Windows Cortana: A Robotic's Human Interaction by Artificial Intelligence

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Introduction

ABSTRACT

Windows Cortana interacts with human intelligence by the influence of artificial

intelligence. According to Microsoft.com, "Cortana is your digital agent." This means Cortana is

your technical assistant when navigating through Windows operating system, but she is not only

your technical assistant, she is also your personal assistant and assists the user by asking

questions through a speech device and assisting the user with results through a search engine.

Some believe digital assistants are paving the way for artificial intelligence when they are not

fully aware that the tools and programming used in artificial intelligence created the new age of

robotic agents that operate in human like abilities to digital assistants that are now like robotics

with a source for human cognition in various ways. I will discuss how this agent was further

developed to help users in saving time from relying on their own memories to search and retrieve

information-the way a human form of a personal assistant would.

CORTANA'S ROLE AND RELATION TO OTHER AI

Windows Cortana was an artificial intelligence in the war game Halo. Then she appeared

as Microsoft's virtual assistant in Windows phone 8.1. According to pcworld.com,

> But the real star of the Windows Phone 8.1 show is Cortana, the virtual assistant that's

> Microsoft's answer to Google Now and Siri. Actually, Cortana's kind of a blend of

Google Now and Siri—a bouncy, bubbly sphere UI that's powered by Bing's deep and powerful Satori knowledge engine.

Cortana has a Siri-esque personality, responding to personal questions from Belfiore with jokes. For example, when Belfiore asked what Cortana thought of her appearance, she responded "Some things I resemble: A hula hoop, a donut... and a halo." (The last is a sly reference to Cortana's origins; she's named after the Cortana A.I. central to the popular Halo video game series.) (Chacos, 2014)

Though Cortana is also a personal digital assistant in Windows 8.1 Phone, she has now emerged as Microsoft's personal digital assistant in Windows 10. She not only sends reminders about appointments and events, organize your contact information, provides results related to requested searches, but she communicates with users through voice commands to have an insight of their personal needs such as places where they want to go, music they want to hear, updates on any types of entertainment they are interested in, etc., which is similar to the virtual assistants in Android, Google Now and Apple's Siri. She communicates to users through a search engine and a digital microphone where users can ask Cortana to perform tasks such as searching for a particular subject and any personal relevant information. She is also available in Microsoft Surface Pro and tablets.

According to *Time Magazine,* "As a result, in its current state, Cortana is a promising start, but it's far less useful than its direct rivals, Siri and Google Now, which are widely available on smartphones worldwide." (Chen, 2015 p.3). Android has featured Google Now for years before Microsoft created Cortana for Windows Phone 8.1. This shows a pattern on how AI

expanded to other technologies to acquire a similar interaction with users. Though Cortana still has a different level of capabilities from other virtual assistants like Apple's Siri and Google Now, it is artificial intelligence that programs these virtual assistants to operate in human like abilities, more than the influence they have on artificial intelligence.

How Language Influences Virtual Assistants

WHAT IS ARTIFICIAL INTELLIGENCE?

Edward Brent (1988) states, "Artificial Intelligence is a specialty within computer science that attempts to program computers to perform tasks once thought possible only for thinking human beings." (p. 159). It is human logic that allows the programming of artificial intelligence to be able to solve problems. For example, in many situations, we determine how we react in order to discover solutions from our own thoughts. Sometimes it is also based on knowing what the rules are. The way we function as humans to perform tasks is through reasoning. Artificial intelligence is programmed in robotics by machine learning through Natural Processing Language (NPL) and Algorithms to understand and respond to linguistic data to perform human related tasks. These robotics can be built into devices such as phones, video games, computers, and tablets.

Natural Processing Language

According to Goksel-Canbek and Mutlu (2016), "By using NLP, demanded questions on a specific topic or subject consisting of sentences, phrases and words can be computerized appropriately and be responded via PDAs and IPAs programmed within the scope of AI." (p. 594). PDA stands for Personal Digital Assistants and IPA stands for Intelligent Personal Assistants. This article referred to Windows Cortana along with Siri and Google Now as a

product of Natural Processing Language. Natural Processing Language is the method used to create software that solves problems, stores information, and perform repetitive tasks as requested by the user. It is the analysis of linguistic data in the form of textual data such as documents, used by computational methods. After learning about this method, it is clear that these digital assistants must learn human language by artificial intelligence in order to respond accurately based on machine reasoning.

Windows Cortana must learn the user's voice before setting up the microphone for speech recognition. From experience, I learned that you need to customize Cortana's personal settings in order for her to understand your voice. Under microphone settings, I clicked on the option for "Try to respond only to me: Learn How I say Hey, Cortana." After I chose this option, I has to speak six phrases in order for her to understand to recognize my voice so she won't speak to anyone else. This is an example of how digital assistants are controlled by artificial intelligence to learn our language to have an effect on their capabilities and functions.

Algorithms

The responses developed by digital assistants comes from computer algorithms. According to Alberts et al., (2014 p. 63), John Backus who was a programmer at IBM states, "the purpose of algorithmic language is to describe computational processes." Algorithms are a set of rules or instructions that tell a computer what to do. They respond to data input and output. Search engines like Bing, which is Cortana's search database provider, are built with algorithmic search strings that respond to keyword searches. Algorithms are usually involved in deep learning when it comes to Natural Language Processing. If Cortana does not know the answer to

a search typed in her search engine, it will just show a list of website results from Bing's search engine that relates to the information typed.

Rhetoric and Artificial Intelligence

The way we identify rhetoric in human language is a type of persuasion used to address a particular audience. According to Lynette Hunter (1991), "One of the main questions noted by AI people in the 1950s and 1960s was whether it was possible to get machines to solve problems that humans usually solve, and this developed into a field that came to be known as expert systems." (p. 326). By reading this quote, we can have a sense to how virtual assistants were invented to reach out to users in need of technical assistance. Virtual assistants are designed to speak and attract attention to users the way we try to use human language a certain way to capture the attention of an audience. In human reality, presenters use rhetoric in order to project their voice to capture the audience's attention. They must sound accurate, assuring, and convincing. What the author means in this article is that these are the same principles that were considered years ago to program machines to solve problems the way humans are taught. Windows Cortana speaks to users in a tone set to make them listen and believe she is there to solve all their problems. In other words, she presents herself as a reliable source. For example, when you type a request in Cortana's search engine, she responds to you by saying, "Take a look at this," or "Ok, I can help you with that."

WHAT IS A DIGITAL ASSISTANT?

Digital assistants are programmed in artificial intelligence by Natural Processing Language and Algorithms to understand human intelligence in terms of human cognition and sentence structure in order to perform tasks related to human form of assistants. "Digital assistants can be contrasted with another type of consumer-facing AI programming called smart advisors. Smart advisor programs are subject-oriented, while digital assistants are task-oriented," (Rouse, 2014). Here this author exemplifies how digital assistants like 'Cortana,' rely on factors of artificial intelligence to perform tasks from human intelligence. She describes smart advisor programs as a way of reasoning in order to control the behavior of a digital assistant when asked by a human to perform a task. In other words, what would a digital assistant do without artificial intelligence? I believe we as humans cannot use digital assistants to our advantage no matter what outcomes arise if it wasn't for the programming of AI. As I go further in stating evidential research from some philosophers, there is a deeper meaning of artificial intelligence that affects human language in return of how we have used language that affects the functional aspects of digital assistants such as Windows Cortana.

PHILOSOPHY OF THE MIND

First, there are scientific studies involved in human intelligence. The mind understands the world without knowing what the brain is capable of though they are connected to produce thoughts. The way we understand how our minds work help us to understand the way computers work simply because computers are made up of systematic agencies the same way our brains are made up of cognitive agencies.

Marvin Minsky (1987) states:

> In order to have access to information about our recent thoughts we must use some machinery. Let's assume that this machinery is composed of certain agents that we'll call "short term memory units." In order to do its complex job so quickly and effectively, each short-term memory unit is a substantial system of machinery, with many intricate and specialized connections to other agents! Our brains cannot afford to maintain very many such units. Accordingly, short term memory units are always in limited supply. Each new job forces us to re-use some of them, and that means erasing their previous contents for different jobs! This must be why our short term memories are temporary, short term memories!" (p. 27)

This quote was taken from Minsky's published article, *The Society of Mind*. From Minsky's perspective, it is evident that the way our brains function influence the way computers operate. Since we have short term memories and cannot sustain a certain amount of data or information, we as humans can train computers to do so. This is the type of job human personal or professional assistants usually perform. The difference is and as interpreted from Minsky's quote is the time management involved. It does take time for a human to perform tasks to retrieve information where as a computer may display results more efficiently.

Let's think of digital assistants that existed before Microsoft's Cortana for windows operating system. They had some of the similar qualities performed by Cortana, except the use of speech –recognition. This includes software assistants and search engines. For example, Microsoft Word's office assistant, Clippy, would first predict the type of document you are

typing and offer tips on how to successfully complete your document by displaying a set of

questions on tools you can use to create your document, but Clippy did not speak with a robotic

voice like Cortana. Surely, we still had Bing, AOL, and MSN as our search engines, but they

operated on their own; they did not respond to a voice command, only through text. These are

considered to be an evolution of virtual assistants that assist our short term memories in

searching and retrieving information. Though search engines were part of increasing our brain's

capacity to obtain information, they still did not act like human assistants the way these modern

digital assistants are equipped to perform. Did they directly ask us what we need, remind us of

upcoming events, or featured digital microphones to speak our inquiries? No, all the results were

based on written communication and cognition. Bing is now Windows Cortana's search provider

and must respond to voice commands through Cortana's search engine. This rises a very big

concern; have our memories slowed down to the point that we need digital assistants to actually

communicate with us? Well, this can only be done through artificial intelligence.

SOCIOLOGICAL THEORIES

Robotics as Social Agents

In artificial intelligence, robotics are programmed to be social agents. According to Alec

et al., (2011). "Social roboticists design their robots to function as social agents in interaction

with humans and other robots." (p.893). Let's take a look at the elements involved at the way we

communicate with other humans. We either speak, write, or use gestures to send a message that

will determine how the people who we communicate with will respond or react. As permitted by

AI, humans have the capability to operate a machine to communicate with humans as if it were

another human. The only difference is the tools that robotics use to communicate. Roboticists

don't always need to design their robotics with mechanical hands, arms, eyes, and legs to communicate with humans, but other components can be used such as speakers, audio, and visual screens to interact information with humans.

According to *The New York Times,* Jack Markoff (2014) states:

> Ben Schneiderman is a University of Maryland Computer Specialist who has argued for interface design where users directly manipulate virtual objects and has been opposed to the development of computer agents with imitation personalities. While both Apple and Microsoft have developed such humanized assistants with their Siri and Cortana smartphone assistants, Google has shied away from humanizing the speech-recognition.

Though Schneiderman, as mentioned by Markoff, is against the need for virtual assistants and prefers virtual objects, he is demonstrating that we as humans have the power to choose how we control what computer technology does which artificial intelligence can provide. Windows Cortana was designed with a computer interface that features a search engine and a digital microphone within its digital platform to allow the user to navigate and interact in order to obtain information. The user has an option to either speak or type requests for Cortana. The same way we ask a human personal assistant to help us retrieve information, a digital assistant is programmed to ask us if we need any help. As soon as you turn on a computer with a Windows 10 operating system, you see a text on the screen that reads, "Ask me anything." This is an example of what human assistants in many professions are trained to do. I think we can say that companies like Microsoft and Apple are employing these digital assistants to make their technology more useful in today's society because of our sociological behaviors.

How Virtual Assistants Affect Human Language

CONSTRAINTS

Threat of Artificial Intelligence

In return, digital assistants like Cortana affect human logical thinking. The search engines are becoming much more advanced that they will out smart human intelligence. William Badke (2015) states:

> So let's imagine a time in which search becomes intuitive, the semantic web rules, and artificial intelligence makes search engines smarter by the day. Natural language searching translates a request like this—"Search engine, I want an analysis of the price of oil in relation to gasoline prices for the period of 2008 to the present"—into a data table with commentary. The average person begins to think of finding tools as intelligent buddies who can take their questions and turn them into solutions. (p.73)

Since artificial intelligence has strengthened over the years, our memories will just keep slowing down. The more tasks these digital assistants are able to efficiently perform, the less employment jobs there will be in the future. The author of this quote is stating how the future of information literacy will be deeply affected, especially students. Students will no longer need to ask teachers or even their own parents on how to search for information on a subject. Other populations will also be communicating less with each other sociologically.

From an article of *The New Yorker,* Marcus (2013) states, "It's likely that machines will be smarter than us before the end of the century—not just at chess or trivia questions but at just about everything, from mathematics and engineering to science and medicine." (p.2). The

advances of artificial intelligence will soon grow in the future to eliminate the need of human resources from people of diverse educational backgrounds. If this becomes a progress, learning can also decrease in human intelligence. People will no longer feel the need to read and will lack oral and writing skills. This issue traces back to what Marvin Minsky points out in the way human language affects digital computers due to short term memories.

Social Concerns

Windows Cortana interacts as a human to the point people will not recognize if a human or a digital assistant is communicating with them. "One of the greatest challenges for bot detection in social media is in understanding what modern social bots can do. Early bots mainly performed one type of activity: posting content automatically. These bots were naive and easy to spot by trivial detection strategies, such as focusing on high volume of content generation." (Davis et al., 2016). Bots operate uncontrollably to deliver a message to users without knowing who these users are personally. Chat bots are designed within digital assistants to enable conversations through text or speech.

Poor Speech Recognition

Though Cortana has a feature in her settings to recognize a user's voice, it can't recognize it really well. Hamblem (2015) of *The New York Times,* quotes Jack Gold when he stated, "I want a true digital assistant that can understand what I say and it won't matter how I say it, and that's the ultimate challenge." There is some frustration a user may experience when activating Cortana's microphone settings. As she asks you several question to complete the voice recognition set up, you may find yourself repeating the same answer five times because Cortana will insist in asking the same question due to the fact she did not understand the first three times.

This is a process that can eliminate the need for Windows Cortana as a personal digital assistant, or degrade her competency to other competitive digital assistants like Siri and Google Now.

Future Advancement for Consumers

The language written in modern digital assistants, have an effect on many companies trying to market themselves. Digital assistants are now beneficial in promoting productivity. According to Joanna Goodman (2016), "As the digital assistant responds to requests, the focus shifts from brand promotion to brands responding to customers' specific needs and preferences." (p. 2). Windows Cortana has the capability to provide information on locations, hotels, buildings, insurance companies, and other businesses. This will provide companies access to many services that can help them become competent and resourceful. Business professionals can perform their daily tasks more efficiently with Cortana's organized Notebook options set up for reminders, events, and meetings.

Not only is Windows Cortana beneficial to marketing and other businesses in the industry, she can educate people on using digital technology. According to *Time Magazine*,

Cortana, Microsoft's virtual assistant available in Windows devices, is getting a little smarter too. With the update, Cortana will be able to send users reminders regarding upcoming events and movie times so that they know when to leave to get to the theater on time. This is similar to what the Google Now personal assistant in Android does. Cortana can also offer up the option to book an Uber to your upcoming appointment. If you're using a Windows device that supports pen input, like the Surface Pro, Cortana will

be able to keep track of addresses, phone numbers, and email addresses relevant to the

notes you scribble." (Eadicicco, 2015 p.1).

Cortana's newly advanced features can help users keep track with their social lives and activities.

These features include a digital calendar for appointments, health categories, traveling

information, restaurants, keeping track of finances, schedule of special events, and track

scheduled movie show times. If you click on her menu options, you will see many of these items

listed under her Notebook section where you can customize and create special events and

categories that you can reference. I believe Cortana can also educate users with the new Surface

Pro computers to become more literate with computer and writing technology in terms of writing

requests electronically with an enabled pen touch screen device.

Adequate Search Results

Brian Chen (2016) wrote about his experience using Cortana and other assistants like

Alexa, Sir, and Google Now when he decided to perform some user testing to see how these

digital assistants respond to human inquiries either on personal or business levels. He states,

"Google, Cortana, and Siri loaded scores for Sunday's National Football League games. But only

Google and Cortana could say the Carolina Panthers would face the Denver Broncos in the Super

Bowl, whereas Siri could only say that the big game would take place on Feb. 7th at Levi's

Stadium in Santa Carla, California." (p.4). It sounds like Cortana could be in the lead here in the

computer technology market along with Google. From my experience, Cortana can easily upload

search results to many categories. For instance, I asked her to play a song and she automatically

provided the link hear and download the song I requested. If you ask her to watch a movie or a

video, you will be directed to a site like you tube where you can view your requests. What I

consider useful in this feature, is that it saves a user time from alternately choosing to type requests on the search engine.

Due to Windows Cortana's efficient and adequate search results, she is also climbing the latter on being one of the most competitive and reliable sources in digital technology. This will cause other types of digital technologies to become obsolete in the near future and can save users time from searching other types of technologies to execute or perform an operation. Michael Muchmore (2015) states:

> In Windows 10, I now say things to my PC like, "Hey, Cortana, open Firefox!" These handsfree interactions can quickly become second nature—why would you want to hunt for a remote control, a switch, or an icon buried on the desktop when you can just tell your device what you want it to do? But this kind of convenience is now only opening ante for digital assistants like Apple's Siri, Google Now, Microsoft Cortana, Amazon Echo, and Facebook M. They now add intelligence to their voice responses to help you complete more and more complex tasks and provide answers to more kinds of queries.

This is similar to what is going on with other digital technologies like e-books, digital music applications, and digital flashlights located on smartphones in the way that they eliminate the need of older technologies that have the same capabilities because the digital version of those technologies provide more comfort to the user. With Windows Cortana, less physical movement will be required such as typing, or double-clicking on an application before clicking on hyperlinks, in order to get results efficiently based on the user inquiries provided. Moreover, if

google and other digital icons get eliminated, there can be a lot more space available on a user's

desktop, and it can save more memory on a user's PC.

Conclusion

In today's world of digital technology, our minds have become more reliant on the

intelligence of machinery. This is also due to the way we communicate in our society and find

ways to come up with solutions to help a certain population. It is useful in any field such as

business, health, entertainment, technology, education, and now it is vital to our daily lives when

we need to communicate and socialize. It is also essential to people who are trying to survive

through challenges they meet such as learning and coping with certain physical disabilities.

While it may all be a benefit to every aspect in our daily lives, it can also cause us more harm in

the near future because of the many advantages we acquire from digital assistants that we are

actually making them smarter and more capable than we are.

However, I believe that part of such a disadvantage is that some people lack the

awareness of where all these advances are coming from with virtual assistants. They did not

originate on their own just because we tell them to. The computational process involved in

artificial intelligence exist with or without our consent, even though programmers in computer

science invented artificial intelligence in the early twentieth century. The term of digital

assistants has been upgraded to personal digital assistants because of the resulting history of

human interaction from artificial intelligence.

References

Alberts, G., Nofre, D., Priestley, M. (January, 2014). When Technology became Language: The Origins of the Linguistic Conception of Computer Programming, 1950-1960. *Technology and Culture. Vol. 55* (No.1). pp. 40-75

Alec, M., Movellan, J., Tanaka, F. (December, 2011). When a robot is social: Spatial arrangements and multimodal semiotic engagement in the practice of social robotics. Social Studies of Science. Vol. 41. (No. 6) pp. 893-926. Received From http://www.jstor.org/action/doBasicSearch?Query=When+a+robotic+is+social&acc=off &wc=on&fc=off&group=none

Badke, W. (July-August, 2015) The Effect of Artificial Intelligence on The Future of Information Literacy. *Infolit Land. Vol.39* (No.4) pp.71-73. Received From http://www.infotoday.com/OnlineSearcher/Issue/5440-July-August-2015.shtml

Brent, E. (1988). Is There a Role for Artificial Intelligence in Sociological Theory? *The American Sociologist. Vol. 19,* (No. 2) pp.158-166 Received From http://www.jstor.org/stable/27698419

Chacos, B. (April, 2014). Meet Cortana: Microsoft announces sweeping Windows Phone 8.1 update. *PCWorld.* Received From http://www.pcworld.com/article/2138542/meet-cortana-microsoft-announces-sweeping-windows-phone-8-1-update.html

Chen, B. X. (2015, July). Windows 10 Review: A Throwback With Upgrades in Software and Security. *The New York Times.* Received From http://www.nytimes.com/2015/07/30/technology/personaltech/windows10-review.html

Chen, B. X. (2016, January). Siri, Alexa and Other Virtual Assistants Put to the Test. *The New*

York Times. Received From

http://www.nytimes.com/2016/01/28/technology/personaltech/siri-alexa-and-other-

virtual-assistants-put-to-the-test.html

Davis, C., Ferrera, E., Flammini, A., Menczer, F. (July, 2016) The Rise of Social Bots. *Review*

Articles. **DOI:10.1145/2818717**

Eadicicco, L. (2015, November). Microsoft Just Majorly Improved Windows 10.

Time Magazine. Received From http://time.com/4110172/windows-10-update/

Goksel-Canbek, N., Mutlu, M. E. On the Track of Artificial Intelligence: Learning with

Intelligent Personal Assistants. *International Journal of Human Sciences. Vol. 13. pp.*

592-601.

Goodman, J. (January, 2016). Digital Assistants: a new brand platform. *The Guardian.* Received

From https://www.theguardian.com/media-network/2016/jan/29/virtual-assistants-brand-

platform

Hamblem, M. (2015, February). Cortana on the PC: Can we talk? *Computerworld.* Received

From http://www.computerworld.com/article/2879473/cortana-on-the-pc-can-we-

talk.html

Hunter, L. (1991). Rhetoric and Artificial Intelligence. *Rhetorica: A Journal of the History of*

*Rhetoric. Vol. 9, (*No. 4) pp 317-340. Received From

http://www.jstor.org/stable/10.1525/rh.1991.9.4.317

Marcus, G. (2013, October). Why We Should Think About The Threat of Artificial Intelligence?

The New Yorker pp. *1-6.* Received From http://www.newyorker.com/tech/elements/why-we-should-think-about-the-threat-of-artificial-intelligence.

Markoff, J. (2014, July) A Robot with a Little Humanity. *The New York Times*. Received From

http://bits.blogs.nytimes.com/2014/07/16/a-robot-with-a-little-humanity/

Microsoft Corporation (2016, September) Who is Cortana? Retrieved From:

https://support.microsoft.com/en-us/help/17214/windows-10-what-is

Minsky, M. (1987). The Society of Mind. *The Personalist Forum. Vol. 3,* (No. 1), *Mind-Body*

East and West. pp. 19-32*.* Received From http://www.jstor.org/stable/20708493

Muchmore, M. (October, 2015). The Brave New World of Digital Assistants. *PC Magazine.*

Received from www.pcmag.com.

Rouse, M. (October, 2014) Definition: Digital Assistant. *WhatIs.com.* Received From

http://whatis.techtarget.com/definition/digital-assistant

Thagard, P. (1990, June). Philosophy and Machine Learning. *Canadian Journal of Philosophy,*

Vol. 20, (No. 2) pp. 261-276. Received From http://www.jstor.org/stable/40231695

Wingfield, N. (2014, April). Meet Microsoft's Cortana, a More Personal Siri. *The New York*

Times. Received From http://bits.blogs.nytimes.com/2014/04/02/meet-microsofts-cortana-a-more-personal-siri/