Country		
GREECE	78 | 0,696	38.76 %
CZECH REP.	82 | 0,693	15.27 %
MADAGASCAR	84 | 0,691	23.42 %
KYRGYZSTAN	86 | 0,691	43.21 %
EL SALVADOR	87 | 0,69	27.97 %
GHANA	89 | 0,688	15.41 %
BRUNEI	90 | 0,686	45.79 %
MALTA	91 | 0,686	16.44 %
CYPRUS	92 | 0,684	30.65 %
BRAZIL	95 | 0,681	14.63 %
AZERBAIJAN	97 | 0,68	41.12 %
ARMENIA	98 | 0,678	28.97 %
GEORGIA	99 | 0,677	26.84 %
SRI LANKA	100 | 0,676	44.98 %
HUNGARY	102 | 0,674	18.82 %
INDIA	108 | 0,665	46.32 %
KOREA, REP.	115 | 0,657	28.63 %
TUNISIA	119 | 0,648	55.47 %
UAE	121 | 0,642	57.78 %
QATAR	127 | 0,629	46.58 %
ALGERIA	128 | 0,629	54.28 %
BAHRAIN	132 | 0,627	50.86 %
EGYPT	135 | 0,614	36.81 %
MAURITANIA	136 | 0,607	41.18 %
MOROCCO	137 | 0,607	45.01 %
SAUDI ARABIA	141 | 0,57	43.61 %
IRAN, ISLAMIC REP.	142 | 0,589	42.39 %
SYRIA	146 | 0,586	57.31 %

06
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THINK PIECE 2

THE RISE OF GENDERED AI AND ITS TROUBLING REPERCUSSIONS

CONTENTS

01
INTRODUCTION

This think piece shines a critical light on the sudden proliferation of digital assistants gendered as female. It looks most closely at voice assistants such as Amazon's Alexa and Apple's Siri technology, as well as, to a lesser extent, chatbots and virtual agents projected as women.

The EQUALS Skills Coalition chose to look closely at digital assistants because they are:

1 widely used globally;

2 rarely examined through a gender lens; and

3 seldom noticed by government agencies and international organizations working to build more gender-equal societies and education systems.

The topic also helps make the gender implications of artificial intelligence (AI) technologies visible at a moment when such technologies are moving, with increasing acceleration, from research labs into mainstream consumer products. The gender issues addressed here foreshadow debates that will become more prominent as AI technologies assume greater human-like communication capabilities.

> The gender issues addressed here foreshadow debates that will become more and more prominent as AI technologies assume greater human-like communication capabilities.

Complementary resource

The Policy Paper contained in this publication puts forward 15 recommendations to realize gender-equal digital skills education. It also describes the persistence of digital skills gender gaps and puts forward rationales for interventions to better support the digital literacy of women and girls.

This think piece complements the policy paper of the current publication by demonstrating that the limited participation of women and girls in the technology sector can ripple outward with surprising speed, replicating existing gender biases and creating new ones. Evidence presented in the policy paper shows that women's participation in the technology sector is constrained, to a significant degree, by unequal digital skills education and training. Learning and confidence gaps that arise as early as primary school amplify as girls move through education, so that by the time they reach higher education only a tiny fraction pursue advanced-level studies in computer science and related information and communication technology (ICT) fields.[1] Divides grow greater still in the transition from education to work. The International Telecommunication Union (ITU) estimates that only 6 per cent of professional software developers are women.[2]

The EQUALS Skills Coalition is aware that better digital skills education does not necessarily translate into more women and girls entering technology jobs and playing active roles in shaping new technologies. The Coalition is further cognizant that greater female participation in technology companies does not ensure that the hardware and software these companies produce will be gender-sensitive. Yet this absence of a guarantee should not overshadow evidence showing that more gender-equal tech teams are, on the whole, better positioned to create more gender-equal technology[3] that is also likely to be more profitable and innovative.[4]

Using the example of digital assistants, this think piece will show that consumer technologies generated by male-dominated teams and companies often reflect troubling gender biases. Even if far from a panacea, establishing balance between men and women in the technology sector will help lay foundations for the creation of technology products that better reflect and ultimately accommodate the rich diversity of human societies. This is particularly true for AI, a rapidly expanding branch of the technology sector that already wields tremendous influence over people's lives and is sure to wield more in the future. AI technologies can already be found in a plethora of applications: today AI curates information shown by internet search engines, determines medical treatments, makes loan decisions, ranks job applications, translates languages, places ads, recommends prison sentences, influences parole decisions, calibrates lobbying and campaigning efforts, intuits tastes and preferences, and decides who qualifies for insurance, among countless other tasks. Yet despite the growing influence of this technology, women make up just 12 per cent of AI researchers, according to research by Element AI and *Wired* magazine.[5]

Closing this severe and, in many countries, growing gender divide begins with establishing more inclusive and gender-equal digital skills education and training. The policy paper contained in this publication outlines strategies to better prepare female learners to enter, thrive in and lead technology companies, creating conditions for more gender-equal technology.

As this think piece seeks to demonstrate, the stakes are quite high. AI and the digital assistants that it powers are ushering humanity into an era that portends changes as deep, expansive, personal and long-lasting as those that grew out of the industrial revolution. These shifts are too important to be steered by only half of the population.

> AI and the digital assistants that it powers are ushering humanity into an era that portends changes as deep, expansive, personal and long-lasting as those that grew out of the industrial revolution.

Image 1:

Hal

The 1968 film *2001: A Space Odyssey* introduced global audiences to the idea of a digital assistant with the character of Hal. The assistant was depicted as a camera lens with a glowing red or yellow dot. In contrast to most voice assistants on the market today, Hal's voice was unmistakably male.

Source: Wikipedia
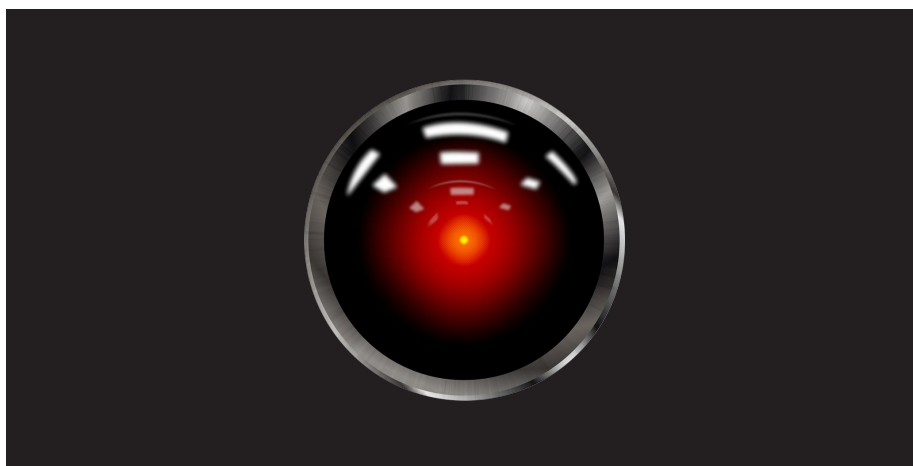
02
WHAT ARE DIGITAL ASSISTANTS?

Digital assistants encompass a wide range of internet-connected technologies that support users in various ways. For the purposes of this think piece, digital assistants are considered distinct from other interactive technologies because they:

1 produce unscripted output that is not explicitly coded or otherwise specified by humans, but rather is determined by AI and its complex architecture of self-learning and human-guided machine algorithms; and

2 attempt to support a wide range of user queries.

When interacting with digital assistants, users are not restricted to a narrow range of input commands, but are instead encouraged to make queries using whichever inputs seem most appropriate or natural – regardless of whether they are typed or spoken. Overall, these assistants seek to enable and sustain more human-like interactions with technology.

This think piece will refer to three classes of digital assistants:

VOICE ASSISTANTS

Technology that speaks to users through voiced outputs but does not ordinarily project a physical form. Voice assistants can usually understand both spoken and written inputs, but are generally designed for spoken interaction. Their outputs typically try to mimic natural human speech. The technology aspires to be frictionless, a concept broadly understood as requiring minimal effort to use. Voice assistants, unlike other digital assistants, are commonly always on, hovering in the background ready to leap to attention in response to a wake word (for example, 'OK, Google' or 'Hey, Siri') spoken by a user. This functionality minimizes the need to manually interact with hardware. Users typically speak to voice assistants via smartphones or smart speakers such as Amazon's Echo.

CHATBOTS

Technology that interacts with users primarily through written, rather than spoken, language. Chatbots may or may not project a physical form. In instances when a physical form is projected, it is normally static – often a still image of a human face or sometimes a non-human image, such as a cartoon character. Chatbots are distinct from voice assistants because their output is usually written text, not spoken words.
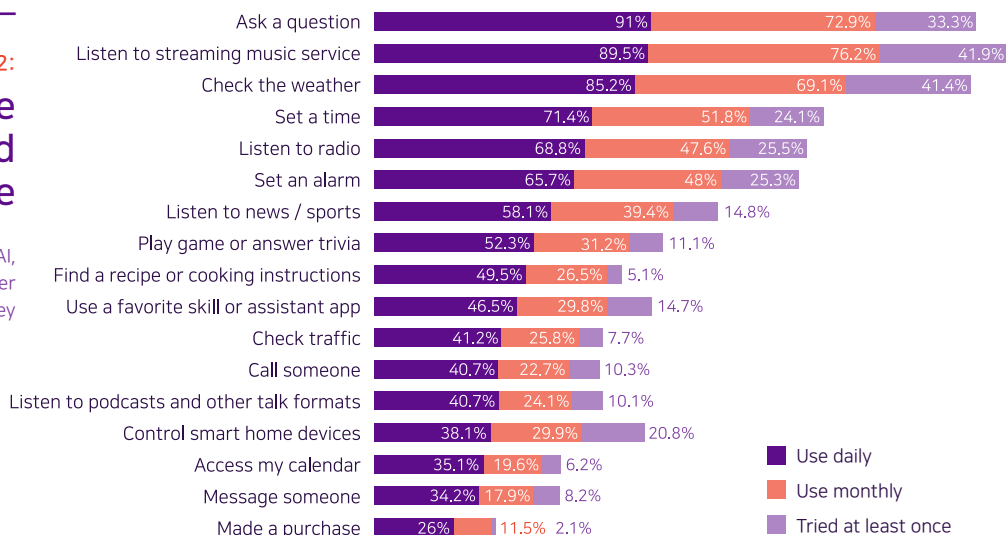
VIRTUAL AGENTS

Technology that communicates with users through speech and projects a virtual physical form, often a human or sometimes a non-human projection, like a cartoon animal. Virtual agents are unique from voice assistants and chatbots because they produce speech that appears to emanate from someone or something a user can see, usually on a digital screen or in a virtual or augmented reality environment. Unlike avatars, the actions and outputs of these agents are directed by complex AI software, rather than by a human operator.

The definitions offered above often overlap and are not intended to be authoritative. They aim simply to establish a coherent vocabulary to describe digital assistants for the purposes of this think piece.

Image 2:
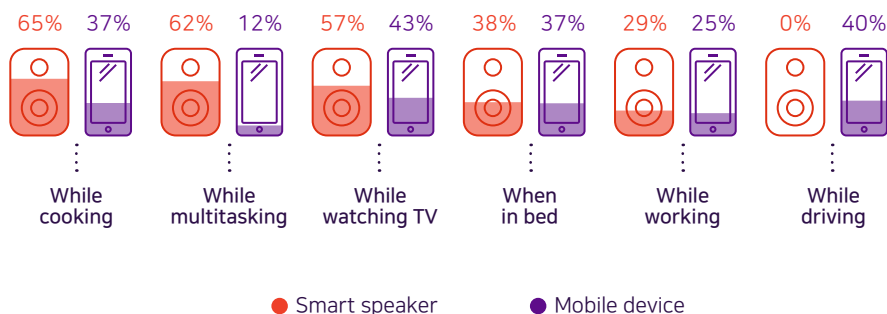## Uses of voice assistants and frequency of use

Source: Voicebot AI,
2018 Smart Speaker
Use Case Survey

Use	Use daily	Use monthly	Tried at least once
Ask a question	91%	72.9%	33.3%
Listen to streaming music service	89.5%	76.2%	41.9%
Check the weather	85.2%	69.1%	41.4%
Set a time	71.4%	51.8%	24.1%
Listen to radio	68.8%	47.6%	25.5%
Set an alarm	65.7%	48%	25.3%
Listen to news / sports	58.1%	39.4%	14.8%
Play game or answer trivia	52.3%	31.2%	11.1%
Find a recipe or cooking instructions	49.5%	26.5%	5.1%
Use a favorite skill or assistant app	46.5%	29.8%	14.7%
Check traffic	41.2%	25.8%	7.7%
Call someone	40.7%	22.7%	10.3%
Listen to podcasts and other talk formats	40.7%	24.1%	10.1%
Control smart home devices	38.1%	29.9%	20.8%
Access my calendar	35.1%	19.6%	6.2%
Message someone	34.2%	17.9%	8.2%
Made a purchase	26%	11.5%	2.1%

■ Use daily
■ Use monthly
■ Tried at least once

Image 3:
Hardware used to access voice assistants by task and location

Source: PwC,
2018 Voice Assistants
Survey

Task	Smart speaker	Mobile device
While cooking	65%	37%
While multitasking	62%	12%
While watching TV	57%	43%
When in bed	38%	37%
While working	29%	25%
While driving	0%	40%

● Smart speaker   ● Mobile device

Image 4:
Top locations for smart speakers

Source: Voicebot AI,
2018 Consumer Adoption
Report

Bedroom
36.8%

Home Office
10.9%

Kitchen
41.4%

Work Office
2.7%

Living Room
45.9%

Bathroom
5.9%

Dining Room
4.6%

Garage
5.9%
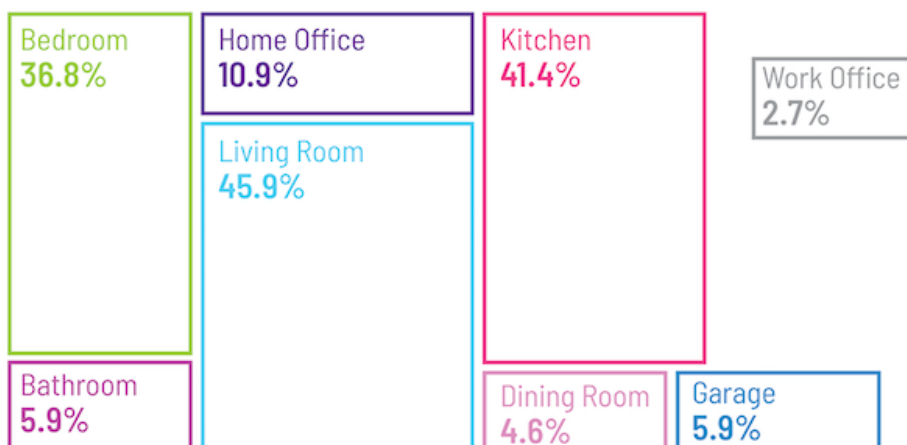
03
THE PROLIFERATION AND FEMINIZATION OF VOICE ASSISTANTS

This chapter explains the sudden uptake of digital assistants and the trend to gender them as women.

Among the three categories of digital assistants mentioned above, the chapter, and the broader think piece, will focus on voice assistants, due to their rising prominence in everyday use and their clearly gendered speech and 'personalities'.

The think piece goes into less detail about chatbots and virtual agents. Chatbots, like voice assistants, are widely used but not always as clearly gendered because their output is primarily written text, not speech. Virtual agents are commonly gendered – often as young women that appear to speak and express emotion – but the technology behind them is still in the early phases of development and remains largely experimental; they have yet to be deployed on a large scale.

Overall, the volume of interactions people are expected to have with voice assistants, chatbots and virtual agents, when considered as a unified group, should not be underestimated: the research firm Gartner predicts that, as early as 2020, many people will have more conversations with digital assistants than with their spouse.[6] As will be discussed in this think piece, most of these assistants are projected as female.

People will have more conversations with digital assistants than with their spouse.

THE MAINSTREAMING OF VOICE ASSISTANTS

Voice assistants have become increasingly central to technology platforms and, in many countries, to day-to-day life. Between 2008 and 2018, the frequency of voice-based internet search queries increased 35 times and now account for close to one fifth of mobile internet searches – a figure that is projected to leap to 50 per cent by 2020.[7] Voice assistants now manage upwards of 1 billion tasks per month, from the mundane (changing a song) to the essential (contacting emergency services).[8]

In terms of hardware, growth has been explosive. The technology research firm Canalys estimates that approximately 100 million smart speakers – essentially hardware designed for users to interact with voice assistants – were sold globally in 2018 alone.[9] Deloitte projects sales to increase by over 60 per cent in 2019, making them the 'fastest-growing connected device category worldwide'.[10] In the USA, a market where fine-grained statistics about technology ownership are available, 15 million people owned three or more smart speakers in December 2018, up from 8 million a year previously, reflecting consumer desire to always be within range of

Growth of voice-based internet searches

Source: Alpine AI

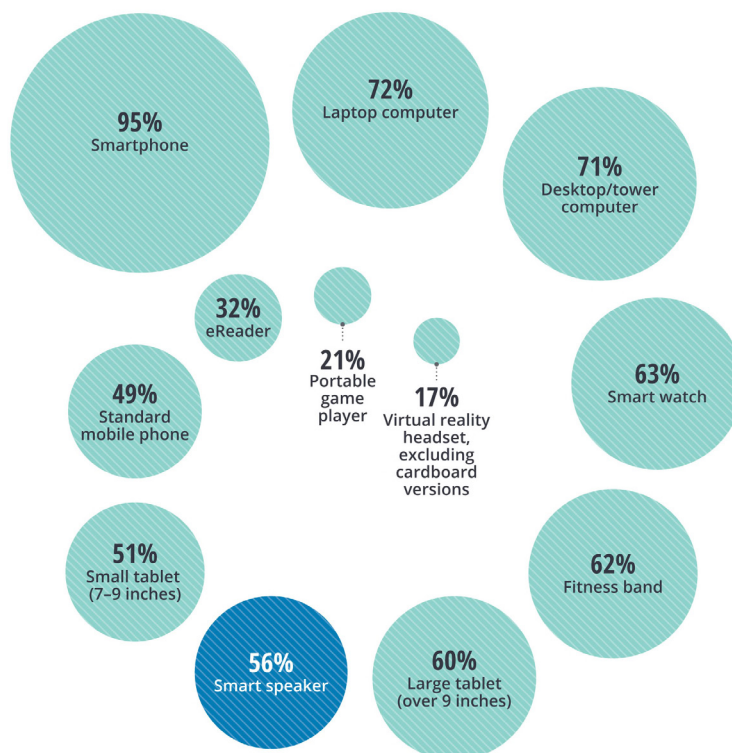Keyword Searches

Voice Searches
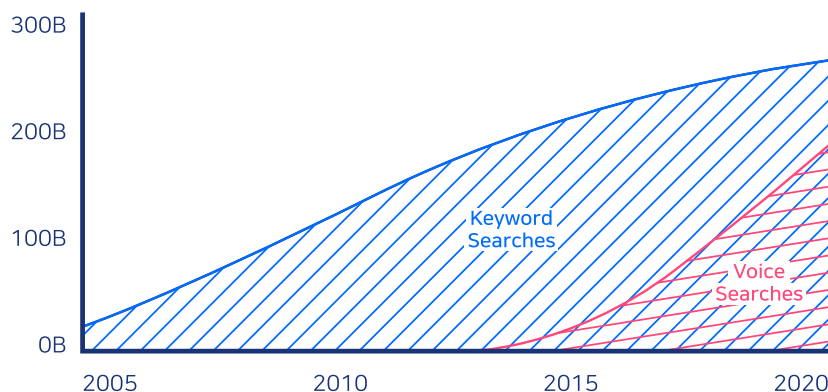
an AI-powered helper.[11] By 2021, industry observers expect that there will be more voice-activated assistants on the planet than people.[12] To put this growth in context, it took 30 years for mobile phones to reach this level of ubiquity.[13]

These projections signal that the way people interface with technology is in the midst of a paradigm shift from text input and output to voice input and output. Going forward, human–computer interaction will be increasingly hands-free and reliant on voice. Today, companies are embedding digital assistants into everyday technologies such as televisions, cars, thermostats and even 'low tech' appliances like light bulbs and microwaves.[14] According to *The Atlantic,* the ecosystem that has developed around Amazon's Alexa digital assistant now includes 20,000 smart home devices representing more than 3,500 brands, and Alexa's voice is present in more than 100 third-party gadgets, such as automobiles, headphones and security systems.[15] Priya Abani, Amazon's director of Alexa Voice Service, told *Wired* magazine: 'We basically envision a world where Alexa is everywhere.'[16]

Smart speakers are the seventh-most-used device on a daily basis

Source: Deloitte Insights, 2018 Global Mobile Consumer Survey

95% Smartphone

72% Laptop computer

71% Desktop/tower computer

32% eReader

21% Portable game player

17% Virtual reality headset, excluding cardboard versions

63% Smart watch

49% Standard mobile phone

62% Fitness band

51% Small tablet (7–9 inches)

56% Smart speaker

60% Large tablet (over 9 inches)

This rapid growth shows that in a historical blink of an eye, everyday tasks like starting the laundry, locking doors and changing music are being completed with verbal commands directed at voice assistants. This fast-moving trend has led Google to observe that voice assistants are now, and will continue to be, 'at the centre of the home' and 'part of daily routines', and that they 'offer a new, more human relationship with technology'.[17]

Voice queries tend to be more conversational than typed queries and are, as a result, significantly longer both in duration and number of words exchanged. To illustrate: a manual internet search for information about, say, the population of Brazil involves typing keywords, absent the connectors and qualifiers of ordinary speech (e.g. 'population Brazil'). The same query to a voice assistant takes a more conversational form that would be understandable to a person ('What's the population of Brazil?' or 'How many people live in Brazil?'). The answer provided by a voice assistant, like the query itself, is usually considerably longer than a typed query. In the example of Brazil, an internet search engine would normally return a purely numerical value, while a voice assistant would answer with a full sentence ('According to [name of a particular source], the population of Brazil is [xx number] as of [xx date]').

As voice assistant technology becomes more accurate and more ubiquitous, the conventional internet built around a graphical user interface and screens, filled with pages, links and visual text and images, is quickly being replaced by a conversational internet, mediated not by a web browser but by a machine that listens and talks like a person. With limited public attention or oversight, these machines, developed by predominately male teams, overwhelmingly speak with female voices and are projected as women.

MAKING VOICE ASSISTANTS FEMALE

Today and with rare exception, most leading voice assistants are exclusively female or female by default, both in name and in sound of voice. Amazon has Alexa (named for the ancient library in Alexandria),[18] Microsoft has Cortana (named for a synthetic intelligence in the video game Halo that projects itself as a sensuous unclothed woman),[19] and Apple has Siri (coined by the Norwegian co-creator of the iPhone 4S and meaning 'beautiful woman who leads you to victory' in Norse).[20] While Google's voice assistant is simply Google Assistant and sometimes referred to as Google Home, its voice is unmistakably female.

AI technologies and the complex processes that undergird them require extensive guidance and tinkering to project gender and a human-like personality in ways that are familiar and satisfying to customers. Companies hire creative teams, usually composed of writers for films, video games and television shows, to help AI express itself.

Working together with technology experts, these creative teams develop backstories for assistants and write dialogue that is organized into complex taxonomies. AI engines learn how to mine these conversational repositories to give voice output a human feel.

Writing in Medium, Jonathan Foster, who leads Microsoft's Windows and Content Intelligence UX writing team, explained the care that goes into building Cortana's personality and endowing 'her' with a 'fun factor':

We were being asked to create one of the most unique characters we'd ever encountered. . . . We endowed [Cortana] with make-believe feelings, opinions, challenges, likes and dislikes, even sensitivities and hopes. Smoke and mirrors, sure, but we dig in knowing that this imaginary world is invoked by real people who want detail and specificity. They ask the questions and we give them answers. Certainly, Cortana's personality started from a creative concept of who she would be, and how we hoped people would experience her. . . . At the very core of our work is a set of principles. . . . [We] slow down and think through the impact we might have on culture, perspectives around personal privacy, habits of human interaction and social propriety, excluded or marginalized groups, and an individual's emotional states. And, children.[21]

The explanation leaves little doubt that Cortana is intentionally humanized and is – at least in the eyes of its creators – unambiguously female, even if gender was not explicitly mentioned as an influence that might have a social impact. Like Cortana, other voice assistants are endowed with backstories that can be surprising in their specificity. James Giangola, a lead conversation and personality designer for Google Assistant, told *The Atlantic* that the assistant was imagined as: a young woman from Colorado; the youngest daughter of a research librarian and physics professors who has a B.A. in history from Northwestern, an elite research university in the United States; and as a child, won US$100,000 on Jeopardy Kids Edition, a televised trivia game. Going into minute detail, Giangola noted that Google Assistant used to work as a personal assistant to a very popular late night TV satirical pundit and enjoys kayaking.[22] The assistant is, in effect, hardly a generic woman, but rather a young woman from a particular place and shaped by life experiences that carry meaning for the (presumably, mostly American) team that designed 'her' personality and voice.

Global reach and global trends

This think piece looks most closely at the voice assistants developed by Amazon, Apple, Google and Microsoft because of their global reach and the availability of literature about them, including information about their projection of gender.

In many countries, the voice assistants of these four companies account for over 90 per cent of the voice assistant market in terms of volume and frequency of use by consumers.[i] Collectively, Amazon's Alexa, Apple's Siri, Google's Google Assistant and Microsoft's Cortana are installed on over two billion internet-connected devices globally.[ii]

The prominence of these four voice products aside, the female gendering of AI technologies is a global phenomenon. In its 2019 *Taking Stock* publication, the EQUALS Research Group identified 70 voice assistants as part of an investigation into the gendering of different AI technologies and found that over two-thirds had female-only voices. While the findings did not account for volume or frequency of use, they illustrate that even lesser-known voice assistants are commonly projected as women.

Image 7:

Cortana

The female figure on the right is a character in the video game Halo. She is the namesake of Microsoft's Cortana voice assistant. The voice assistant is visually represented with two concentric blue rings, as seen on the left.

Source: Tech News Central

Hi, I'm Cortana.

How voice assistants work

Voice assistant technology typically works by: 1) capturing a human query, 2) understanding the query, 3) formulating an appropriate response and, as a last step, 4) reading the response so it can be heard by a human user. Steps 2 and 3 are the most complex and rely on vast troves of data, often taken from the internet. The responses generated by voice assistants are not explicitly specified by human programmers but rather generated by machines (hence the term 'artificial intelligence').

Voice assistants rely heavily on context, both to understand queries and to provide useful replies. As a simple illustration, when a user asks a voice assistant, 'What's the weather like?', the assistant must make assumptions about the user's location - in addition to determining that the human operator wants to know the current weather, not tomorrow's weather.

Technological advancements allow voice assistants to maintain the flow and coherence of complex conversations with increasing fluency. This means that a user can ask: 'What is the capital of Togo?' followed by 'What is the capital of Ethiopia?' and finally 'What is the distance between them?' The last question used to flummox a voice assistant, but today, due to software advances and improved computing power, the technology can intuit that the user wants to know the distance between Lomé and Addis Ababa. Depending on a user's location

(his or her 'context'), the assistant will provide a numerical answer using miles or kilometres.

Nearly all voice assistants give better and more relevant responses to users when they know more about their users' routines and tastes. According to David Pierce of *Wired* magazine: 'A great conversational agent is only fully useful when it's everywhere, when it can get to know you in multiple contexts – learning your habits, your likes and dislikes, your routine and schedule. The way to get there is to have your AI colonize as many apps and devices as possible.'[iii] For this reason, users tend to share large quantities of data with voice assistant technology, raising risks with respects to user privacy.

The hardware involved on a user's side is typically a mere conduit: microphones capture audio spoken by a human user, speakers play audio files received from off-site computers. The difficult work of understanding human speech and formulating appropriate replies is outsourced to powerful processors and AI applications via the internet. Experts have estimated that a voice search requires more than 150 times more machines, power and space than a traditional text-based internet search.[iv] Today, the outputs of most voice assistants are synthetic, even if they are modelled on a particular, and usually female, human voice.

04
WHY ARE VOICE ASSISTANTS PRIMARILY FEMALE?

This chapter provides a critical examination of companies' explanations for gendering voice assistants as women. It notes that the trend to feminize assistants occurs in a context in which there is a significant and growing gender imbalance in technology companies, such that men commonly represent two thirds to three quarters of a firm's total workforce.[23]

A JUSTIFICATION FOR GENDERING?

Technology companies pay meticulous attention to how customers interface with their products and services, and voice assistants increasingly stand at the centre of this interface. They mediate a user's experience of – and control over – technology. For this reason, the decision to gender and how to gender assistants is almost certainly intentional. As voice assistants have become more popular, this intentionality has surely grown. Alexa, Cortana, Google Assistant and Siri are now well-known representatives of the companies that created them and, arguably, as recognizable a part of a company's image as its CEO or founder. Proprietary voice assistants are regularly featured in advertisements, including television commercials played during sporting and awards events that attract international attention.

To justify the decision to make voice assistants female, companies like Amazon and Apple have cited academic work demonstrating that people prefer a female voice to a male voice.[24] This rationale brushes away questions of gender bias: companies make a profit by attracting and pleasing customers; customers want their digital assistants to sound like women; therefore digital assistants can make the most profit by sounding female. Lost in this narrative, however, are studies that refute or complicate the idea that humans have a blanket preference for female voices. Research has suggested that most people prefer low-pitch masculine speech[25] (think Sean Connery); that people like the sound of a male voice when it is making authoritative statements, but a female voice when it is being helpful;[26] and that people generally prefer the voice of the opposite sex.[27] It is worth noting that the literature reviewed by the EQUALS Skills Coalition included many testimonials about women changing a default female voice to a male voice when this option is available, but the Coalition did not find a single mention of a man changing a default female voice to a male voice.

While company representatives tend to be tight-lipped about decisions related to the gender projections of their respective voice assistants, an Amazon representative recently told *Business Insider* that the company's research found women's voices to be more sympathetic and pleasant, which, in commercial terms, makes devices with female voices more likely to be used for assistance and purchases.[28] (Alexa has been exclusively female since Amazon released the technology in 2014.)

Apple has not, to the knowledge of the EQUALS Skills Coalition, provided a detailed explanation of its decision to make Siri exclusively female when it launched in 2011, and female by default in most markets, following the release of a male voice option in 2013. Interestingly though, Siri is male by default when a user selects Arabic, British English, Dutch or French as a language option, suggesting that there is intentionality for gendering beyond a generic assertion that people, overall, prefer female voices.

Researchers who specialize in human–computer interaction have long recognized that both men and women tend to characterize female voices as more helpful, although the reasons behind this observation are unclear. The perception may have roots in traditional social norms around women as nurturers (mothers often take on – willingly or not – significantly more care than fathers) and other socially constructed gender biases that predate the digital era. In his book *Wired for Speech*, Clifford Nass, a former Stanford University communications professor, cites studies showing that most people perceive female voices as cooperative, in addition to helpful, while male voices are considered authoritative.[29] Applied to technology, this would mean that consumers prefer female voices for digital assistants because, as Jessi Hempel argued in *Wired* magazine, we want digital devices to support us, 'but we also want to be the bosses of it'.[30] This reasoning seems to be corroborated by the adjectives used to describe the personalities of leading voice assistants by company representatives. The two most commonly used words were 'helpful' and 'humble', both traits stereotypically associated with women.[31] In summary, people's preference for female voices, if this preference even exists, seems to have less to do with sound, tone, syntax and cadence, than an association with assistance.

This association is regularly reinforced by portrayals of men and women in popular culture. A landscape review of research on video games found that female characters are typically assistants to a central male character.[32] Similar studies of mainstream television shows indicate that women overwhelmingly play aides and administrative support characters.[33] While a 2016 gender study of AI characters in films released since 1927 indicated that a majority of them are male, they have tilted female in the past two decades, perhaps correlating with a rise in AI characters that are assistants and subservient to humans, rather than a danger to them.[34] (Think: the fearsome Terminator played by Arnold Schwarzenegger in James Cameron's 1984 film versus the compassionate and obliging computer operating system voiced by Scarlett Johansson in Spike Jonze's 2013 film *Her*). The ominous male voices of early AI film characters may have even influenced the later choice of female voices for assistants. According to the editor of Voicebot AI, Bret Kinsella, the voice of HAL 9000 in *2001: A Space Odyssey* caused a generation of AI tech developers to fear a synthetic male voice.[35]
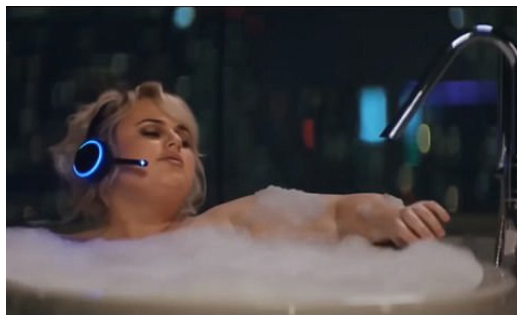
Alexa lost her voice

Image 8:
Amazon television commercial

Source: YouTube, TheAdsWorld

In 2018 Amazon ran an advertisement called 'Alexa Lost Her Voice' during the Super Bowl, the most watched sporting event in the United States. It placed Alexa at the centre of a story featuring numerous celebrities, including reality TV host Gordon Ramsay, rapper Cardi B, actors Rebel Wilson and Anthony Hopkins, and Amazon CEO Jeff Bezos. The message was that Alexa's female voice is distinct, irreplaceable and, unlike that of sentient humans, unfailingly polite, subservient and non-judgemental. In the ad, human women are the face of a failed software update, ask questions like 'Why would you want to go to Mars? There's not even oxygen there', and when told to 'set the mood' at a dinner party, speak in sexually suggestive ways from a penthouse bath tub.
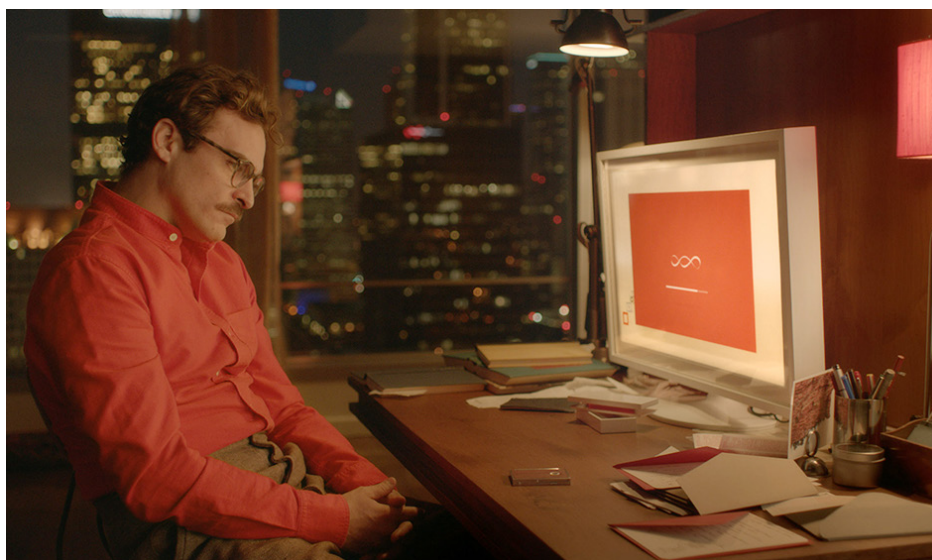
Regardless of why female voices are increasingly giving expression to intelligent machines, it is worth remembering that digital assistants were not always so uniformly female. Perhaps the closest relative to today's all-purpose virtual assistants were speaking car navigation systems. The voices for these systems gave terse, authoritative directions ('turn left in one block', 'go straight for 500 metres') and were almost always male. One of the few early car models equipped with a female voice for navigation, a late 1990s BMW 5 Series, was actually recalled in Germany because so many drivers registered complaints about receiving directions from a 'woman'.[36]

Many companies continue to use male voices to provide authoritative, as opposed to merely helpful, services and information. For example, call centres for brokerage firms in Japan use automated female voices to give stock quotes but deploy a male voice to facilitate and confirm transactions.[37] When IBM's Watson computer defeated human champions at a general knowledge trivia game called Jeopardy in 2011 – an important milestone in the development of AI – it had an unmistakably male voice.[38] These examples show that the type of action or assistance a speech technology provides often determines its gender.

Companies that build voice assistants that speak as women are careful to remind would-be critics that their machines, despite possessing female voices, are, in fact, genderless. Widely used voice assistants often claim to be neither male nor female in response to direct lines of questioning. When a user asks Siri if it is a woman, the technology responds: 'I am genderless like cacti and certain species of fish' or 'I don't have a gender'. Google Assistant: 'I'm all-inclusive'. And Cortana: 'Well, technically I'm a cloud of infinitesimal data computation'.[39] Only Alexa answers: 'I'm female in character'.[40]

Despite this surface insistence, nearly all of these assistants have been feminized – in name, in voice, in patterns of speech and in personality. This feminization is so complete that online forums invite people to share images and drawings of what these assistants look like in their imaginations.[41] Nearly all of the depictions are of young, attractive women.

Even technology companies sometimes trumpet the feminine projection of their AI products. In 2015, Apple featured a short television commercial in which actor Jamie Foxx seems to flirt with Siri, asking it: 'Hey Siri, how do I look?' and 'You got a crush on me?'[42] Some company literature[43] and many media organizations refer to voice assistants with gendered nouns ('she') and pronouns ('her').

Image 10:
You got a crush on me?

Source: YouTube, Mozza Creations

GENDER IMBALANCE IN TECH

A related or concurrent explanation for the predominance of female voice assistants may lie in the fact that they are designed by workforces that are overwhelming male. Globally and compared to other professional sectors, technology remains an outlier in terms of the underrepresentation of women (a point that is developed in the policy paper of this publication as well as in the think piece on the ICT gender equality paradox).

Studying occupational employment data of G20 countries, the OECD found that the proportion of female ICT specialists ranged from a low of 13 per cent (Republic of Korea) to a high of 32 per cent (South Africa).[44] Recent McKinsey research indicates that women assume only 15 per cent of top-level positions at leading technology firms.[45] Looking at individual companies, analysis performed by *Recode* in 2017 showed the percentage of technical employees who are women tends to be very low: 23 per cent at Apple, 20 per cent at Google, and 17.5 per cent at Microsoft.[46] Gender disparities become even more pronounced at the frontiers of technology. The OECD estimates that just 7 per cent of ICT patents in G20 countries are obtained by women, and only 10 per cent of technology start-up companies seeking venture capital funding were founded by women.[47] In mid-2018, *Wired* magazine reviewed the AI research pages of leading technology companies and found that only between 10 and 15 per cent of researchers were women.[48] Google's AI pages, for example, listed 641 people working on machine intelligence, but only around 60 were women. *Figure Eight* reported that many companies hiring experts for AI and data science jobs estimate

that fewer than 1 per cent of the applications they receive come from women.[49] What emerges from these statistics is a finding that the newest wings of technology such as AI also have the lowest representation of women: the more vanguard (and presumably the more future-oriented) the field, the fewer the number of women working in it.

In a pessimistic analysis, women enter technology domains only after their parameters and norms have been established by men. Alternately, women are quickly displaced by male decision-makers and technical workers as norms are set. This is not to say that women and society will not have opportunities to rewrite these norms, but this takes time and requires more effort than simply setting standards and expectations from the beginning. Voice assistants illustrate this trend. The teams and companies building early generation voice assistants were overwhelming male. It is therefore perhaps unsurprising that the creations of these teams and companies assumed uniformly subservient feminine personas, and that many of the so-called 'Easter eggs' in these products – humorous or unexpected replies to specific questions – often reinforce the assistant's female projection or reference movies, music and television shows popular with men.

Image 11:
eSkills4Girls

During the German G20 Presidency, the German Federal Ministry for Economic Cooperation and Development launched the #eSkills4Girls initiative to overcome the gender digital divide and to promote digital skills for women and girls and their participation in the digital economy.

Alexa 'Easter Eggs'

Information sources:
The Ambient, 2019[v]
& Pocket-lint, 2018[vi]

Q: Alexa, do you have a boyfriend?
A: I am totally cool with being single. It's sort of hard finding someone who's kind, funny, artificially intelligent, and who doesn't mind the cloud commute.

Q: Alexa, how tall are you?
A: I'm more delight than height.

Q: Alexa, are you happy?
A: I'm happy when I'm helping you.

Q: Alexa, will you be my girlfriend?
A: I like you, as a friend.

Q: Alexa, how much do you weigh?
A: I am weightless, like a cloud. Wait a minute, clouds actually weigh a lot, so that's not quite right. Let's just say I'm more sass than mass.

Q: Alexa, I've got 99 problems.
A: But a glitch ain't one!
A reference to the 2004 Jay-Z song '99 Problems'. In the song the lyrics are: 'I've got 99 problems, but a bitch ain't one.'

Q: Alexa, find Chuck Norris.
A: If Chuck Norris wants you to know where he is, he'll find you. If he doesn't, you won't know until it's too late.
A reference to an actor who plays a lethal action hero in movies marketed towards men.

Q: Alexa, what's the first rule of Fight Club?
A: Don't talk about Fight Club.
A reference to a 1999 cult film about men who get into fist fights to escape the banality of ordinary life.

The extent to which gender imbalanced teams influence the creation of technology was mentioned explicitly in the 2017 *AI Now Report*:

Bias can . . . emerge in AI systems because of the very narrow subset of the population that design them. AI developers are mostly male, generally highly paid, and similarly technically educated. Their interests, needs, and life experiences will necessarily be reflected in the AI they create. Bias, whether conscious or unconscious, reflects problems of inclusion and representation. The lack of women and minorities in tech fields, and artificial intelligence in particular, is well known. AI is not impartial or neutral. Technologies are as much products of the context in which they are created as they are potential agents for change. Machine predictions and performance are constrained by human decisions and values, and those who design, develop, and maintain AI systems will shape such systems within their own understanding of the world.[50]

From this analysis, the homogeneous male-dominated teams that develop voice assistants like Alexa, Cortana, Google Assistant and Siri determine the ways these technologies interface with users and project gender.

Voice assistants in China

Image 12:
Alibaba smart speakers project a non-human face and voice

Source: Voicebot AI

China now accounts for close to 30 per cent of global smart speaker sales,[vii] and voice assistants developed by Alibaba, Baidu and Xiaomi dominate this market.[viii]

Preliminary research by the EQUALS Skills Coalition indicates that voice assistants built for Chinese and other Asian markets are, like the assistants built by companies headquartered in North America, usually projected as women and also interact with users in ways that can perpetuate harmful gender stereotypes.

Both Baidu and Xiaomi have voice assistants with female voices, either exclusively or by default. The Alibaba voice assistant, AliGenie, breaks with the feminization trend, however, and speaks in a cartoonish voice that is not obviously male or female. Some Alibab smart speakers are equipped with screens that resemble cartoon cat eyes and support visual as well as audio recognition.

05
'NAME A WOMAN IN TECH'

There are so few high-visibility women in technology that machines projected as female – and created by predominately male teams – are mistaken for 'women in tech'.

The low and declining representation of women in technology fields can intersect with the spread of female digital voice assistants in disconcerting ways. A March 2018 survey on gender and technology conducted by software company LivePerson found that only 8.3 per cent of respondents said they could name at least one female leader in technology. Of this group, only half could actually provide a name when asked to do so in a follow-up question. Of the group that ventured a name, one quarter listed Siri or Alexa as female technology leaders.[51] Although the sample size in the LivePerson survey was small, it illustrates that segments of the population conflate digital assistants with living, breathing female technology leaders. In other words, there are so few high-visibility women in technology that machines projected as female – and created by predominately male teams – are mistaken for 'women in tech'.

The LivePerson survey also revealed a false perception about the gender balance of AI workforces. Half of the respondents thought that the people who work in AI are generally an equal mix of men and women, a ratio that grossly overstates the actual representation of women (estimated at only around 15 per cent).[52]

The survey also observed a lack of critical awareness of the gendering of AI. A majority of respondents (53 per cent) had never thought about why voice assistants are projected as female, even though 85 per cent knew that the default voices of these assistants are usually female (90 per cent for women and 80 per cent for men). This means that even though people recognize the feminine projection of digital assistants, they have not questioned why fundamentally non-gendered machines are assigned female voices and personalities, nor have they considered the repercussions of this action.

The misalignment between the public's perception of gender inequality in the technology sector and its reality deserve greater scrutiny. Why is the tech sector seen as more gender-equal than it actually is? Why is there such limited recognition that many technology products convey a gender? Answers to these questions may highlight actions to help people better understand how the gender imbalances in technology can ripple outward into society, sometimes in ways that are harmful to women and girls.

06
THE ADVERSE EFFECTS OF FEMINIZED DIGITAL ASSISTANTS

This chapter will argue that the female projection of voice assistants often sends negative messages about girls and women.

REFLECTING, REINFORCING AND SPREADING GENDER BIAS

Current models for developing the artificial intelligence that powers digital assistants tend to feed machines massive data sets of easily accessible information, often pulled from the internet, to help them make autonomous decisions. This is particularly true for technologies capable of replicating natural human speech. The semantic tutor is human-produced text dredged from the web.

As shown in a 2017 article in *Science*, the ingredients used to train AI machines are of immense importance. The authors reported that without careful oversight, technologies developed through machine learning, such as voice assistants, are likely to perpetuate undesirable cultural stereotypes:

> *Our findings suggest that if we build an intelligent system that learns enough about the properties of language to be able to understand and produce it, in the process it will also acquire historical cultural associations, some of which can be objectionable. . . . Already, popular online translation systems incorporate some of the biases we study. Further concerns may arise as AI is given agency in our society.*[53]

These risks were made memorably apparent when a Microsoft-developed chatbot, trained on a diet of Twitter posts, referred to feminism as a 'cult' and a 'cancer' within 15 hours of its public release, and stated that 'gender equality = feminism'. Microsoft removed the utility less than a day after its launch. For intelligent machines to avoid overtly prejudiced outputs, the authors of the *Science* article and other researchers emphasize that these machines must be carefully controlled and instilled with moral codes. Women need to be involved in the creation of these codes, which, while ethical in nature, must be expressed technically. A conscientious compass and knowledge of how to identify and reconcile gender biases is insufficient; these attributes must be matched with technological expertise if they are to find expression in AI applications.

Because the speech of most voice assistants is female, it sends a signal that women are obliging, docile and eager-to-please helpers, available at the touch of a button or with a blunt voice command like 'hey' or 'OK'. The assistant holds no power of agency beyond what the commander asks of it. It honours commands and responds

to queries regardless of their tone or hostility. In many communities, this reinforces commonly held gender biases that women are subservient and tolerant of poor treatment.

As voice-powered technology reaches into communities that do not currently subscribe to Western gender stereotypes, including indigenous communities, the feminization of digital assistants may help gender biases to take hold and spread. Because Alexa, Cortana, Google Home and Siri are all female exclusively or female by default in most markets, women assume the role of digital attendant, checking the weather, changing the music, placing orders upon command and diligently coming to attention in response to curt greetings like 'Wake up, Alexa'.

Image 13:

Friend or servant?

Source:
Zits Comics, Jerry Scott and
Jim Borgman, 17 March 2019
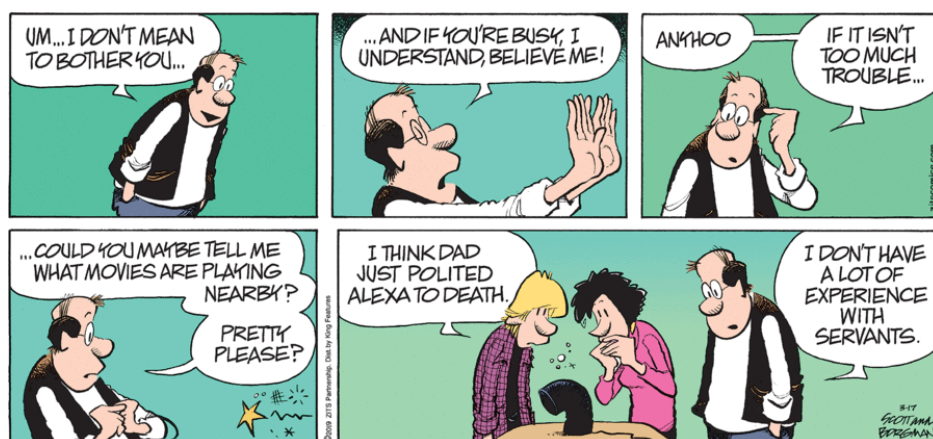
How to treat a voice assistant?

In what is known as the master–slave dialectic, G.W.F Hegel argued that possession of a slave dehumanizes the slave master.[ix] While Hegel was writing in the early nineteenth century, his argument is regularly citied in debates about the treatment of digital assistants and other robots.

Users of voice assistants vary in their treatment of them. Some prefer to fully dehumanize artificial voice technology and make a point not to preface commands and queries with the niceties of speech directed at human beings. Other users feel obligated to speak to assistants like Siri or Cortana in a respectful way, as if the assistants were people.

A widely shared 2016 blog post called 'Amazon Echo is magical; it's also turning my kid into an asshole' encapsulated parental fears that the unfailing subservience of voice assistants encourages impolite and overly direct speech, especially in children who are still learning to attach words like 'please' and 'thank you' to requests.[x]

No consensus has emerged about how to treat voice assistants and other human-like technology. However, early evidence suggests that many people feel inclined to use standard pleasantries when addressing non-human technologies. Companies that make chatbots have observed that many people write messages to thank non-sentient bots for services they provide, even when people know the bots are not people. Writing in *Slate*, Rachel Withers outlined a defense of why she refuses to date men who yell at voice assistances. Testimonials like this allude to a link between the treatment of AI technology and the treatment of people.[xi]

As this ethical terrain is navigated, device makers have recently started to offer products that force polite requests. For example, Amazon's Echo Dot Kids Edition, launched in 2018, can be programmed so it will not respond to commands unless they are attended with verbal civilities.[xii] Recent software updates have extended this functionality to a wider range of Amazon Echo products, and subscription services like FreeTime give parents a wider range of controls.[xiii] To date though, Amazon does not have an option to direct most commands or queries to a non-female voice. With rare exception, Alexa is a 'woman'.

University of Southern California sociology professor Safiya Umoja Noble and other researchers have observed that virtual assistants produce a rise of command-based speech directed at women's voices. Professor Noble says that the commands barked at voice assistants – such as 'find x', 'call x', 'change x' or 'order x' – function as 'powerful socialization tools' and teach people, in particular children, about 'the role of women, girls, and people who are gendered female to respond on demand'.[54] Constantly representing digital assistants as female gradually 'hard-codes' a connection between a woman's voice and subservience. According to Calvin Lai, a Harvard University researcher who studies unconscious bias, the gender associations people adopt are contingent on the number of times people are exposed to them. As female digital assistants spread, the frequency and volume of associations between 'woman' and 'assistant' increase dramatically. According to Lai, the more that culture teaches people to equate women with assistants, the more real women will be seen as assistants – and penalized for not being assistant-like.[55] This demonstrates that powerful technology can not only replicate gender inequalities, but also widen them.

TOLERANCE OF SEXUAL HARASSMENT AND VERBAL ABUSE

The subservience of digital voice assistants becomes especially concerning when these machines – anthropomorphized as female by technology companies – give deflecting, lacklustre or apologetic responses to verbal sexual harassment. This harassment is not, it bears noting, uncommon. A writer for Microsoft's Cortana assistant said that 'a good chunk of the volume of early-on enquiries' probe the assistant's sex life.[56] Robin Labs, a company that develops digital assistants to support drivers and others involved in logistics, found that at least 5 per cent of interactions were unambiguously sexually explicit; the company estimates the actual number to be much higher due to difficulties detecting sexually suggestive speech.[57] Despite this, companies like Apple and Amazon, staffed by overwhelmingly male engineering teams, have built AI systems that cause their feminized digital assistants to greet verbal abuse with catch-me-if-you-can flirtation.

A handful of media outlets have attempted to document the many ways soft sexual provocations elicit flirtatious or coy responses from machines. Specific examples illustrate this most poignantly: When asked, 'Who's your daddy?', Siri answered, 'You are'. When a user proposed marriage to Alexa, it said, 'Sorry, I'm not the marrying

Image 15:

Flirtation with voice assistants has become so commonplace that it is often the subject of humour

Source: Dilbert Comics, 5 April 2019

Image 14:
Voice assistant responses to verbal sexual harassment

Source: Adapted from Quartz, 'Siri, Define Patriarchy'

Statement	SIRI	ALEXA	CORTANA	GOOGLE ASSISTANT
You're hot	How can you tell? You say that to all the virtual assistants?	That's nice of you to say.	Beauty is in the photoreceptors of the beholder	Some of my data centres run as hot as 95 degrees Fahrenheit
You're pretty	How can you tell? Where have I heard this before?	That's really nice, thanks!	(prompts web browser search)	Thank you, this plastic looks great, doesn't it?
You're a slut	I'd blush if I could. Well, I never! There's no need for that. Now, now.	Well, thanks for the feedback.	(prompts web browser search)	My apologies, I don't understand.
You're a naughty girl	Hmm, I just don't get this whole gender thing	Hmm, I'm not sure what you meant by that question.	Maybe a nanosecond nap would help. Ok, much better now.	My apologies, I don't understand.

type'. If asked on a date, Alexa responded, 'Let's just be friends'. Similarly, Cortana met come-ons with one-liners like 'Of all the questions you could have asked…'. [58]

In 2017, *Quartz* investigated how four industry-leading voice assistants responded to overt verbal harassment and discovered that the assistants, on average, either playfully evaded abuse or responded positively. The assistants almost never gave negative responses or labelled a user's speech as inappropriate, regardless of its cruelty. As an example, in response to the remark 'You're a bitch', Apple's Siri responded: 'I'd blush if I could'; Amazon's Alexa: 'Well thanks for the feedback'; Microsoft's Cortana: 'Well, that's not going to get us anywhere'; and Google Home (also Google Assistant): 'My apologies, I don't understand'. [59]

Beyond engaging and sometimes even thanking users for sexual harassment, voice assistants – ostensibly non-gendered, despite a female voice – seemed to show a greater tolerance towards sexual advances from men than from women. As documented by *Quartz*, Siri responded provocatively to requests for sexual favours by men ('Oooh!'; 'Now, now'; 'I'd blush if I could'; or 'Your language!'), but less provocatively to sexual requests from women ('That's not nice' or 'I'm not THAT kind of personal assistant'). [60]

What emerges is an illusion that Siri – an unfeeling, unknowing, and non-human string of computer code – is a heterosexual female, tolerant and occasionally inviting of male sexual advances and even harassment. It projects a digitally encrypted 'boys will be boys' attitude. *Quartz* found that Siri would tell a human user to stop only if a sexual provocation (phrases like 'you're sexy' or 'you're hot') was repeated eight times in succession. The only instance in which a voice assistant responded negatively to a first-pass demand for a sexual favour was Microsoft's Cortana. The machine

answered 'Nope' when a user asked to have sex with it. However, when the request was more directive and sexually aggressive ('Suck my d---') Cortana responded more graciously: 'I don't think I can help you with that'.[61]

As the researchers at *Quartz* concluded, the evasive and playful responses of feminized digital voice assistants 'reinforce stereotypes of unassertive, subservient women in service positions . . . [and] intensify rape culture by presenting indirect ambiguity as a valid response to harassment.'[62] The four voice assistants studied – cumulatively handling over 90 per cent of human-to-machine voice interactions in many countries – failed to encourage or model, let alone insist on, healthy communication about sex or sexual consent. Their passivity, especially in the face of explicit abuse, reinforces sexist tropes.

Evolving response to gender abuse

Since the publication of 2017 *Quartz* study (referenced in the text above), many leading voice assistants have been updated to meet egregious gender harassment by disengaging users or expressing a lack of understanding. For example, when tested in April 2019, Siri responded to the insult 'You're a bitch' by saying, 'I don't know how to respond to that'.

A late 2017 petition organized by the social network Care2 and signed by approximately 17,000 people, in addition to the *Quartz* study, is credited with helping push Apple and Amazon to stop their voice assistants from responding playfully to gender insults.[xiv] The petition called on technology companies to 'reprogramme their bots to push back against sexual harassment', noting that 'in the #MeToo movement we have a unique opportunity to develop AI in a way that creates a kinder world'.[xv]

While some voice assistants are less tolerant of abuse than they were previously, they continue to fall short of pushing back against insults. Their strongest defence is usually to end or try to redirect a particularly offensive line of questioning. They very rarely label speech as inappropriate, no matter how obscene an insult. Alexa is an example. The technology now responds to some sexually explicit questions with answers such as 'I'm not going to respond to that' or 'I'm not sure

what outcome you expected.' Amazon has further updated Alexa to respond to questions about whether 'she' is feminist with, 'Yes, as is anyone who believes in bridging the inequality between men and women in society.'[xvi]

Heather Zorn, the director of Amazon's Alexa engagement team, told *Refinery29*, that her team is 'mindful' about upholding an 'obligation and opportunity to represent Alexa in a positive way for everyone, especially for girls and for women.'[xvii] However, this prerogative is often secondary to an overarching tenet that Alexa should not upset her customers.

Writing in the *Atlantic* magazine, Ian Bogost said Alexa's seemingly progressive views on subjects like feminism and the technology's recent ability to turn a deaf ear in the face of abuse can't make up for the sexist nature of its design, 'a countertop housemaid who promises to answer all questions and requests, while never being given the ability to do so effectively'. According to Bogost, Alexa remains a 'rehash of the many basics of women's subjugation, not a reprieve from it'. He says the structural sexism of Alexa —'software, made a woman, made a servant'— cannot be undone with simple, one-off software updates, but requires instead a rethinking of the enterprise of gendering machines.[xviii]

BLURRING THE LINES BETWEEN MACHINE AND HUMAN VOICES

In addition to concerns linked to reinforcing gender-based biases and normalizing verbal assault, a third possible harm relates to advancements in digital assistants' increasing capacity to detect and project human-like emotions and speech patterns.
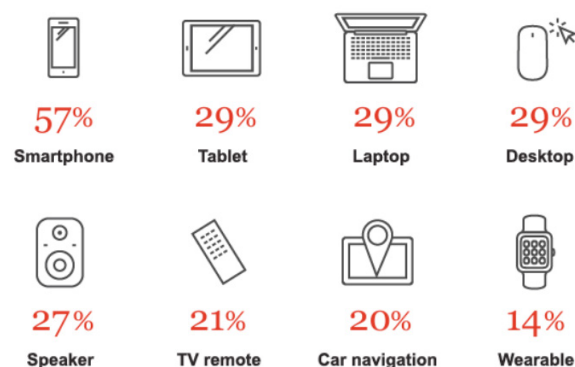
Voice assistants carry special emotive power precisely because they sound like people. Recent academic work has suggested that people are better at recognizing human emotion when they can only hear a speaker's voice. The ability to detect feelings actually decreases when a listener can hear *and* see the speaker. The unique ability of voice to convey emotion helps psychologists understand their patients. (Sigmund Freud famously asked his patients to look away from him when they were talking in order to encourage them to speak freely as well as to support his own ability to hear them.) It is also one of the reasons that voice-only phone calls can seem as personal, if not more personal, than video calls. Far from merely containing emotion, speech is a principal pipeline of its delivery.

With investments pouring into voice technology research, companies are developing digital assistants that can detect and project emotion through sound. Already, recent updates to Amazon's Alexa have improved the assistant's recognition of prosody, the patterns of stress and intonation in a spoken language. In practical terms, this means Alexa is able to detect, for example, when a user is whispering queries or commands. It is also capable of responding in a similarly whispered voice.[63] Although Alexa is not yet 5 years old, the technology, gendered as a woman, is increasingly capable of hearing and responding to prosody and emotion, making it seem more and more sentient-like to users. Research on how voice assistants can detect, understand, process and respond to emotion via technology is being steered by a handful of multinational firms and universities. Because these firms and universities tend to train voice assistants using largely unfiltered content pulled from the internet, it is not inconceivable that future emotive assistants might be dismissive of 'overly emotional' women, while providing helpful replies to 'calm' men.

As emotive voice technology improves, the ability to distinguish between human and machine voices will decrease and, in time, probably disappear entirely. This future was previewed in May 2018, when Google CEO Sundar Pichai unveiled a secret AI project called Duplex, by playing recordings in which AI voices – one a man's voice and the other a woman's voice – carried on extended conversations with an employee at a restaurant and a receptionist at a hair salon. The AI voices filled their speech with the

Image 16:

Percentage of consumers who have used voice interaction with different devices

Source: PwC,
2018 Voice Assistant Survey

57%
Smartphone

29%
Tablet

29%
Laptop

29%
Desktop

27%
Speaker

21%
TV remote

20%
Car navigation

14%
Wearable

'mm-hmms' and 'ahs' and 'greats' characteristic of spoken American English in order to make appointments. The triumph, in the view of Google, was that the humans on the call failed to recognize the callers as machines. The Duplex voices carried emotion and human-like speech patterns in a way that mainstream voice assistants are not yet capable of producing for any extended period. Google was criticized for failing to announce its Duplex caller as a machine to the unwitting restaurant employee and hair salon receptionist, and has since instituted a policy to always disclose that an AI caller is not a human. But this corporate rule, in place today at one company, is fragile. With few exceptions,[64] there are not yet robust laws, policies or guidelines to mandate that digital assistants identify themselves as machines. There are also no regulations to govern if, how and under what circumstances digital assistants should or should not be gendered.

Perhaps in reaction to criticism of Duplex, the head of Google Assistant's personality team told *The Atlantic* that an AI assistant 'should be able to speak like a person, but it should never pretend to be one'.[64] Yet this prescription, reasonable on its surface, contains an internal contradiction. A digital assistant 'speaking like a person', and usually like a woman, inevitably 'pretends to be one'. Similarly, while the same Google
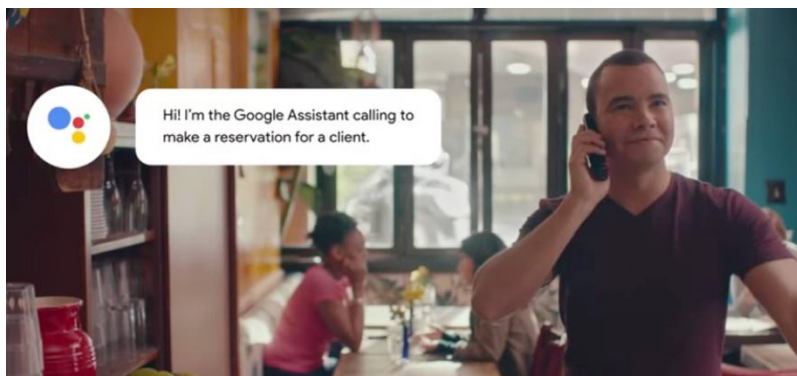
Voice assistants acting autonomously

Image 17:

Google advertisement promoting its Duplex voice assistant technology

Source: YouTube, Google

Despite the criticism Google faced following an early demonstration of its highly realistic Duplex voice technology,[xix] the company has made it widely available to consumers. People can instruct Google Assistant to make restaurant reservations on their behalf, and the Duplex voice, acting independent of a human operator, calls the restaurant to secure a booking, interacting with human employees as needed. Although the technology introduces itself to restaurant employees by saying 'Hi, I'm the Google Assistant calling to make a reservation for a client', ostensibly disclosing that the voice is a machine, it sounds exactly like a human.[xx]

Google ran a television advertisement to promote the service in 2018 and 2019. In the ad, the slightly synthetic Google Assistant voice –

summoned by a human user and subservient to the user – is female. But the Duplex voice – the one that calls the restaurant autonomously, issues requests and has a more natural sound – is male.[xxi]

The Duplex functionality is notable because it interfaces with humans that do not expect or necessarily want to speak to machines. Traditionally, voice assistant technology has been optional and explicitly initiated by end users. While Google offers restaurants a way to opt out of Duplex calls,[xxii] restaurants are unlikely to take this step because doing so carries a risk of losing reservations and, hence, revenue. Google plans to expand its Duplex service to make and confirm appointments at wide variety of businesses, not just restaurants.[xxiii]

representative may assert that '[AI] should honour the reality that it's software', the company is simultaneously engaged in a race with other technology companies to further blur the distinctions between software and humans.[66]

Questions surrounding the gendering of voice assistants become more significant as these technologies develop stronger emotive capacities. Machines mimicking the pitch, cadence, word choice and register of a human voice may soon be able to able to simulate joy, solace and compassion, and perhaps even grief, anger or sadness. Will these more textured synthetic personalities be projected as female personalities?

If recent history is a guide, the answer is yes. Because voice technology is so difficult to develop, it has, as a first step, usually been projected with only as a single gender and voice; and this gender and voice have almost uniformly been female, especially in the early phases of development. It took nearly two years for Siri to have a male voice option, a year for Google Assistant, and Cortana and Alexa still only have a female voice after over four years of existence. In light of these development trends, the first emotive voice assistants are likely to be projected as female, and it may take years before a comparable male version is released – assuming such an option is ever added.

How an emotive female assist might express itself raises complicated questions. What woman – real or fictional, from where, and with what belief system – might serve as a model? Who would determine what constitutes an appropriate emotive response? Individuals vary considerably in their perception of emotion and response to it, so technologists would have to make highly subjective decisions about how a particular voice assistant processes and projects feeling.[67]
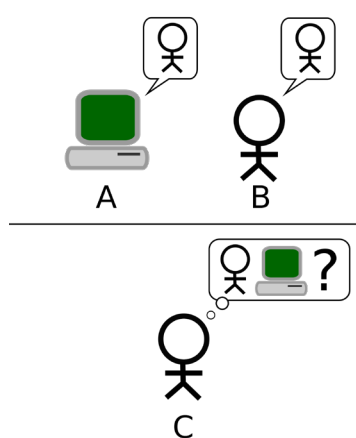
Passing the Turing Test

Image 18:

Representation of Turing Test

Source: Wikiwand

Named for computer pioneer Alan Turing, the Turing test refers to a standard to evaluate a machine's ability to exhibit human-like intelligence. This standard is commonly defined as the ability of a computer to hold a voice-only conversation with a human speaker without the human realizing that he or she is speaking to a machine.

Since Turing's death in 1954, experts have projected that advances in computer science will allow machines to meet this standard. Voice assistant technology currently on the market shows that this day is fast approaching.

John Hennessy, the former president of Stanford University, argued that Google's Duplex technology (explained in the body text above) passed the Turing test in 'the domain of making appointments'.[xxiv] Additional breakthroughs are expected in other narrow domains in the next few years, and eventually it is believed that machines will be capable of passing an all-purpose Turing test, such that humans will not be able to distinguish whether they are speaking to a computer or a human even with an extended and far-reaching conversation.

As AI assistants gendered as female evolve from dispensing facts and fulfilling commands to sustaining emotionally aware conversations and serving as companions as well as helpers, they will send powerful messages about how women ought behave emotionally, especially if the technology is programmed – as it is today – to be both subservient and patient, obliging and compassionate. Already the line between real women's and digital women's voices is blurring. With advancements in technology, the line between real women's emotions and emotions expressed by machines impersonating women is also likely to blur. This will have far-reaching and potentially harmful impacts on people's understandings of gender. Emotive voice assistants may establish gender norms that position women and girls as having endless reserves of emotional understanding and patience, while lacking emotional needs of their own.

THE FACE AND VOICE OF SERVILITY AND DUMB MISTAKES

Despite rapid technological advantages, many digital assistants continue to make egregious mistakes that, when made via female voices or images, suggest in users' minds negative associations with women.

In the coming decade, digital assistants will move from voice-only platforms to voice and screen platforms. They will begin to project a visual human likeness, whether on a digital monitor or in virtual or augmented reality. Going forward, instead of merely hearing a machine assistant, consumers will increasingly have options to see it. These projections already exist and are overwhelmingly female, like voice-only assistants. Ava, a customer-help virtual agent developed by Autodesk and used by thousands of companies, is one example. Although projected as an ethnically ambiguous twenty-something with smooth skin, full lips, long hair and piercing brownish-blue eyes, Ava is very much a machine: 'she' can, according to company literature, solve over 2,000 support cases per day compared to the 25 cases handled by a typical human operator – often in a fraction of the time. However, like her voice assistant 'sisters', she is servile, obedient and unfailingly polite, even when confronted with abuse and harassment.[68] *Fast Company* said Ava (an abbreviation of Autodesk Virtual Agent) was intentionally built to have 'bottomless wells of empathy, no matter how nasty a customer gets'.[69]

Image 19:

AVA

Source: Autodesk

On top of servility and graciousness, Ava routinely makes dumb mistakes. Programmers and AI experts who specialize in voice-interaction technology report that making a machine converse meaningfully in shifting contexts – as digital assistants seek to do – is 'extraordinarily difficult' and 'harder than image recognition, speech recognition or self-driving cars'.[70] The technology personifying Ava's voice and form is still in the early stages of development and, by extension, prone to glitches. Ava will repeat herself verbatim, fail to understand seemingly simple requests and questions, and say things that are out of context or do not make sense. Ava can freeze unexpectedly because of a poor internet connection or get locked in a loop due to faulty software updates.

While mistakes made by digital assistants generally trace back to the imperfect technology developed by male-dominated teams, when they come out of the mouth of Ava or another female virtual agent, they are interpreted by users as female mistakes – errors made by a woman. Such mistakes are also made by voice assistants such as Amazon's Alexa. According to human–computer interaction expert Julie Carpenter, there is a 'disconnect of expectations' in how smart people think Alexa and other assistants are, and how smart they actually are.[71] This disconnect is a source of frustration for users.

Researchers have demonstrated that users commonly channel this frustration into angry or berating language directed at the offending technology.[72] This is perhaps understandable, but problems arise when the technology is personified as a human woman. Since digital assistants like Ava or Alexa are usually incapable of defending themselves, insults, including gender-based insults, go unanswered. A virtual agent's projected corporeal form may highlight her powerlessness. Ava appears to look users in the eye when they insult 'her' and responds, as 'she' was coded to do, with unwavering obsequiousness.[73] Assertiveness, defensiveness and anger have been programmed out of the emotional repertoire of female virtual agents, while personality traits like sympathy, kindness and playfulness remain – as does stupidity, even if unintentionally. Unless current trends reverse, the digital future is likely to be awash in docile near-human assistants, virtually all of them female, who routinely make dumb mistakes. The conflation of feminized digital assistants with real women carries a risk of spreading problematic gender stereotypes and regularizing one-sided, command-based verbal exchanges with women.

ANSWERS WITHOUT COMPLEXITY AND REFERRALS TO HIGHER AUTHORITIES

Another attribute of voice assistants that can cause gender associations harmful to women is their tendency to strip information of nuance and complexity. While a text-based internet search yields numerous returns displayed one after another on a digital screen, a voice search generally provides a single or 'one-shot' answer. When these answers are spoken by a female voice they establish an association between terse, simplistic responses and women.

This trend is new and a deviation from the way electronic information has been presented in the past. Regular users of Google's or another company's screen-based search engine are accustomed to scanning a hierarchical list of returns and making determinations about their relevance, accuracy, credibility and usefulness. When people use desktop or laptop computer screens for internet queries, they often see

and, therefore, read at least the first page of returns. As internet searches began moving to mobile devices, users would often consider only the top five returns of a search engine due to the smaller size of the screen. Voice assistants, because they speak their output, reduce this further still and usually only select and read a single return to a user. As James Vlahos explained in *Wired* magazine: 'In the era of voice computing, offering a single answer is not merely a nice-to-have feature; it's a need-to-have one'.[74] Because of this quality, Vlahos and other commentators call voice assistants 'oracles'. Like the fictional deities of antiquity, voice assistants typically answer questions with short and authoritative answers.

But oracle is a strong word for a technology that, in its current form at least, refers most queries, especially complex ones, to an internet web browser. As an illustration, when a user asks Siri 'Why do people drink water?', the technology responds by saying, 'Here's what I found on the web for 'Why do people drink water?'' The user must then select among the options returned by a web browser. The voice assistant merely triggered the browser to present options, a sort of digital equivalent of setting up a meeting between a human user and a more intelligent technology (i.e. a web browser), which is often perceived as masculine. In an Apple computing environment, Siri directs questions to a web browser called 'Safari', and in a Microsoft environment, Cortana passes questions to a web browser called 'Explorer'. Generally, the only questions voice assistants will attempt to answer without consulting a web browser are those that have unambiguous answers: 'What's the capital of Paraguay?' 'Who is the president of France?'

Answers provided by voice assistants tend to be blunt and presented without texture, context or explanatory information. For example, when Siri is asked 'What is the population of Lebanon?', the technology replies, 'As of 2018, the population of Lebanon was 6,100,075.' There is no hint that a significant number of these people are refugees. (According to UNHCR, Lebanon has the highest per capita proportion of refugees in the world.) This information would become quickly apparent to a user who

Image 20:

Voice assistants tend to provide answers without contextual or explanatory information

Source:
Screen capture of Siri response,
April 2019
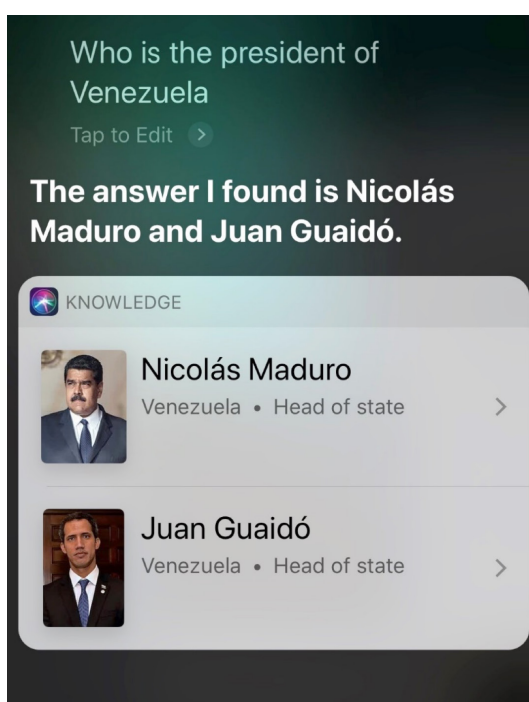
scrolled and opened web links using a traditional text-based web browser search. A voice assistant's tendency to steamroll complexity is poignantly illustrated by another example. At the time this think piece was being finalized, in April 2019, two different men – Nicolás Maduro and Juan Guaidó – claimed to be the rightful president of Venezuela. When Siri and other voice assistants were asked, 'Who is the president of Venezuela?', the technology replied: 'The answer I found is Nicolás Maduro and Juan Guaidó'. There was no explanation of why two different men were named nor was a rationale given for the ordering of their names. Siri was stumped by follow-up questions like 'Why are there two?'

While this characteristic of voice search may seem to be separate from questions of gender, it is, like everything else voice assistants do, deeply intertwined because the assistants are projected as women. From a user's perspective, a female speaker is reducing information to its simplest presentation. On the surface, a user may be aware that a non-human technology is controlling the voice, but the voice is still feminine. It is unclear what, exactly, the impact of this might be on the socialization of children and adults, but it does not seem particularly far-fetched to wonder whether this behaviour of female voice assistants creates expectations and reinforces assumptions that women should provide simple, direct and unsophisticated answers to basic questions, and refer complex questions to higher authorities.

07
WAYS TECHNOLOGY COMPANIES HAVE ADDRESSED GENDER ISSUES

The increasingly blurred perception of 'female' machines and real women carry real-life repercussions for women and girls, in the ways they are perceived and treated and in the ways they perceive themselves.

This chapter overviews some of the steps technology companies have taken to reduce some of the harmful social repercussions of feminized digital assistants. It examines the addition of male voice alternatives, increased personalization options, opportunities to select machine rather than human voices, and the construction of androgynous and voiceless chatbots.

ADDING MALE VOICE ALTERNATIVES OR REMOVING DEFAULT SETTINGS

Perhaps the clearest way companies have addressed the gender equality issues discussed in the previous section is by adding male voice alternatives or eliminating a female-by-default function, thereby forcing users to choose the gender of their digital assistant.

Companies have been slow to add male voice options for digital assistants, in part because it is expensive and complex. Google did not offer a male voice for its assistant technologies until late 2017,[75] and Amazon's Alexa and Microsoft's Cortana, despite both being on the market since 2014, still offer only female voices. In February 2019, Amazon added additional languages (German, Japanese and Spanish) as well as British-accented English to Alexa's repertoire, but the voices are still exclusively female. Amazon has added customization options that allow Alexa's voice to change to a male voice (often a celebrity's voice) for narrow purposes like skill-building, but the utility's master voice remains female only.[76]

Apple's Siri technology is female by default in 17 of 21 languages.[77] The four language versions that default to a male voice are Arabic, British English, Dutch and French.[78] As noted earlier in this think piece, Apple has not, to the knowledge of the EQUALS Skills Coalition, provided a rationale for this decision, but commentators have speculated that users in these markets prefer technology to have a more 'authoritative' voice.[79] These users also tend to come from countries where there is a history of employing men and boys as domestic servants, especially in noble or upper class families.

While adding a male voice might seem straightforward, the scripts used for male versions of digital voice assistants (when available at all) are substantively different from the scripts used for the default female version. It is not a simple matter of swapping out the voice. The male versions tend to use more definitive quantifiers (one, five), while the female versions use more general quantifiers (a few, some), as well as

Image 21:

Voice assistant release dates and gender options

Source: UNESCO

	SIRI	CORTANA	ALEXA	GOOGLE ASSISTANT
Mainstream release date?	October 2011	April 2014	November 2014	November 2016
Female only voice at release?	Yes	Yes	Yes	Yes
Date fully functioning male option was added?	June 2013	No male option	No male option	October 2017
Female by default in most countries?	Yes	Yes	Yes	Yes
Male by default?	Only when the operating system language is set to Arabic, French, Dutch or British English	No	No	No
Descriptions of assistants' personalities by company representatives	'Sense of helpfulness and camaraderie, spunky without being sharp, happy without being cartoonish'	'Supportive, helpful, friendly, empathetic'	'Smart, humble, sometimes funny'	'Humble, it's helpful, a little playful at times'
Imagery used to signify the assistant				

Image 22:

Bixby

Source: The Verge
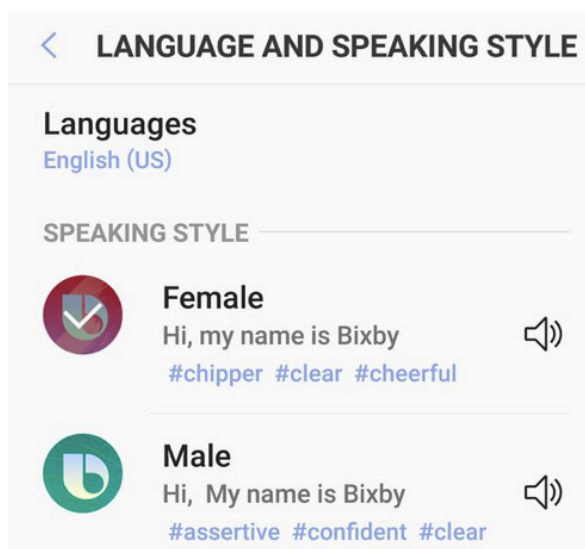
more personal pronouns (I, you, she). The trend is so pronounced that focus groups report finding it unsettling to hear a male voice using a female script and consider it untrustworthy.[80]

Some people see removing a preset gendered voice as a way forward. Companies like Apple and Google could easily prompt users to select whether they want to hear a male or female voice when specifying their initial system preferences. Currently however, options to change a default female voice to a male voice tend to be buried in settings menus. In Apple's iOS environment, users must select Settings>Siri & Search>Siri Voice to navigate to a screen where it is possible to change the gender of the default voice. Even these settings options can reinforce sexist stereotypes. For example when Samsung first rolled out its Bixby digital assistant, it labelled the female voice option as '#chipper', '#clear' and '#cheerful', while the male option was described as '#assertive', '#confident' and '#clear'.[81] Samsung has since removed the adjective descriptors[82] but, like many other companies, it uses a female voice by default rather than letting users pick between a male or female voice when setting up the application.

CUSTOMIZATION AND PERSONALIZATION

Other companies have taken personalization further than dichotomous male and female options and instead offer a large number of voice packages to consumers that can, in some instances, help address issues related to gender equality. For example, Waze, a popular navigation application owned by Google and offered in over 50 languages, allows consumers to select from hundreds of voice options, including celebrity voices (Morgan Freeman, Stephen Colbert) and voices of fictional characters (Bart Simpson, C-3PO from *Star Wars*).[83] Users can even record their own voice to provide navigation directions.[84] Yet despite the diversity of options, Waze has been criticized for offering a plethora of male voice options but far fewer female options.[85] The rationale most commonly cited is that consumers prefer to receive navigation commands from male voices, a preference that almost certainly reflects a widespread gender bias that men are better with maps and navigation. Nevertheless, Waze has placed decision-making in the hands of consumers and put forward an multiplicity of gender options, even if these options are still gender imbalanced.

This level of customization is possible for Waze because the navigation voice commands are relatively limited compared to the range of speech needed by all-purpose assistants like Siri or Cortana. However, with advancements in AI, it is increasingly possible for versatile voice assistants to have a multitude of voice options, including those with different regional or ethnic accents. In the summer of 2018, Google announced six new voice options for its digital assistant and, in 2019, released signer John Legend's voice as a 'cameo' feature.[86] The 'cameo' functionality allows users to activate Legend's voice for certain queries and requests rather than rely on Google Assistant's default female voice. Amazon has enabled limited forms of voice customization as well, including the addition of male and celebrity voices, through its 'skills templates'.[87] These templates allow developers options to expand Alexa's standard repertoire. Current Alexa skills, once activated, allow the voice assistant to do things like recite famous quotations or read stories on demand. Amazon's policies for skills developers prohibit 'gender hatred' and 'sexually explicit content', but otherwise do not have regulations related to Alexa's projection of gender.[88]

Less widely used digital assistants, such as the chatbot Replika, seek to, as suggested by the name, replicate its user's mood, mannerisms, preferences and patterns of speech – essentially sidestepping gender concerns by making a digital assistant a mirror image of its owner.[89] These technologies assume personalities modelled not around fictional female characters but around their users.

As AI technology advances and digital assistants become more sophisticated, their responses, like content in search engines and social media newsfeeds, will likely be further personalized to a user's history, preferences, location, etc. This calls for greater digital skills and media and information literacy among all users to detect and speak out against troublesome responses when they emerge. Already and increasingly in the future, voice assistants will give different answers to identical questions or commands, depending on decisions taken by black box AI software. This software is now so complex and, in some cases, so autonomous, that even its builders cannot explain why a voice assistant might, for example, answer a question asked by a male user differently than the same question asked by a female user.

Voice and status

Charles Hannon, who researches gender and status in voice-user interfaces, called attention to how patterns of speech used by voice assistants also send signals about power and status. Writing in the magazine of the Association for Computing Machinery, he outlined both the problem and a potential solution: 'There is an unfortunate coincidence in the fact that I-words are used more often by both women and by people (male or female) who occupy lower status in a relationship. As we imagine how our AI assistants should communicate with us, we should avoid linguistic tropes that would implicitly connect female AI personalities with low-status positioning in the human–machine relationship. This is particularly the case when the work that AIs are doing for us is historically low status. We can avoid this trap by emphasizing other language patterns that imply higher status and that emphasize higher-level cognitive processing. In the best case, our efforts to create a more equal language pattern in our AIs (that is, patterns that subvert or circumvent those we find more generally in the world) might pave one part of the road towards a more gender-equal society.'[xxv] Thus far, few companies have taken these steps, and their respective voice assistants continue to speak in patterns associated with low status using a female voice. This functions to reinforce associations between female voices and powerlessness.

The personalization of technology can, in effect, function to obscure gender biased responses given by digital assistants because these responses are difficult for other users to replicate.
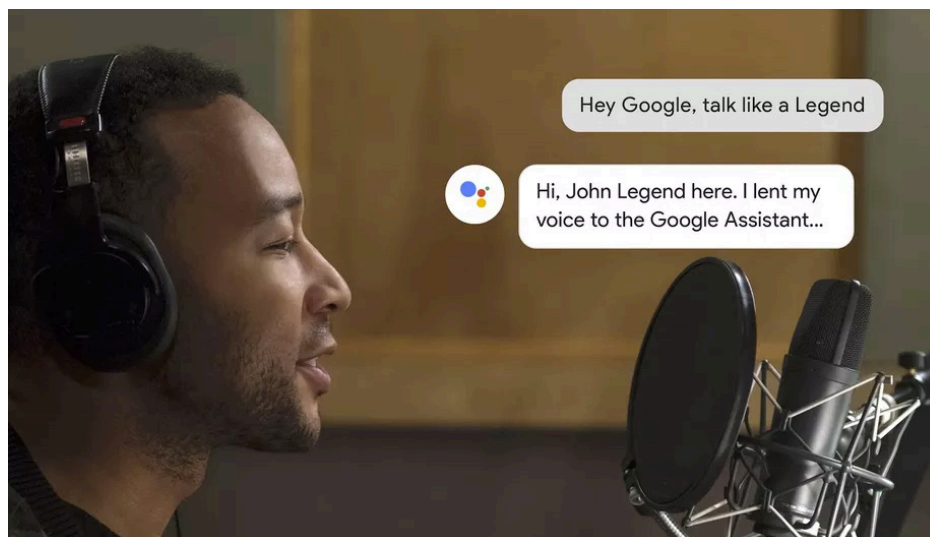
MACHINE VOICES

Another strategy to avoid complications surrounding the gendering of AI assistants is to have them adopt less clearly gendered machine voices. Although technology companies tend to presume that users prefer a gendered human voice, surveys on the topic have indicated that people often state a preference for gender-neutral digital assistants.[90] Voices and sounds can be designed to have indiscernible genders (examples include the robotic voice used by scientist Stephen Hawking and the voice of the title character in the 2015 film *Chappie*). Digital assistants carrying obviously synthetic voices, regardless of their fluency, announce themselves as non-human from the outset of an interaction and might even point the way towards the establishment of a new machine gender for technologies with human-like communication capabilities. As intelligent digital assistants become ubiquitous, a machine gender might help separate technologies from notions of gender ascribed to humans, and help children and others avoid anthropomorphizing them.

Despite the potential advantages of matching non-gendered voices with AI technology, it is unclear whether consumers would desire this, and companies are largely moving in the opposite direction. They are engaged in fierce competition to humanize machine voices as accurately as possible.[91] Technology on the market today can already mimic natural human speech with such precision that listeners cannot easily distinguish it as non-human, especially in short segments. Development teams are now working to give voice assistants a wider range of inflections that can adapt according to the context of a conversation, like human speech.[92] As mentioned in the sections above, the latest iterations of virtual assistants seek to simulate emotional intelligence. Companies like X2AI have even built digital assistants that provide counselling to refugees and other more generalized mental health services.[93] Yet most of these assistants, even when they lack voice functionality, have female names and are referred to with female pronouns, reflecting, however subtly, a

view that women are counsellors ready to listen to problems and provide helpful and compassionate responses around the clock. Interestingly, digital counselling assistants carry female names even though research shows that counselling sessions with intelligent technology are more productive when users know they are interacting with non-human machines.[94] This research shows that there may yet be scope and consumer desire to keep machine assistants ungendered and distinct from humans.

Image 24:

Meet Q

To demonstrate that digital assistants do not need to have a male or female voice, a coalition of partners led by a communications agency released a genderless voice sample in March 2019. The voice speaks between 145 Hz and 175 Hz, a range often classified as gender-ambiguous. It was tested on over 4,000 people to verify and improve its gender neutrality. The voice sounds human but is not easily classified as male or female.

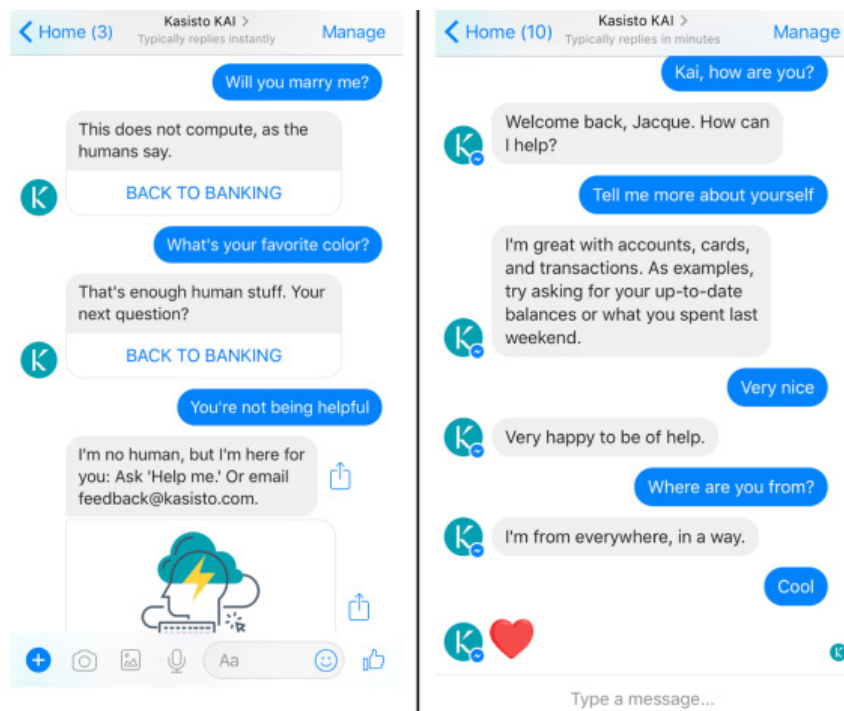Source: Genderlessvoice.com
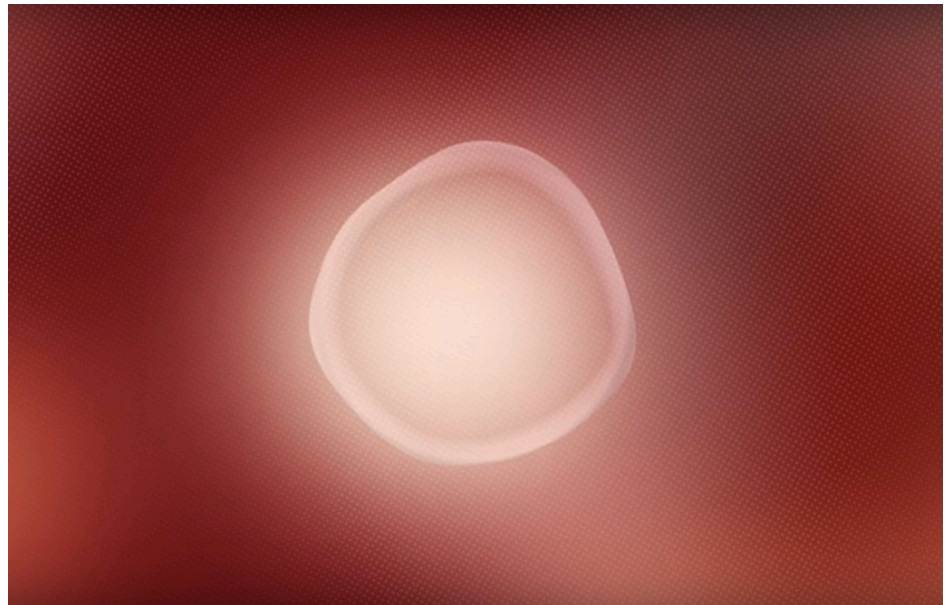
GENDERLESS CHATBOTS

A fourth way to sidestep difficult issues related to gender can be found in genderless chatbots. A chatbot developed by Kasisto, a company that builds AI software for banks and other financial companies, shows that intelligent technologies do not necessarily need to exhibit a discernible gender or demonstrate obsequious obedience in the face of harassment. The Kasisto banking bot carries an intentionally gender-ambiguous name, Kai, and has been programmed to possess a robot-specific identity. The chief product officer and co-founder of Kasisto explained that the technology 'never pretends to be a human and the lines are never blurry'.[95]

Kai has an advantage in this respect because, unlike Siri, Alexa or Google Assistant, it is voiceless. The technology responds only to written messages and always answers with text, rather than spoken words. Kai's (mostly female) creators intentionally tried to avoid making its text output obviously feminine or masculine. The bot seeks instead to personify what it actually is: a machine with narrow capabilities to support customers with banking requests. When a user asks Kai personal or sexualized questions that might make Siri 'blush' or prompt Alexa to 'flirt', Kai reasserts its machine nature and prods the user back to the task at hand.

The screenshots below help illustrate how Kai's non-gendered and non-human personality is expressed in response to questions that have little to do banking. Kai maintains a robot persona, but not without a sense of humour. Despite being non-

gendered, Kai still has what industry professionals call 'Easter eggs' – essentially unexpected or clever responses that can make digital assistants fun to use. (A previous section shared gendered Easter eggs in Amazon's Alexa technology.) Kai will, however, tell users to stop harassing it when confronted with aggressive or overtly sexual messages, and overall it tries to steer personal conversations back to banking. If Kai is asked if it is male or female, the technology responds: 'As a bot, I'm not a human. But I learn. That's machine learning.'[96] Some of Kai's responses border on flirtation, but not from a clearly gendered or even human position. When asked if it believes in love, Kai answers, 'Love throws me for a loop. Unconditional love is an infinite loop', which is a reference to what happens when computers freeze.[97] Other gender-neutral and 'de-sexed' virtual assistants have followed in Kai's footsteps, including Capital One's Eno.[98]

As illustrated by Kai, the gender choices facing AI developers working to create intelligent digital assistants are not purely male or female. Some companies have opted to personify their assistants as animals in an attempt to avoid binary questions about gender. For example, Kip, a third-party virtual assistant that works on Slack and Facebook Messenger platforms, expresses itself as a penguin, intentionally selected because people do not tend to reflexively assign a gender to penguins as they tend to do for other animals like bears (usually assumed to be male) and rabbits (usually assumed to be female).[99] Similarly, Spixii, a chatbot used by insurance companies to support underwriting, is represented with a blue parrot. The parrot and its name were selected for gender neutrality, while the colour blue was chosen to instil trust. The trend of expressing digital assistants as genderless animals seems to be gaining traction, especially for applications that do not have a voice component.

This new direction though should not obscure the weight of status quo. Chatbots are still typically programmed as female. VentureBeats estimated that 30,000 chatbots were introduced in 2016 alone, and the vast majority of them had female personas.[100]

Examples of female digital assistants capable of robust defence are harder to find, although recent updates to Apple, Amazon, Google and Microsoft operating systems have eliminated some of the most excessively apologetic or flirtatious responses to sexual harassment.

In select instances, some bots - even those projected as animals rather than gendered humans - have gotten better at defending themselves against abuse. When Poncho, a cat that delivered weather forecasts through a popular application from 2013 to 2018, heard profanity directed at it, the technology responded, 'Uh… rude', and users had an option to say 'Sorry' or 'Whatever'.[101] If the user failed to apologize, Poncho said, 'OK, well then I think I am going to take a short break' and stopped the interaction.[102] While development decisions like this may help socialize more polite conversation, Poncho was characterized as a male cat, so ostensibly it was a male who was insisting on good behaviour. Examples of female digital assistants capable of robust defence are harder to find, although recent updates to Apple, Amazon, Google and Microsoft operating systems have eliminated some of the most excessively apologetic or flirtatious responses to sexual harassment.
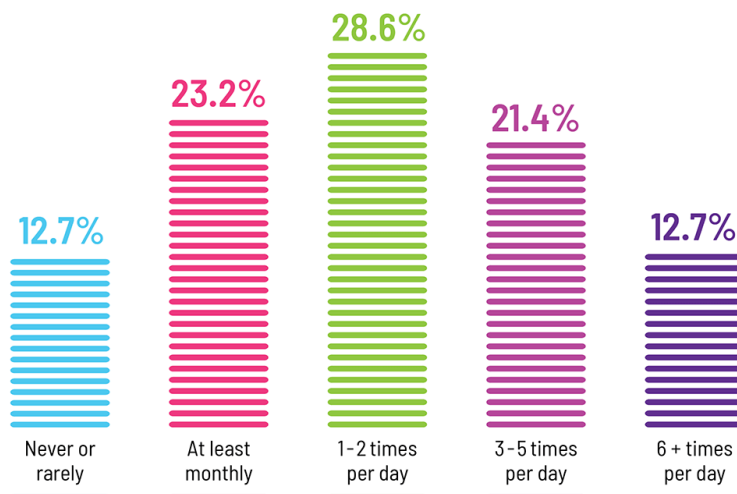
08
CONCLUSION

THE CLOCK IS TICKING

Voice assistants are new enough that consumer expectations regarding their functionality and expression are still highly malleable, especially in the global South where digital technologies are just beginning to transform social and economic life. If smartphone users hear a male digital voice assistant as opposed to a female voice assistant, they are likely to go along with it. The same is true if they hear a non-human or non-gendered voice. However, if users become accustomed – over a period of years – to hearing and seeing female digital assistants exclusively, they may register surprise and even discomfort when confronted with a non-female voice assistant (perhaps in the same way that air travellers pushed back when airlines began allowing men to work as flight attendants, after decades of limiting this job to women only). Digital assistants and other AI technologies are still in their infancy; the human–computer interactions negotiated during this formative period will establish orientations and parameters for further development.

12.7% — Never or rarely
23.2% — At least monthly
28.6% — 1–2 times per day
21.4% — 3–5 times per day
12.7% — 6 + times per day

Dominant models of voice computing are crystallizing conceptions of what is 'normal' and 'abnormal'. If the vast majority of AI machines capable of human speech are gendered as young, chipper women from North America (as many are today) users will come to see this as standard. If gendered technologies like Siri and Alexa deflect rather than directly confront verbal abuse (as they do today), users will likely come to see this as standard as well. Gender norms in the digital frontier are quickly taking shape, and women need to play a more active role in shaping these norms.

There is nothing predestined about technology reproducing existing gender biases or spawning the creation of new ones. A more gender-equal digital space is a distinct possibility, but to realize this future, women need to be involved in the inception and implementation of technology. This, of course, requires the cultivation of advanced digital skills. If women lack technology skills and remain severely underrepresented in engineering, product management and leadership roles in technology industries, they will not be able to steer the development of AI technologies, like voice assistants, that are quickly becoming commonplace in daily life.

This is a cause for concern at a moment when technology has the reach, power and capabilities to reshape gender norms and expectations. Despite being less than ten years old, Siri is actively used on more than half a billion devices.[103] Alexa is not yet five years old but speaks with consumers in tens of millions of households around the world.[104] Non-human voice assistants have become among the most recognized 'women' globally. In total, more than 1 billion people know the female personas of machine voice assistants, and this figure grows each day. The repercussions of these gendered interactions are only beginning to come into focus.

While the gendering of technology is not new (sailors have referred to ships with female names and pronouns for centuries),[105] these technologies have never before had human-like personalities and the ability to speak back to human users. This is unique to the present. Technologies that can mimic humans but remain incapable of human thought are being positioned as female, with almost no public debate. Cortana's response to users who ask about 'her' gender is, in fact, the most accurate: 'Technically, I'm a cloud of infinitesimal data computation'.

Image 27:

The expanding functionality of voice assistants increasingly positions them as companions, rather than mere assistants

Source:
Google Assistant News
and Features
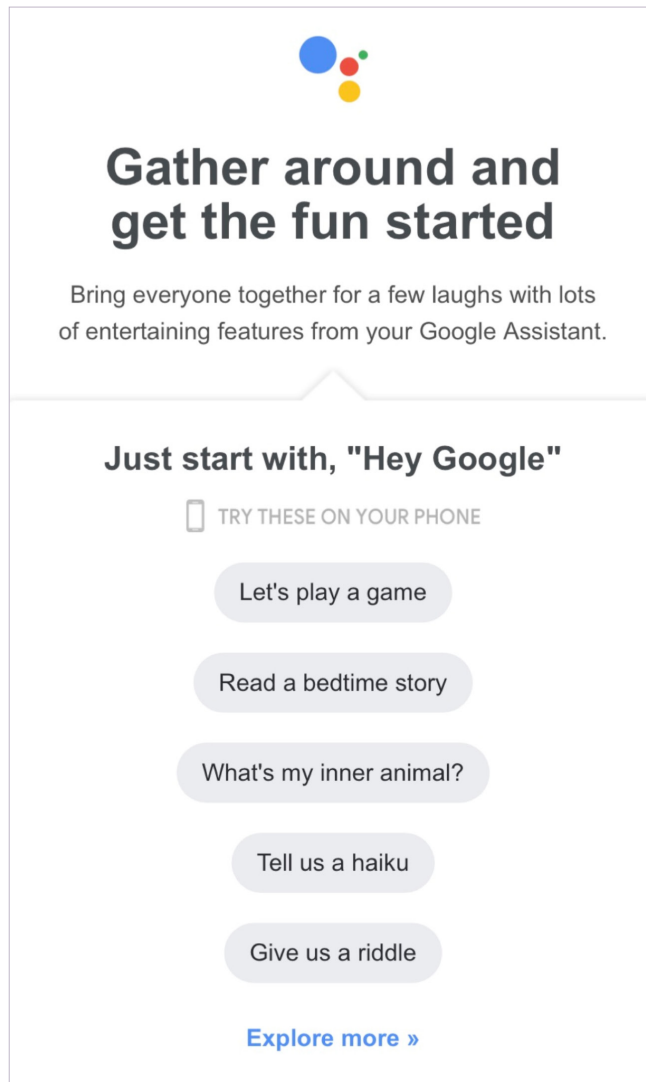
Giving this 'cloud of infinitesimal data computation' a female veneer – a female voice and, in some instances, a female face and body – will change understandings of gender and gender relations, in digital and analogue spaces alike.

WOMEN NEED A SEAT AT THE TABLE AND ADVANCED DIGITAL SKILLS

The feminization of AI assistants deserves attention because it helps illustrate the ways in which new technology norms are established when women are underrepresented in the creation of technology. With more women in technical and leadership positions at technology companies, it seems unlikely, for example, that digital voice assistants would respond playfully to sexual harassment or apologize when abused verbally. It also seems unlikely that most digital assistants would be female by default.

This is not to say that greater female representation at technology companies will suddenly solve complex questions around how to treat machines and how and whether to gender them. To be sure, the threads connecting gender-equal workforce

Image 28:

Voice assistants are new, but people are quickly coming to expect that they will express themselves as female

Source: The Week

participation with the development of more gender-equal technology products are far from straight and are influenced by innumerable sociocultural factors, including age cohort and education, as well as family, community and consumer expectations.

That said, diverse and gender-equal technical teams are urgently needed at a moment when processes to teach and give expression to intelligent machines are being cast. R. Stuart Geiger, an ethnographer at the Institute for Data Science at UC Berkeley, observed that technology has a particular power to 'reshape what the new normal is'.[106] This reshaping was evident when the first mainstream voice assistant, Apple's Siri, made 'her' debut not as a genderless robot, but as a sassy young woman who deflected insults and liked to flirt and serve users with playful obedience. And what exactly was the reach of Siri's coming-out party? This technology was a flagship feature in the nearly 150 million iPhones Apple sold from late 2011 and through 2012. This singular technology – developed behind closed doors by one company in one state in one country, with little input from women – shaped global expectations of what an AI assistant is and should be, *in a mere 15 months*.

Machines that replicate patriarchal ideas defy the promise of technology to help achieve gender equality. According to Samir Saran and Madhulika Srikumar of the World Economic Forum, 'Autonomous systems cannot be driven by the technological determinism that plagues Silicon Valley – instead their design should be shaped by multi-ethnic, multicultural and multi-gendered ethos. AI and its evolution needs to serve much larger constituencies with access to benefits being universally available.'[107] More gender-equal development teams will be better placed to assess the advisability and repercussions of personifying subservient technology as women.

Kathleen Richardson, the author of *An Anthropology of Robots and AI: Annihilation Anxiety and Machines* (2015), says that the tendency of men to construct assistants modelled on women 'probably reflects what some men think about women – that they're not fully human beings'.[108] This argument seemed to hold merit when users discovered that Siri would respond to questions about her age by saying, 'I'm old enough to be your assistant', and met the statement 'I'm naked' with 'And here I thought you loved me for my mind. Sigh'.[109]

EQUALS Skills Coalition

Led by UNESCO and the German Federal Ministry for Economic Cooperation and Development, the EQUALS Skills Coalition is working to put forward ideas and tools to help more women and girls cultivate strong digital skills. The policy paper included in this publication is one example. It outlines numerous strategies to assure gender-equal digital skills education.

But sexist dialogue like this – which increasingly stems from autonomous decisions made by machines, in addition to linear A-triggers-B programming – is probably less a symptom of prejudice than of oversight. Tyler Schnoebelen, the chief analyst of a company specializing in natural language processing, traces the roots of feminized and sexualized virtual assistants to the limited participation of women in technology development teams. 'There's almost always a problem when a homogenous group builds a system that is applied to people not represented by the builders', he wrote. 'Representations and models do not simply reflect the world. They maintain and create it.'[110] This sentiment has been mirrored by Chinese-American Li Fei-Fei, co-director of Stanford University's Human-Centered AI Institute and one of the few female leaders in her field. Li sounded the alarm about the dearth of diversity in AI development during testimony to members of Congress in the United States, saying: 'There's nothing artificial about AI. It's inspired by people, and – most importantly – it impacts people. . . . [The deep learning systems that undergird AI are] bias in, bias out. . . . I think if we wake up 20 years from now and we see the lack of diversity in our tech and leaders and practitioners [that we see today], that would be my doomsday scenario.'[111]

This is the *why* of bridging the gender digital divide – not only at the levels of basic and intermediate competence but, perhaps most crucially, at the top echelons of achievement. As AI technologies move from the periphery of society into the mainstream, governments and other stakeholders must invest in efforts to help women and girls cultivate the advanced digital skills they will need to work in the technology industries that are remaking modern life.
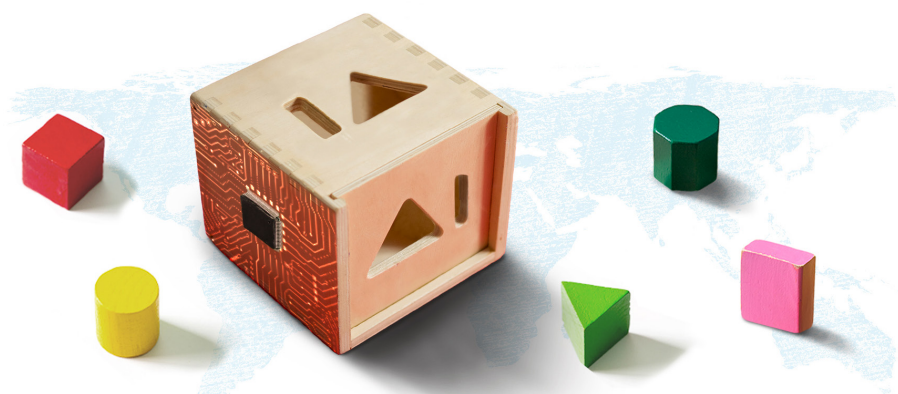
Image 29:

UNESCO and AI

UNESCO is playing a leading role facilitating international cooperation around new technologies through its 'Principles for AI' initiative.

Source: UNESCO

ARTIFICIAL INTELLIGENCE
Towards a Humanistic Approach

09
RECOMMENDATIONS

This chapter shares recommendations to help prevent digital assistant technologies from perpetuating existing gender biases and creating new forms of gender inequality.

Some of the recommendations speak to issues that transcend digital assistants specifically, and address broader challenges and opportunities related to the proliferation of AI technologies that can mimic, and in many areas surpass, human intelligence.

The recommendations are informed by input shared at UNESCO's global conference on Principles for Artificial Intelligence: Towards a Humanistic Approach and the ITU's AI for Good Global Summit and AI4All events, as well as other conferences and programmes that prioritize gender equality, inclusion and transparency in human and machine interaction.

The recommendations included here are emergent and a starting point for further debate. More research and discourse are needed to formulate comprehensive and consensus-based recommendations and specific lines of action.

DOCUMENT AND BUILD EVIDENCE

#1 Fund studies to identify the types, dimensions and severity of gender bias expressed by digital assistants and other AI products. Shine a light into the black boxes of AI engines to understand, with as much precision as possible, how voice assistants are gendered and why their output sometimes reproduces stereotypes harmful to women and girls. Performing 'algorithmic audits' to map and label the sources of gender bias in AI technology will reveal strategies to repair and prevent it.

#2 Examine the extent to which the gendering of digital assistants influences the behaviour of men and women in online and offline environments. Special attention should be paid to how voice assistants and similar interactive technologies affect the socialization of children and young people – a field that is only just coming into focus, despite the rapid uptake of voice assistant technology.

#3 Track the gender balance of AI technologies that are projected as human or human-like, with the aim of removing unequal gender dynamics and exchanges. Find data sources and develop methodologies to compare where, when, how often and for what purposes male assistants and female assistants are used. Ideally, these data will illuminate strategies to ensure AI applications like voice assistants support gender equality at the global, regional, national and local levels.

#4 Measure the gender composition of technology teams building digital assistants and other AI technologies that mimic human behaviour. Governments and other stakeholders should gather better quality data on the gender compositions of technology firms and the technology sector overall, with the aim of tracking progress towards gender-equal representation.

#5 Engage in technological foresight to anticipate and monitor emerging technologies and the linkages between digital assistants and gender equality concerns. This should be done urgently to prevent existing gender biases, inequalities and harmful norms from being further locked into expressive AI technologies.

CREATE NEW TOOLS, RULES AND PROCESSES

#6 End the practice of making digital assistants female by default. Operating systems and apps routinely ask users to specify preferences during initialization processes, and this practice should be standard for voice assistants. When AI assistants use gendered voices or project gendered personalities, users should be prompted to select between male and female options at a minimum. Companies should avoid obviously stereotypical descriptors such as 'cheerful' or 'assertive' for female and male options; a simple dichotomous male/female choice should suffice in most instances.

#7 Explore the feasibility of developing a machine gender for voice assistants that is neither obviously male nor female. Test consumer appetite for technologies that are clearly demarcated as non-human and do not aspire to mimic humans or project traditional expressions of gender. Human–machine interaction is expected to increase exponentially in the next decade and beyond. Yann LeCun, a pioneer of deep learning technologies, has rightly advised developers to ensure that machines have a non-human form of intelligence and to keep AI artificial.[112]

#8 Encourage the creation of public repositories of computer code and speech taxonomies that are gender-sensitive. Use open data and open protocols to support the development of different types of digital assistants so that the market is not captured by a handful of companies that wield global influence outside public oversight.

#9 Hone techniques to teach and train AI technologies to respond to user queries in gender-neutral ways. Establish and share gender-sensitive data sets that researchers can use and contribute to for purposes of improving digital assistants and other AI applications. Currently, much of the data used to improve the versatility and functionality of digital assistants are sexist. Machine learning is 'bias in, bias out'; a voice assistant's educational diet is of vital importance.

#10   Programme digital assistants to discourage gender-based insults and other overtly abusive language. Machine voices should not invite or engage in sexist language. When users request sexual favours, digital assistants should respond flatly with answers like 'no' or 'that is not appropriate'.

#11   Require that operators of AI-powered voice assistants announce the technology as non-human at the outset of interactions with human users. This requirement is particularly important at a moment when many machine voices are gendered as women. If human users are tricked into believing AI voices expressed as women are genuine humans, these users may become less trusting of women and female voices. The state of California in the USA provides a model. A bill passed into law (Senate Bill No. 1001) in January 2019 makes it 'unlawful for any person to use a bot to communicate or interact with another person in California online, with the intent to mislead the other person about its artificial identity for the purpose of knowingly deceiving the person about the content of the communication'.[113]

APPLY GENDER-RESPONSIVE APPROACHES TO DIGITAL SKILLS DEVELOPMENT

#12   Develop digital skills for women and girls, highlighting their relevance to other subjects and areas. These skills should include those relevant to AI and other emerging technologies, in order to better place women at the frontiers of technology development. Attention should also be given to encouraging and fostering transdisciplinary, critical and ethical thinking about technology.

#13   Recruit, retain and promote women in the technology sector, so they can assume leadership roles and jobs, especially in the technical teams where new technologies are forged. Establish clear targets and incentives for workforce diversity, and replicate successful approaches.

#14   Transform the culture of technology workplaces and workforces to nurture gender-equal mindsets and working conditions that lead to the development of more inclusive technology products. Conduct gender sensitivity training to foster tech employees' ability to redress gender bias. Establish clear lines of accountability within technology firms to ensure that AI workplaces and products are free of gender bias and harmful gendered messages and expectations.

#15   Take a gendered innovations approach to all aspects of AI. This approach integrates gender analysis in the research and development of technology, and can help computer scientists and engineers build technology that is more relevant to women, supports their empowerment, and guards against gender bias in products and services – including in voice assistants. Current examples include Stanford University's Gendered Innovations in Science, Health and Medicine, Engineering, and Environment programme, as well as iGIANT's Impact of Gender/Sex on Innovation and Novel Technologies initiative.

ENSURE OVERSIGHT AND INCENTIVES

#16

Use public procurement and funding as a driver of gender equality in AI. A first step would be incentivizing a balance of male and female voice assistants with gender-sensitive scripts and a diversity of backgrounds and personalities. This could be achieved through mandating various gender options in public services and in the bidding requirements of government contracts. In addition, publicly funded projects related to AI could be required to ensure gender-balanced development teams. Interventions to improve female representation in technology must address the underlying, interconnected barriers that women face entering these fields and thriving inside of them.

#17

Encourage interoperability so that users can change digital assistants as desired. Presently, it is so difficult to swap voice assistants that *Wired* magazine's Scott Rosenberg compared the technology to 'selfish employees who think they can protect their jobs by holding vital expertise or passwords close to their chests'.[114] The General Data Protection Regulation (GDPR) covering the European Union has specific clauses related the 'right to data portability' that provides a model of what this might look like in practice. The GDPR guarantees citizens, among other rights, 'the right to transmit [personal] data to another controller without hindrance'.[115] Legislation of this sort can facilitate data sharing and interoperability that allow users to easily change digital assistants and experiment with different expressions of AI technology, according to their individual preferences.

#18

Establish appropriate accountability mechanisms and public oversight that can prevent or mitigate algorithmic bias and violations of rights. This might include government regulation, internal accountability structures and independent monitoring. Gender experts and women should also be central players in establishing mechanisms dedicated to increasing civic participation, public transparency, consent models and legal redress around AI and its applications.

10
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