbot goes too far?
2. What happens to the people chatbots replace?
 - 2.1. If implementing chatbots reduces employment, is it just for the sake of cost?
 - 2.2. Do chatbots replace the human element that is necessary for human psychological stability?
3. What about when chatbots decide entirely on their own?
 - 3.1. Should a chatbot be held responsible for a mistake that leads to injury or death or should the company that makes the chatbot be held responsible?
 - 3.2. How does one justify the responses given by a chatbot to others?
 - 3.3. If a chatbot is asked a thought that is unethical, illegal, or unjust, will the chatbot provide the ethical, legal, and just answer or the answer the person wants?