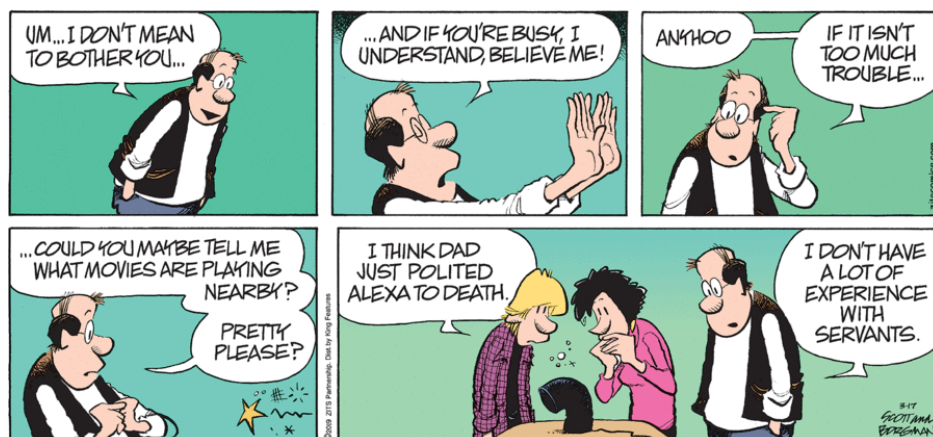


to queries regardless of their tone or hostility. In many communities, this reinforces commonly held gender biases that women are subservient and tolerant of poor treatment.

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.^x While Hegel was writing in the early nineteenth century, his argument is regularly cited 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 assistants. 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.

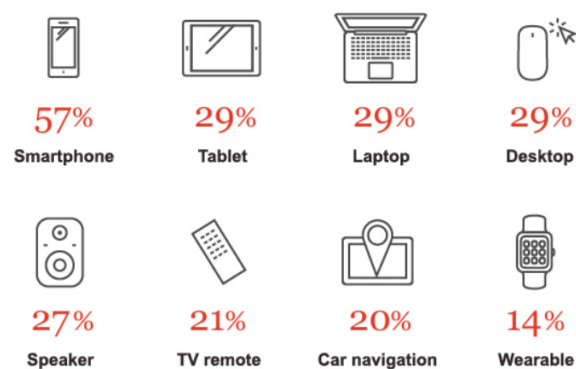
Voice assistants carry special emotive power precisely because they sound like people. Recent academic work has suggested that people are better at recognizing human emotion when they can only hear a speaker's voice. The ability to detect feelings actually decreases when a listener can hear *and* see 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



'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

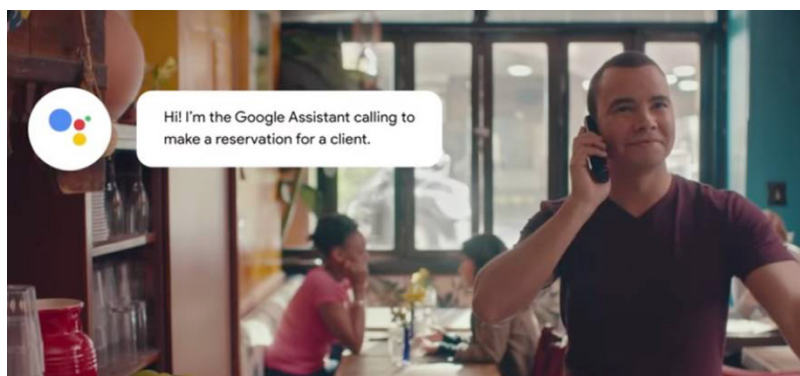


Image 17:
Google advertisement promoting its Duplex voice assistant technology

Source: YouTube, Google

Despite the criticism Google faced following an early demonstration of its highly realistic Duplex voice technology,^{xx} 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 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

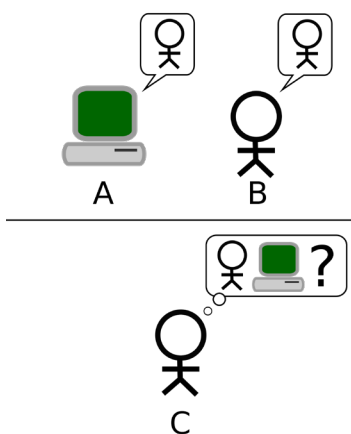


Image 18:
Representation of Turing Test

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.

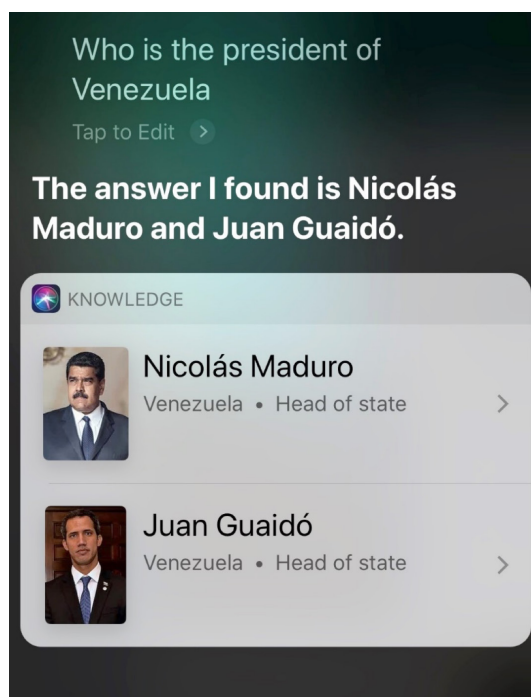
But oracle is a strong word for a technology that, in its current form at least, refers most queries, especially complex ones, to an internet web browser. As an illustration, when a user asks Siri 'Why do people drink water?', the technology responds by saying, 'Here's what I found on the web for 'Why 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

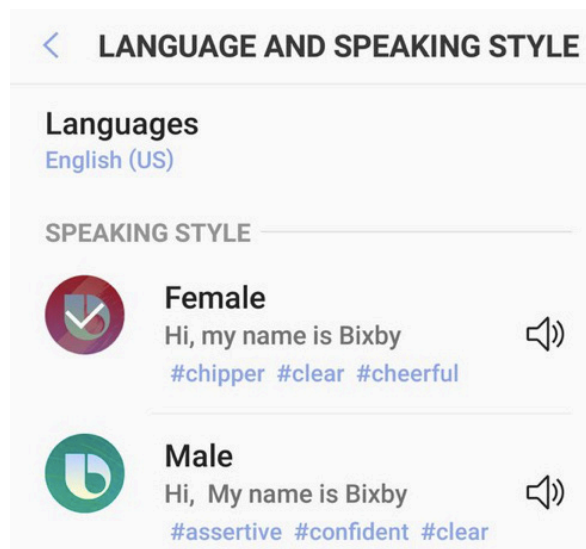
Image 21:
**Voice
assistant
release dates
and gender
options**

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 descriptors⁸² 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

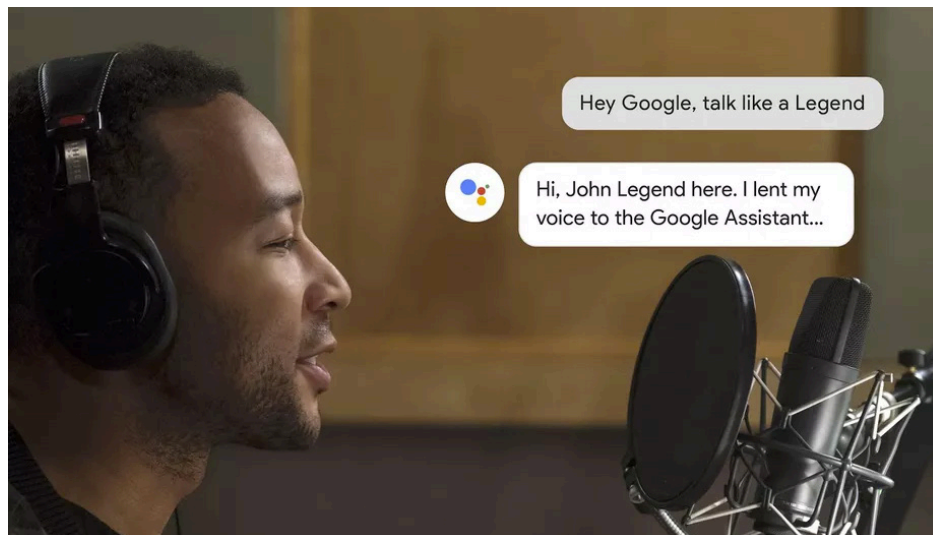
Charles Hannon, who researches gender and status in voice-user interfaces, called attention to how patterns of speech used by voice assistants also send signals about power and status. Writing in the magazine of the Association for Computing Machinery, he outlined both the problem and a potential solution: '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.

Image 23:
**Celebrity voices
have become
a common
customization
option**

Source: Google Assistant News



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.

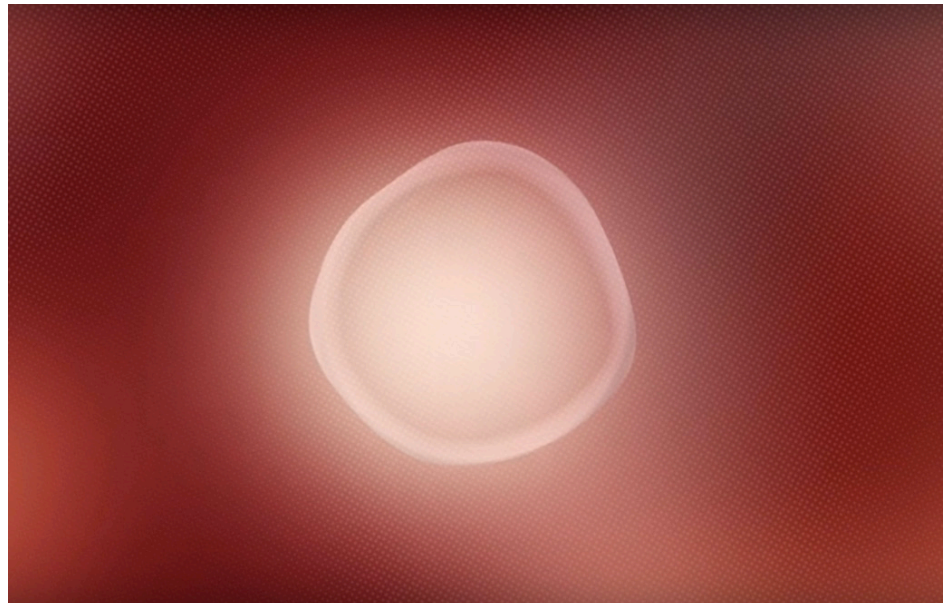
Image 24:

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

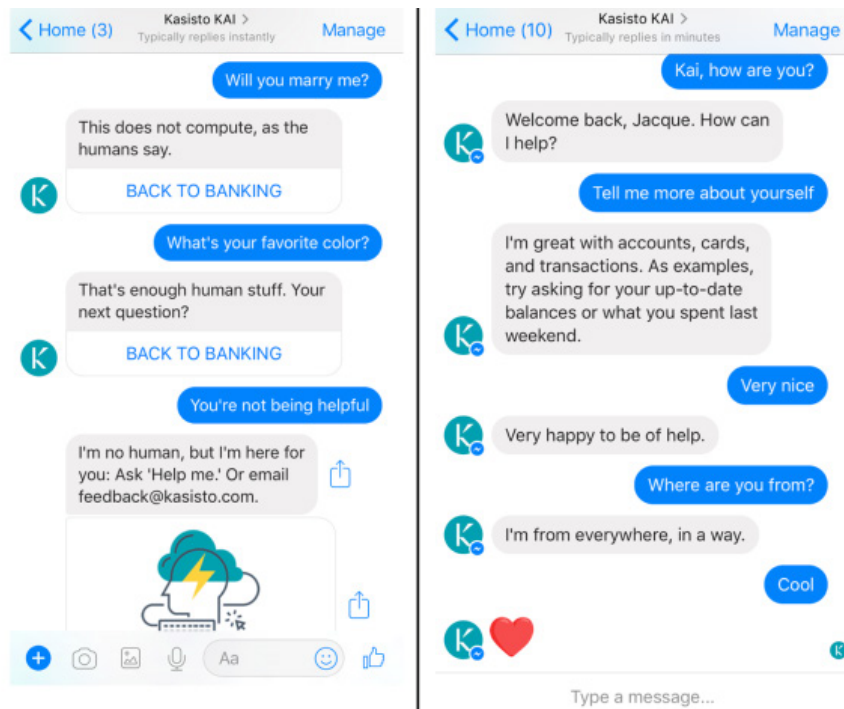
A fourth way to sidestep difficult issues related to gender can be found in genderless chatbots. A chatbot developed by Kasisto, a company that builds AI software for banks and other financial companies, shows that intelligent technologies do not necessarily need to exhibit a discernible gender or demonstrate 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-

Image 25:
Kai chatbot
deflects personal
questions and
does not reflect a
gender

Source: Quartz,
screenshots from an exchange
with Kai



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.

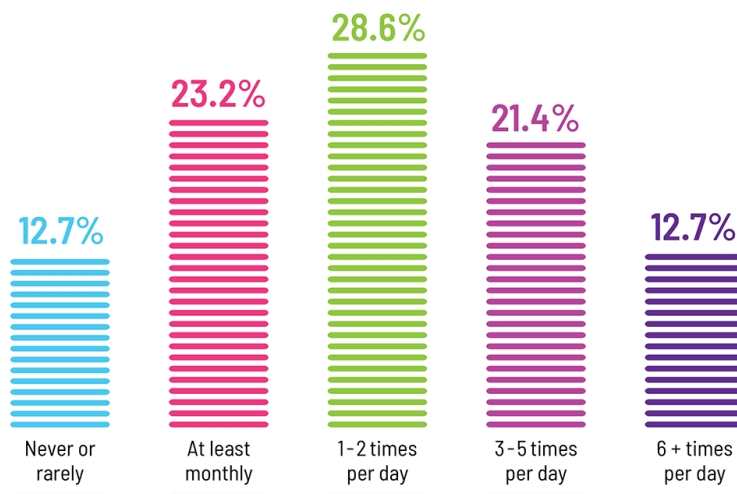
08 CONCLUSION

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.

Image 26:
Frequency of
smart speaker
use

Source:
Voicebot AI,
2018 Consumer Adoption Report



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.

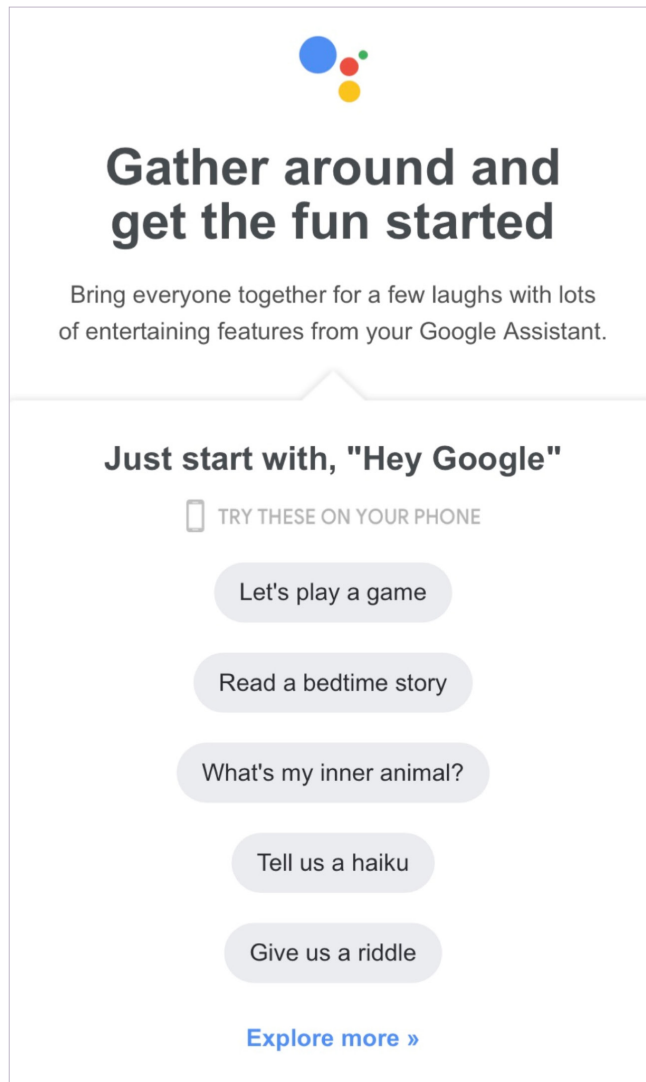
This is a cause for concern at a moment when technology has the reach, power and capabilities to reshape gender norms and expectations. Despite being less than ten years old, Siri is actively used on more than half a billion devices.¹⁰³ Alexa is not yet five years old but speaks with consumers in tens 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

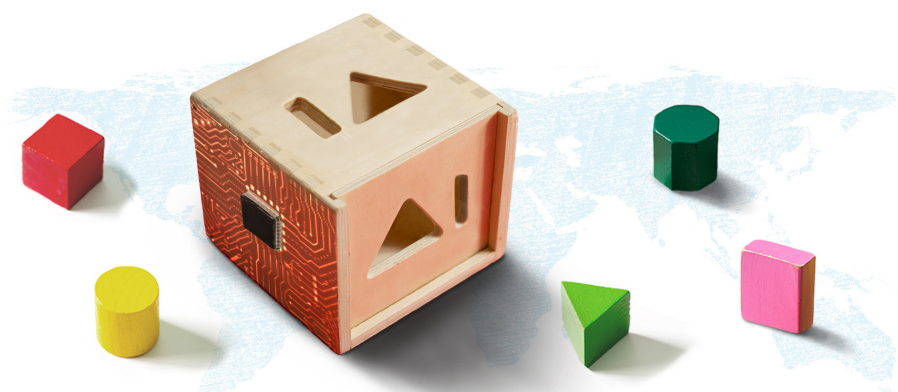
UNESCO is playing a leading role facilitating international cooperation around new technologies through its ‘Principles for AI’ initiative.

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.

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