Alexa, Google Assistant, and Siri's language options:
How voice assistants reproduce monoglossic language ideologies

Introduction

By 2024, 8.4 billion voice assistants were projected to be installed on devices, surpassing the world's 8.2 billion population (Laricchia 2020). 30 percent of people surveyed in the United States (US), United Kingdom (UK), and Germany report using them daily (Vixen Labs 2022). The ever-increasing options for languages, accents, and voices are often touted to enhance the accessibility and usability of voice assistants. New language additions sustain enthusiasm for its market potential (e.g., Jannach 2023), healthcare (e.g., Jadczyk et al. 2021), caregiving (e.g., Jiménez et al. 2022), or language learning (e.g., CBC News 2022). However, little attention is paid to *which* and *whose* languages are supported by voice assistants and how these languages are framed.

This study addresses the gap by examining the language options of Apple's Siri, Google's Google Assistant, and Amazon's Alexa alongside related corporate and media texts to determine how voice assistants reflect dominant language beliefs. It aligns with the special issue by understanding voice assistants as shaped by human language traditions, cultural values, and power asymmetries. The study asserts that voice assistants' language options are a powerful mechanism for reproducing hegemonic language beliefs, expressing the capitalist desires of technology companies. The language framings determine which language communities become privileged and legible in voice technologies and which become devalued.

This paper begins with a literature review intersecting voice assistants, language ideologies, and language practices. Standard language ideology, native speakerism, linguistic imperialism, and supralingualism are described to theoretically frame this study. The methodology section explains steps taken to collect and treat data through qualitative content

analysis. Alexa, Google Assistant, and Siri's language options are presented and analyzed in relation to relevant corporate and media texts to consider how language options perpetuate monoglossic language ideologies upholding the dominant social order.

Sociolinguistic and computational linguistic perspectives on interactions with voice assistants

Emerging work explores the intersection of voice assistants, multilingualism, and language framings from the user perspective. Leblebici (2024) examines the language beliefs of multilingual voice assistant users in Germany and the implications for how Turkish, English, and German are operationalized. Through a semiotic assemblage approach, Leblebici (2024) situates the users' individual language preferences within the context of technological affordances, cultural discourses about AI, and language ideologies. One key finding is the belief that English is the "original" and "natural" language of voice technologies, an idea that is bolstered by cultural discourses and the technical systems of devices (Leblebici 2024, pp. 26).

Other studies involving multilingual speakers focus on user experience and implications for voice assistant design, consumer behaviour, and language learning. Seaborn et al. (2024) compare how Japanese speakers in Japan and English speakers in the US idealize interactions with voice assistants based on linguistic expressions, dialogic structures, social norms, and attitudes toward technology. Where American respondents expect extended social exchanges providing advice and leadership, Japanese respondents prefer short and polite relational exchanges providing emotional support. More attention is focused on using English in different accents. Debajyoti et al. (2019) find that while there are no differences between how English "native" and "non-native" speakers in Thailand use Siri and Alexa, satisfaction levels are higher for "native" speakers (pp.1). Sattarapu et al. (2024) determine that "accented English-language

speakers" in India frequently encounter communication failures with their voice assistants, negatively impacting consumer behaviours (pp. 281). In education, Chen et al. (2023) find "English-as-a-foreign-language" students in Taiwan respond positively to using Google Assistant for learning English, even with "lower level" language learners experiencing pronunciation challenges (pp. 1346). Similarly, Moussalli and Cardoso (2020) find that "accented L2 learners" in Canada can use Alexa productively for language learning and deploy different strategies to mitigate communication breakdowns (pp. 876).

A monolingual orientation towards voice assistant usage is apparent in this set of studies; users use only one language to communicate with the voice assistant, despite all users being multilingual. They rely heavily on the problematic and contested idea of the "native" speaker as the golden standard of speech (Slavkov et al. 2022; Rivers 2018), emphasizing "accented speech," "non-native accent," "foreign accent," "native," and "non-native" distinctions. The underlying assumption of "native speakers" as linguistically superior to "non-native" speakers contributes to inequities in terms of ethnicity, race, and/or gender and fails to represent the realities of people living in globalized contexts (Slavkov et al. 2022). Moreover, these studies fail to account for imperial legacies that led to the prevalence and hegemony of English (Phillipson 2009), the very conditions undergirding their research.

Some decolonial and anti-oppression approaches to speech technology research centre the language practices of minoritized language speakers and trace colonial histories. Research on language variation as it intersects with speech technologies includes automatic speech recognition development for under-served language communities such as isiXhosa in Langa, South Africa (Markl et al. 2023; Reitmaier et al. 2023) and Gormati, an unwritten language in the Banjara farming community of Western India (Reitmaier et al. 2024). Other projects include

diversifying language datasets, such as The Edinburgh International Accents of English Corpus (Sanabria et al. 2023).

There are also studies exploring voice assistant user experiences through critical race theory. Koenecke et al. (2020) find automated speech recognition (ASR) systems process the speech of Black American English speakers with higher error rates. Mengesha et al. (2021) find the failures of ASR systems create adverse psychological effects on Black users (i.e., feeling othered on the basis of race) by forcing them to adjust their speech to enable more efficacious communication. Racialized ASR error rates may seem trivial in everyday voice assistant use (e.g., finding a recipe or playing music). However, consequences are more dire as ASR integrates with disciplinary institutions such as healthcare (i.e., Palanica et al. 2019), education (i.e., Hannah et al. 2022), employment (i.e., Engler 2021), finance (i.e., Consumer Financial Protection Bureau 2022; First Citizens Bank 2021), social systems (i.e., Eubanks 2018) and law enforcement (i.e., Jansen et al. 2021).

Socio-technical analyses of synthetic voices also expand the understanding of language ideologies in voice assistants. N. Holliday's (2023) survey on Siri's American English voices investigates correlations between voice qualities and user judgements on age, race, gender, geographic region, and personality. N. Holliday (2023) finds that users map stereotypical identity characteristics onto voices. For example, Siri's voice 3 is perceived as "a young, Black man from the Southeast who is funny but not especially competent or professional" (N. Holliday 2023, pp.10). Voice qualities intertwine with identity markers, reproducing harmful tropes and highlighting connections between voice perceptions and ideas about language.

Overall, the literature demonstrates that how language is understood and framed in speech technologies has implications for language users and their practices. My study contributes to this conversation by positioning voice assistants' language options as a policy reproducing dominant language ideologies while facilitating commercial expansion.

Language options as language policy: Implications of language ideologies

The language options of voice assistants function as a company's language policy. Language policy as a discipline studies language practices, beliefs and ideologies, and explicit policies that manage a speech community (Spolsky 2005). Language policymaking is normative, occurring in contexts of unequal power relations (Martin-Jones and da Costa Cabral 2018). While language is the primary object of language policies, many non-linguistic sociopolitical elements are intertwined (Spolsky 2005). In this case, voice assistants' language options are language policies shaped by a technology corporation's perceived value around languages connected to sociohistorical, commercial, and political factors.

Several sociopolitical and linguistic phenomena are salient to my analysis. The first is *standard language ideology*, the belief that there are forms of language which are uniform, codified into written and spoken systems, and practiced by speakers assumed to be monolingual (Walsh 2021). Milroy and Milroy (2012) assert language standardization is an ideology, more "an idea in the mind rather than a reality" since absolute language conformity can never truly be realized, particularly in spoken form (pp. 19). Despite this, language standardization endures, motivated by social, political, and commercial needs. At its core, language standardization aspires to maximize functionality, increase efficiency, and reduce miscommunications (Milroy and Milroy 2012). Standardization is particularly significant for nation-building, where a national language is seen as key to facilitating the practical needs of political and economic life,

building social cohesion, symbolizing citizenship or belonging, and justifying nationhood (Wright 2016). Hence, standard languages are often associated with nation-states as homogenous language varieties. In the context of nation-building or global expansion, standard language ideologies interact with official language policies to produce hegemony by privileging one or a few languages over others. Official language speakers are legitimized; other languages and their speakers become minoritized.

Noting *whose* language practices are marked as standard is critical. Standard language ideologies are inextricable from the notion of *native speakers* as legitimate (and typically monolingual) speakers of a first language with "moral, linguistic, or professional superiority" (Slavkov et al. 2022, pp.5). Scholars have contested the idea of "native speakers" as without definition or relevance (Rivers 2018; Slavkov et al. 2022). A. Holliday (2015) argues "native speakers" are clearly a construct "because they are not self-evident on technical, linguistic or even nationality grounds" (pp.13). Slavkov et al. (2022) explain the term's inadequacies in the contexts of migration, super-diversity, and globalization, particularly for adoptees, immigrants, and Indigenous or multilingual people (pp.6). In English language teaching, A. Holliday (2015) claims that the "native speaker" construct is neo-racist, privileging Whiteness and discriminating against people of colour in the employment of English teachers. Teachers positioned as "non-native" are often associated with linguistic unintelligibility and cultural deficiency (A. Holliday 2015). Despite contentions, inequitable beliefs around "native" speakers continue to manifest in language-related scholarship.

Unequal power distribution is also a primary concern in Phillipson's (2009) *linguistic imperialism*, which investigates how and why certain languages and speakers come to dominate internationally. Linguistic imperialism "entails unequal resource allocation and communicative

rights between people defined in terms of their competence in specific languages, with unequal benefits as a result, in a system that legitimates and naturalizes such exploitation" (Phillipson 2009, pp.2). Phillipson (2009) asserts language dominance works concertedly with economic, political, and other types of dominance. He also cites English's global expansion and dominance as justifying its status as the language of modernity, technological progress, and unity (Phillipson 2009).

Traditionally, the management of public language use via policies was led by nation-states, which incentivize public and private entities to implement their strategies. An example is the British Council, a government-funded body from the UK promoting Britain and structuring English language education globally. However, the global reach and dominance of technology companies disrupt traditional power flows of nation-states. Technology companies do not necessarily share the same language policy goals as nation-states. To this point, Gramling (2020) proposed *supralingualism* to describe a core language ideology of technology companies as:

> an insatiable and totalizating belief in the value (in all senses) of coordinating translatability among global languages for practical purposes. It presumes the underlying good of doing so – for individuals, firms and investors; for social justice movements; for economic development and political stability; for education, literacy, and knowledge-sharing; and for scientific progress alike. (pp. 129-130)

Here, technology corporations develop voice technologies that coordinate meaning across global languages. Monolingualism and multilingualism are not seen as a positive or negative divide, but as a technologically solvable problem with commercially valuable solutions (Gramling 2020, pp. 130). Increasing language diversity boosts a company's supply of what can be traded, rented,

or sold as part of market expansion. However, the commercial potential of language diversity relies heavily on strengthening language boundaries and decontextualizing language meanings (Gramling 2020). How standard language ideology converges with linguistic imperialism and supralingualism will be explored in the context of voice assistants and their language options.

Data collection & analysis

This study investigates the language options of Amazon's Alexa, Google Assistant, and Apple's Siri as of February 2025. Voice assistant selection was based on popularity around the time of the study (Vixen Labs 2022). I focused on the devices most commonly used for each voice assistant: Google Assistant and Siri installed on smartphones (Google Pixel 8 with Android 15 and iPhone 13 with operating system 18.3.1) and Alexa paired with Amazon's Echo Pop speaker (application version 2.2.635412; Vixen Labs 2022).

The first part of the study documents the voice assistants' language options. I accessed the options using company manuals: Apple's guide on changing Siri voice or language (2024a) and Google's help centre instructions for Android phones (2024). For Alexa, I consulted the customer service guide for the Alexa app (Amazon 2024) and the Alexa developer documentation guide (Alexa 2024). Corporate and media texts were then collected to determine how Amazon, Google, and Apple conceptualize languages for voice assistants or voice technologies more generally. Texts include company blogs, official research papers, press releases, media interviews, and reports on newly released features (totalling 41 artifacts).[1] Texts collected were published between July 2011 to October 2024. Corporate discourse supplements the analysis of the voice assistants' language options.

[1]The full list of texts is available at https://tinyurl.com/4zp9zp6w

Each language option in Siri, Google Assistant, and Alexa was documented as a distinct unit. For example, I counted each of Siri's nine regional varieties of English as separate language options. I organized the findings by their appearance on my devices, regions, and language varieties. Next, a reading of the supplementary corporate and media texts yielded contextualized meanings that I inductively coded for key themes. Qualitative content analysis, which emphasizes latent meaning within the subjective interpretation of a text, was used to treat this data (Selvi 2019). Zotero was used to collect, organize, code, and analyze texts. The main coding themes relevant to language ideologies include native speakerism, language standardizations, official languages, language resourcing,[2] English dominance, language as commodity, and multilingualism.

My physical location in Canada impacted access to product features, limiting this study. The device language and region settings were English (Canada) and Canada. Other language (Cantonese (Hong Kong), Mandarin (China mainland), French (Canada), and English varieties) and regional settings (India, Hong Kong, and Ireland) did not affect the language options available. The supplementary texts were limited to English, based on my language competencies.

The findings report the language options for Alexa, Google Assistant, and Siri, organized by order of appearance, official status, and varieties. The discussion draws on the findings and corroborations between data and supplementary texts to analyze language ideologies embedded in language options.

Findings

An overview of language options

[2] *Language resourcing* refers to resources invested in developing a language for voice technologies (e.g., funding, data, labour).

As of February 2025, Alexa supports 18 languages, Google Assistant supports 60, and Siri supports 41. Table 1 lists the specific language options for each voice assistant in order of appearance on my devices. For Alexa and Google Assistant, the language and region options are written in the language itself, which I have translated into English. All of Siri's language options are presented in English. Alexa has bilingual language options, combining some of their available languages. For clarity, the bilingual options are separated and presented in Table 2.

Table 1

Languages supported by Alexa, Google Assistant and Siri, February 2025

Alexa	Google Assistant	Siri
English (Canada)	Danish (Denmark)	Arabic
French (Canada)	German (Belgium)	Chinese (Cantonese-China mainland)
Arabic (Saudi Arabia)	German (Germany)	Chinese (Cantonese-Hong Kong)
Portuguese (Brazil)	German (Switzerland)	Chinese (Mandarin-China mainland)
Spanish (Spain)	German (Austria)	Chinese (Mandarin-Taiwan)
Spanish (Mexico)	English (Australia)	Danish
English (Ireland)	English (Belgium)	Dutch (Belgium)
English (US)	English (Canada)	Dutch (Netherlands)
English (India)	English (India)	English (Australia)
English (Australia)	English (Indonesia)	English (Canada)
Japanese (Japan)	English (Ireland)	English (India)
German (Germany)	English (Nigeria)	English (Ireland)
Italian (Italy)	English (Philippines)	English (New Zealand)
French (France)	English (Singapore)	English (Singapore)
English (UK)	English (Switzerland)	English (South Africa)
Dutch (Netherlands)	English (Thailand)	English (UK)
Spanish (US)	English (UK)	English (US)
Hindi (India)	English (US)	Finnish
	Spanish (Argentina)	French (Belgium)
	Spanish (Chile)	French (Canada)
	Spanish (Colombia)	French (France)
	Spanish (Spain)	French (Switzerland)
	Spanish (US)	German (Austria)
	Spanish (Mexico)	German (Germany)
	Spanish (Peru)	German (Switzerland)
	French (Belgium)	Hebrew
	French (Canada)	Italian (Italy)

Alexa	Google Assistant	Siri
	French (France)	Italian (Switzerland)
	French (Switzerland)	Japanese
	Indonesian (Indonesia)	Korean
	Italian (Italy)	Malay
	Italian (Switzerland)	Norwegian Bokmål
	Dutch (Belgium)	Portuguese (Brazil)
	Dutch (Netherlands)	Russian
	Norwegian (Norway)	Spanish (Chile)
	Polish (Poland)	Spanish (Mexico)
	Portuguese (Brazil)	Spanish (Spain)
	Portuguese (Portugal)	Spanish (US)
	Swedish (Sweden)	Swedish
	Vietnamese (Vietnam)	Thai
	Turkish (Turkey)	Turkish
	Russian (Russia)	
	Urdu (India)	
	Arabic (Saudi Arabia)	
	Arabic (Unified)	
	Arabic (Egypt)	
	Marathi (India)	
	Hindi (India)	
	Bangla (India)	
	Gujarati (India)	
	Tamil (India)	
	Telugu (India)	
	Kannada (India)	
	Malayalam (India)	
	Thai (Thailand)	
	Chinese (Taiwan)	
	Chinese (Simplified)	
	Chinese (Hong Kong)	
	Japanese (Japan)	
	Korean (Korea)	

For Alexa, English (Canada) and French (Canada), and their bilingual combinations appear first, as they are the fully supported languages for my region. The subsequent languages are organized under “other languages” with this caption: “These languages are not fully supported in your country. Some Alexa features and content may be unavailable.” Google

Assistant's language options begin with languages written in Roman script, ordered alphabetically; non-Roman scripts followed. Siri's language options are ordered alphabetically.

Alexa lists every language option with a corresponding nation-state. Google Assistant lists every language option with a region except for two: "Arabic (Unified)" and "Chinese (Simplified)." For Siri, 29 of the 41 language options specify a region. Chinese is also split into Cantonese and Mandarin varieties, further divided by regions: Hong Kong, Mainland China, and Taiwan. The remaining 12 language options appear to stand alone without specified regions. Generally, all voice assistants list each language as a unique option, often delineated by geopolitical region.

Alexa's bilingual options offer some combination of two languages, with a primary language appearing first. The bilingual setting enables users to speak to Alexa in either language and Alexa will respond in that language. The primary language determines text display on connected devices (Amazon 2025) and the primary locale (Goarin 2019). Table 2 lists Alexa's bilingual options, organized into four categories: Bilingual options paired with English (US), bilingual options paired with English (UK), bilingual options paired with another English variety, and bilingual options not paired with English.

Table 2

Alexa's bilingual options, February 2025

Bilingual options paired with English (US)	**Bilingual options paired with English (UK)**	**Bilingual options paired with another English variety**	**Bilingual options not paired with English**
English (US)/ Spanish (US)	English (UK)/ Spanish (Spain)	English (Canada)/ French (Canada)	German (Germany)/ French (France)
Spanish (US)/ English (US)	Spanish (Spain)/ English (UK)	French (Canada)/ English (Canada)	French (France)/ German (Germany)

English (US)/ Spanish (Spain)	English (UK)/ Italian (Italy)	English (India)/ Hindi (India)	German (Germany)/ Italian (Italy)
Spanish (Spain)/ English (US)	Italian (Italy)/ English (UK)	Hindi (India)/ English (India)	Italian (Italy)/ German (Germany)
English (US)/ French (France)	English (UK)/ French (France)		
French (France)/English (US)	French (France)/ English (UK)		
English (US)/ Spanish (Mexico)	English (UK)/ German (Germany)		
Spanish (Mexico)/ English (US)	German (Germany)/ English (UK)		
English (US)/ Arabic (Saudi Arabia)	English (UK)/ Hindi (India)		
Arabic (Saudi Arabia)/ English (US)	Hindi (India)/ English (UK)		
English (US)/ German (Germany)			
German (Germany)/ English (US)			
English (US)/ Japanese (Japan)			
Japanese (Japan)/ English (US)			
English (US)/ Portuguese (Brazil)			
Portuguese (Brazil)/ English (US)			
English (US)/ Hindi (India)			
Hindi (India)/ English (US)			
English (US)/ Italian (Italy)			
Italian (Italy)/ English (US)			

Google Assistant also has a multilingual feature where users can add an additional language of their choice. Siri's multilingual feature only applies to its "English (India)" option. Users have two sub-options to select Siri's response languages: bilingual "English & Hindi" or monolingual "English Only". An accompanying description notes users can speak to Siri using

English mixed with Bangla, Gujarati, Hindi, Kannada, Malayalam, Marathi, Punjabi, Tamil, or Telugu. However, Siri will only respond in English or Hindi, or English only.

Language options and official language policies

The connection to nation-states is evident in how voice assistants prioritize official languages. Table 3 lists all countries and regions referenced in the language options with official national language policies, organized by voice assistant, as of March 1st, 2025. These official languages are legally recognized by the government (i.e., via constitutions, legislations, and/or state conventions) and granted rights for national use in government, courts, public services, and education.[3] Countries referenced in the language options without official national language policies are excluded.[4] Table 3 also lists official national languages included and excluded from the voice assistants' language options, followed by a list of other languages included. Only language options with a specified region are included.

Table 3

List of countries/regions referenced in voice assistants' language options with official national language policies, their official languages included or excluded in language options, and other languages included (March 1st, 2025).

Voice assistant	Country/region	Official languages included	Official languages excluded	Other languages included
Alexa	Brazil	Portuguese		
	Canada	English, French		
	France	French		
	Germany	German		

[3] Languages with official status confined to a territory within a nation are not included in this list. For example, Inuinnaqtun and Inuktitut have official language status only in Nunavut, a territory in Canada, and are thus excluded (Nunavut Legislation 2008).

[4] Some referenced countries do not have official national languages designated in their constitutions or laws. For example, while Mandarin is a majority language in Taiwan, it does not have official language status (Wang 2023).

Voice assistant	Country/region	Official languages included	Official languages excluded	Other languages included
	India[5]	Hindi, English		
	Ireland	English	Irish	
	Italy	Italian		
	Netherlands	Dutch	Dutch Sign Language	
	Saudi Arabia	Arabic		
	Spain	Spanish[6]		
	United States	English[7]		Spanish
Google Assistant	Austria	German		
	Belgium	Dutch, French, German		English
	Brazil	Portuguese		
	Canada	English, French		
	Colombia	Spanish		
	Denmark	Danish		
	Egypt	Arabic		
	France	French		
	Germany	German		
	Hong Kong	Chinese[8]	English	
	India	Hindi, English		Urdu, Marathi, Bangla, Gujarati, Tamil, Telugu, Kannada, Malayalam[9]
	Indonesia	Indonesian		English
	Ireland	English	Irish	

[5] Hindi and English are India's official languages of the Union. There are also 22 officially recognized languages in the Eighth Schedule to the Constitution of India intended to support the development of Hindi (Government of India, 2015, 2024).
[6] While Spain's constitution designates Castilian as the official Spanish language of the state, it recognizes other Spanish languages within respective autonomous communities (Senado de España 2024).
[7] On March 1, 2025, the US designated English as the official language in Executive Order 14224 (2025).
[8] Hong Kong is a special administrative region of China. Hong Kong's Official Languages Ordinance Cap (2017) designates Chinese and English as official languages without specifying language varieties. Google Assistant's "Chinese (Hong Kong)" option operationalizes in Cantonese.
[9] These eight languages are part of the 22 officially recognized languages in the Eighth Schedule to the Constitution of India.

Voice assistant	Country/region	Official languages included	Official languages excluded	Other languages included
	Italy	Italian		
	Korea	Korean		
	Netherlands	Dutch	Dutch Sign Language	
	Nigeria	English		
	Norway	Norwegian	Sámi	
	Peru	Spanish		
	Philippines	English	Filipino	
	Poland	Polish		
	Portugal	Portuguese		
	Russia	Russian		
	Saudi Arabia	Arabic		
	Singapore	English	Malay, Tamil, Mandarin,	
	Spain	Spanish		
	Sweden	Swedish		
	Switzerland	German, French, Italian	Romansh	English
	Thailand	Thai		English
	Turkey	Turkish		
	United States	English		Spanish
	Vietnam	Vietnamese		
Siri	Austria	German		
	Belgium	Dutch, French,	German	
	Brazil	Portuguese		
	Canada	English, French		
	China	Mandarin		Cantonese
	France	French		
	Germany	German		
	Hong Kong	Chinese[10]	English	
	India	English, Hindi[11]		
	Ireland	English	Irish	
	Italy	Italian		

[10] Siri's Chinese option for Hong Kong is listed as "Chinese (Cantonese-Hong Kong)."
[11] Siri's Hindi option is part of the "English and Hindi" sub-option within "English (India)". While Siri can process user commands in Bangla, Gujarati, Kannada, Malayalam, Marathi, Punjabi, Tamil, or Telugu, it will only respond in English or Hindi and are thus not included in Table 3. These eight languages are officially recognized languages in the Eighth Schedule to the Constitution of India.

Voice assistant	Country/region	Official languages included	Official languages excluded	Other languages included
	Netherlands	Dutch	Dutch Sign Language	
	New Zealand		Māori, New Zealand Sign Language	English
	Singapore	English	Malay, Tamil, Mandarin	
	South Africa	English	Sepedi, Sesotho, Setswana, siSwati, Tshivenda, Xitsonga, Afrikaans, isiNdebele, isiXhosa, isiZulu, South African Sign Language.	
	Spain	Spanish		
	Switzerland	German, French, Italian	Romansh	
	United States	English		Spanish

Every region referenced in the language options with official language policies has at least one of its official languages included as an option, except for New Zealand. For Alexa, all but two regions have all their official languages included.[12] For Google Assistant, 25 of 32 regions have all official languages included, the other seven regions have at least one official language included.[13] For Siri, 10 of 18 regions have all official languages as an option. Seven

[12] The two exceptions are Ireland and the Netherlands. For Ireland, English is included, but Irish excluded. For the Netherlands, Dutch is included but Dutch Sign Language excluded.

[13] For Hong Kong, Ireland, the Netherlands, Norway, Philippines, Singapore, and Switzerland, the official languages excluded are English (Hong Kong), Irish (Ireland), Dutch Sign Language (Netherlands), Sámi (Norway), Filipino

regions have at least one of their official languages included.[14] The remaining region, New Zealand, has no official languages available as language options, but English, a non-official but de facto national language, is included as a distinct variety.[15] Overall, the official languages of nation-states are prioritized in all three voice assistants.

Language varieties per language

Table 4 visualizes the number of language varieties resourced per language by voice assistant. Languages with more than one variety supported by at least one voice assistant are presented, along with the number of varieties and the percentage of all language options for that voice assistant.

Table 4

Languages with more than one variety in at least one voice assistant, February 2025

	Alexa		Google Assistant		Siri	
Language	Number of varieties	Percentage of all language options	Number of varieties	Percentage of all language options	Number of varieties	Percentage of all language options
English	6	33%	13	22%	9	22%
Spanish	3	17%	7	12%	4	10%
French	2	11%	4	7%	4	10%
German	1	6%	4	7%	3	7%
Chinese	0	0%	3	5%	4	10%
Arabic	1	6%	3	5%	1	2%
Italian	1	6%	2	3%	2	5%
Dutch	1	6%	2	3%	2	5%
Portuguese	1	6%	2	3%	1	2%

(Philippines), Malay (Singapore), Tamil (Singapore), Mandarin (Singapore), and Romansh (Switzerland). English, Tamil, and Mandarin are available language options but localized for other regions.

[14] For Belgium, Hong Kong, the Netherlands, and Switzerland, excluded official languages are German (Belgium), English (Hong Kong), Dutch Sign Language (Netherlands), and Romansh (Switzerland). German and English are available but localized for other regions. For Ireland, Singapore, and South Africa, all official languages except English are excluded. For Singapore, Mandarin is available but localized for another region, Malay appear as stand-alone, and Tamil is excluded.

[15] English is spoken by 95.4% of New Zealand's population (Stats New Zealand 2020).

Across all voice assistants, English is the most resourced language, with six distinct varieties for Alexa, 13 for Google Assistant, and nine for Siri. Spanish and French varieties place second across all three voice assistants. German and Chinese are third for Google Assistant and Siri. English clearly takes the lead, with double the number of varieties than the next leading language.

Discussion: Language options as language ideological reproduction

This section draws from findings and qualitative reading of the supplementary corporate and media texts to discuss how language options are an ideological mechanism reproducing language hegemonies. It is organized under six key themes: standard language ideology, nationalization of languages, English linguistic imperialism, native speakerism, monolingual legacies, and language as commercial expansion.

Standard language ideology

Amazon, Google, and Apple are language standardization actors. Their standardizing role can be gleaned from how language options are presented and discussed. First, listing each language as a unique entity demonstrates a belief in separate, standard languages (Milroy 2001). This is highlighted in Siri's stand-alone languages (no specified regions): Arabic, Danish, Finnish, Hebrew, Japanese, Korean, Malay, Norwegian Bokmål, Russian, Swedish, Thai and Turkish. The region may be assumed to be self-evident in the name of the language (e.g., Japanese as the language of Japan). However, geopolitical regions connected to Arabic and Hebrew are not as self-evident; their reference are to the languages in standard form. The allusion to a universal standard can also be found in Google's Arabic and Chinese options. Arabic is specified as "Unified" and not as Modern Standard Arabic, a formal, written, literary

standard for Arabic and the official language of Arab countries. Unified Arabic is a set of typography letter forms created to adapt the written script for printing technologies (Nammour 2015). Google's Chinese language options are specified into "Taiwan," "Hong Kong," and "Simplified".[16] Perhaps "Simplified" is assumed to mean mainland China. Simplified Chinese is a written form where characters feature fewer strokes than their more ornate, traditional form. Historically, simplified Chinese was developed to increase literacy rates and create a written standard (Kuzuoğlu 2023; Pan et al. 2015). The selection of "Arabic (Unified)" and "Chinese (Simplified)" as options is curious because Unified Arabic and Simplified Chinese are not spoken forms, and voice assistants primarily interact with users orally. Regardless, both language options allude to standardization. The lack of specification of these varieties suggests a naturalization of standard language ideology, "an appeal to 'common sense'" which no longer invites scrutiny or analysis (Milroy and Milroy 2012, pp.135).

Language standardization is corroborated in the supplementary documents. In media announcements of Alexa's Arabic language addition, spokesperson Raf Fatani noted how Alexa can respond to user queries in "either Khaleeji Arabic or Modern Standard Arabic (Fus'ha)…with perfect local pronunciations and intonations" (Farrow 2021, pp.1). Khaleeji Arabic, or Gulf Arabic, is a spoken language variety associated with Saudi Arabia, Kuwait, Bahrain, Qatar, the United Arab Emirates, and Oman. Modern Standard Arabic is typically restricted to writing and other formal settings. It is also noted that Alexa can process two other Arabic variations, Hejazi and Najdi, which are used in Jeddah, a religious and commercial hub, and Riyadh, Saudi Arabia's capital and financial hub (Darley 2021). However, of the many varieties of Arabic in the world, the Khaleeji variety and its "perfect pronunciations and

[16] Google's "Chinese (Taiwan)" option operationalizes in Mandarin, "Chinese (Hong Kong)" in Cantonese, and "Chinese (Simplified)" in Mandarin.

intonations" are implemented as the standard, generic Arabic language option (Farrow 2021, pp.1). This decision privileges Khaleeji against other Arabic varieties. Further, the term "perfect" suggests a standard of excellence for pronunciation and intonation, where "imperfect" versions exist but are undesired.

Standard language ideologies are also embedded in Google's official blog posts. Google researchers articulate the goal of "one unique speaker, with the standard accent" in developing a text-to-speech voice for the Bangla language (Ha 2015, pp.1). Bangla pronunciation standards, referred to as a "pronunciation dictionary" or "lexicon," were developed ad hoc for the system (Ha 2015, pp.1). The lexicon was also released to the broader technology community under a Creative Commons License (Ha 2015; Jansche 2016). The people who contributed speech recordings followed the lexicon "to speak in a friendly, knowledgeable, 'Googly' voice" (Ha 2015, p.1). The ideal voice was determined through voting by the Bangladeshi Google community. Here, language bias as related to accent, pronunciation, and even expressions of personality manifests as the standard in explicit language policy that is the lexicon and speech recordings of idealized speakers. It is then further distributed freely and widely through an open license.

Amazon, Apple, and Google actively standardize languages, as evidenced by how language options are presented, their development of Arabic and Bangla options, and the ubiquity of their technologies. Fundamentally, language standardization is about reducing variability inherent to all language practices. Reducing linguistic variability may be necessary for technology development, given practical limitations, but it is also always political. Standardizing one language variety is always at the cost of other varieties, bestowing higher prestige,

legitimacy, and perceived value to one over those that become non-standard (Walsh 2021). The following section will further develop this point by focusing on how standard language ideology is connected to national identity.

Nationalization of languages

Standard language policies are strongly connected to the construction of nations and national belonging to enable social and political cohesion (Walsh 2021; Wright 2016). Linguistic homogeneity is "a central organizing principle in modern nation-states" (May 2016, pp.48). How voice assistants express a national linguistic homogeneity is apparent in the presentation of limited language options and their explicit reference to regions. Their prioritization of official languages validates and naturalizes socially-constructed geopolitical boundaries and national languages. Practical considerations may drive voice assistants to emphasize official languages. For example, Apple used census and official language data to measure how accessible their language dataset is to the world's population (Longpre et al. 2021). Official languages may also be prioritized due to a higher social and legal status than non-official languages. For example, all three voice assistants link Canada to its official languages: English and French. In practice, many more languages are used in Canada, with 400 non-official and 72 Indigenous languages spoken at home (Statistics Canada 2023).[17] Yet English and French continue to be privileged in voice technologies in Canada, attesting to the strengths of Canadian official language laws and the cultural construction of Canada as a "bilingual and bicultural White settler-nation" (Haque 2012,

[17] The counting of languages draws from standard language ideology and an ontological view of languages as autonomous systems (Pennycook 2024).

pp.139; Lévesque and Schinck 2021).[18] The construct of Canada's bilingual character is reinforced when voice assistants only have English and French available, marginalizing the other 472 languages spoken in Canada (Statistics Canada 2023).

Beyond official languages, the notion of standard languages as de facto national languages is also found within supplementary texts. This is most apparent in Alexa's developer documentation guide, which lists each language with a country code, according to the International Organization for Standardization ISO 3166 (2024a; Alexa 2024). Table 5 lists the languages as they appear on the website.

Table 5

List of languages and corresponding country codes supported by Alexa (Alexa 2024).

Language
Arabic (SA)
Dutch (NL)
English (AU)
English (CA)
English (IN)
English (UK)
English (US)
French (CA)
French (FR)
German (DE)
Hindi (IN)
Italian (IT)
Japanese (JP)
Portuguese (BR)
Spanish (ES)
Spanish (MX)
Spanish (US)

[18] Canada's Official Languages Act (2024) carves out language protections for English and French and applies to federal institutions and federally regulated private sectors.

Corresponding ISO codes with languages (ISO 639; 2024b) and countries (ISO 3166; 2024a) are standard practice for computer science (ISO 2024b), and thus found throughout the supplementary texts. For example, in two Apple research papers, the codes “en-IN” and “hi-Latn” were used as shorthand for English (India) and Hindi transliterated to Latin characters (Titus et al. 2020, pp.3) and “en-US” “es-MX,” “fr-FR” and “de-DE” for English (US), Spanish (Mexico), French (France), and German (Germany; Latorre et al. 2021, pp.3). The repeated appearance of ISO language codes or ISO country codes next to the language name inadvertently strengthens the impression of standardized languages and further legitimizes the language variety as a distinct and bounded object.

In short, voice assistants extend instruments of nation-states to maintain the dominant social order by prioritizing official languages and appealing to standards via ISO codes. The official or de facto national language is most often the language variety of those in positions of power, marginalizing those whose language varieties are farther away from the standard (Walsh 2021). The following section considers the dominance of English in voice assistant technologies.

English linguistic imperialism

The value of a language, or language prestige, can be inferred by the investment of resources towards a language. Table 4 demonstrates that English, Spanish, French, Chinese, German, and Arabic are all languages with three or more varieties developed for at least one of the voice assistants. English is the most well-resourced across all three voice assistants, with its varieties comprising about a quarter of all language options. English favouritism is evident in the options available for Ireland, the Philippines, Singapore, and South Africa. These regions use English alongside one or more other languages as an official language. A localized English

option is available for these regions, yet the non-English official languages are excluded. Moreover, regional varieties of English are developed for countries that do *not* use English as an official language, breaking the tradition of national language ideology. Such is the case for Google Assistant's English for Belgium, Indonesia, Switzerland, and Thailand.

English being the most resourced in voice technologies fits the logic of linguistic imperialism, which posits the privileging of English with erasure of other languages as a feature of colonial empires and a neoliberal, Americanized globalization agenda (Phillipson 2009). English linguistic imperialism looms across all three voice assistants, where the Englishes of Australia, Canada, India, Ireland, the UK, and the US are supported over other English varieties. All but two of these countries belong to the British Commonwealth.[19] All these countries, except for India and Ireland, have or have had explicit, racist immigration policies that restrict non-Whites. Lastly, all these countries have a history of White European colonialism, either as an extractive colony or White settler-colonialism. The Englishes of these select nations and their speakers hold the highest prestige of all languages.

While Google Assistant and Siri offer additional English varieties, it is important to note whose English becomes representative for that region. For example, there is only one American English, which Phan (2019) describes as the language of Whiteness or the "non-raced" (pp.21). The other American Englishes, such as social dialects (i.e., African American Vernacular English) or pidgins, creoles, and immigrant Englishes (i.e., Chicano English; Schilling 2016) are not included in how a standard, American English is conceptualized and defined. The unmarked

[19] The United States declared independence from Great Britain in 1776 and have never been a part of the British Commonwealth. The Republic of Ireland left the British Commonwealth in 1949.

language of Whiteness becomes privileged and standardized as *the* American English. Here, language selection functions as a proxy for racial privilege. As Milroy and Milroy (2012) point out, "discrimination on linguistic grounds is publicly acceptable, even though linguistic difference may themselves be associated with ethnic, religious and class differences" (pp.2). A seemingly innocuous language option can perpetuate racial dominance and discipline those whose language practices are marked as other than the dominant norm.

It is no surprise that the English of Whiteness is favoured in voice assistants. Language options are not about languages alone; they reproduce dominant ideologies about their speakers based on ethnic, racial, gender, class, and market hierarchies. The following section focuses on who is considered the authentic speaker of a standard language: the perceived "native" speaker.

Native-speakerism

Language prestige is often tied to the social prestige of its speakers (Milroy 2001; Milroy and Milroy 2012). In the context of voice technologies, the social prestige of those deemed "native" speakers is the highest, given that their language practices are most valued. While the notion of "native speakers" is not explicit in the language options, it pervades the supplementary texts. References to native-speakerism are found in 10 of the 41 documents explored, including the terms "native speaker," "non-native speaker," "accented speech," "accent," "foreign accent," "non-native accent," or the categorization of "English is natively spoken" versus "English is spoken as a second language." The terms "foreign," "non-native," and "accented speech" suggest an othering and marking of voices that do not match the idealized norm for standardized languages. Harmful effects are further compounded when documents refer to these voices as unintelligible or undesirable (i.e., "less accent" as "more accurate" and "foreign accent…deemed

too pronounced to the extent of impeding intelligibility"; Latorre et al. 2021, pp.4). These depictions are particularly potent as they repeat harmful tropes of non-standard language speakers as less competent or desirable.

By contrast, "native speakers" are depicted as an important resource and partner for technology development, perceived as the legitimate speakers of a language (Caswell 2022a, 2022b, 2024). One Apple research paper notes: "Our translators, who are native speakers of the target language, are verified to live in the targeted region and are required to pass an entrance exam to verify a high level of fluency in English" (Longpre et al. 2021, pp.6). Translators between English and a target ("native") language are only assessed for their language competencies in English ("non-native" language) and not for their "native" language. Language practices in their "native" language are automatically legitimated because of their "native speaker" status and their residency. Their English skills are doubted due to their "non-native speaker" status. It is the "native" speaker's "native" language practices that become the exemplar for translations. Other Apple research papers also use "native speakers" as a benchmark. For example, they explicitly noted "native speakers" as criteria when selecting evaluators of language models for naturalness or accent (Latorre et al. 2018; Maiti et al. 2020). "Native-speaker" language models are also used to measure the quality of synthetic voices (Latorre et al. 2021).

The devaluing of "non-native speakers" and reverence for "native speakers" in the development of voice technologies reinforce the construct of "native speakers" as legitimate and superior speakers of languages organized by political territories. In the realm of voice technologies, the contested idea of "native speakers" continues to confer material currency and prestige. Those positioned as "native" are hired, consulted with, and resourced for, while those

positioned as “non-native” are not represented in the technology's development, implementation, or practical uses.

Monolingual legacies

The idea of “native speakers” who speak a national standard language is typically imagined as monolingual (Slavkov et al. 2022; Walsh 2021). However, voice assistants can be imagined as something other than monolingual; their multilingual orientations are limited by technological affordances and their developers’ language beliefs. According to the supplementary documents, all three voice assistants claim to be multilingual. Google was the first to announce a multilingual feature. Since 2018, Google Assistant could process and speak any two of these languages simultaneously: English, French, German, Italian, Japanese and Spanish (Fox 2018; Schalkwyk and Moreno 2018). At the time of writing this paper, Google Assistant enables users to add one or two other languages to the default language (depending on the device), but it can only process one language per phrase (Google 2024). Its output will continue to be monolingual in the last user-spoken language (Google 2024).

As of 2025, Alexa offers 19 bilingual combinations (See Table 2). Like Google Assistant, users can speak to Alexa in either language but Alexa will only respond in one. Moreover, out of the 19 bilingual sets, ten pair a language with English (US), five with English (UK), one with English (Canada), and one with English (India). Only two sets of bilingual combinations do not pair with English; they are German (Germany)/French (France) and German (Germany)/Italian (Italy). Alexa’s bilingual options not only reinforce monolingualism but English linguistic imperialism as well.

Similarly, English linguistic imperialism and monolingualism are apparent in Siri's multilingual "English (India)" option. Here, Hindi is backgrounded behind English, only available as an "English and Hindi" sub-option within the main "English (India)" option. While users can speak to Siri using English mixed with Bangla, Gujarati, Hindi, Kannada, Malayalam, Marathi, Punjabi, Tamil, or Telugu, it will only produce written text in English or oral responses in either English or Hindi (Apple 2024b). Here, Siri's multilingualism is still monolingual in output, while also privileging English specifically and Hindi to a lesser extent.

All three voice assistants operationalize multilingualism through parallel monolingualisms (Heller 1999). That is, while the assistants support multiple languages simultaneously, these languages cannot mix within a phrase. Rather, multilingualism is conceptualized as rapid successions of multiple monolingual interactions. This partly reflects current technical limitations in computing complex, multilingual practices and may change as voice technologies develop. Additionally, although this orientation shadows traditions of national monolingual ideologies, it does follow a different logic. While national monolingual traditions serve the interests of the governing polities, the language policies of technology companies follow a market rationality that serves the pockets of the tech oligarchy. The final section will consider this link between language options and commercial expansion.

Language as commercial expansion

From the perspective of supralingualism (Gramling 2020), including more languages to voice assistants increases the supply of what can be traded, rented, or sold. Observing which languages are added and when demonstrates how language intertwines with commercial expansion. Including more language options follows a neoliberal logic linking a language's value

to market rationality (Martín Rojo 2018). While language options on our devices do not provide such contextual information, the supplementary texts offer strong hints. For example, Arabic was added to Alexa's language offerings in December 2021 as part of Amazon's expansion in Saudi Arabia, whose e-commerce market was projected to reach US$14 billion by 2024 and US$24 billion by 2029 (Statista 2024). Alexa manager Raf Fatani cited Saudi Arabia's strong internet connectivity, high mobile penetration rates, young demographic, and economic diversification policies as the main drivers for Alexa's Arabic development (Darley 2021). The profit-producing potential of Saudi Arabia as a growth market drove investment in Arabic as a language option. A neoliberal perspective sees Khaleeji Arabic, the spoken language variety associated with Saudi Arabia, as the language to be standardized as Alexa's sole Arabic language option.

Similar market imperatives are observed for Google. In their blog, Google declared the next decade as "Sub-Saharan Africa's digital decade – with emerging technologies set to significantly accelerate the continent's development" (Brittin 2024, pp.1). As part of their mission "to make the world's information universally accessible and useful," Google announced the addition of 15 new African languages to three of their voice products: Chichewa, Hausa, Igbo, Kikuyu, Nigerian Pidgin, Oromo, Rundi, Shona, Somali, South Ndebele, Swati, Tigrinya, Tswana, Twi, and Yoruba (Brittin 2024, pp.1). Google also announced a $5.8 million commitment to support AI education in the region (Brittin 2024). While Google's positioning of building a "digital transformation that includes everyone" seems inclusive and even charitable, Sub-Saharan Africa offers an early market penetration opportunity (Brittin 2024, pp.1). The World Bank (2024) cites a 115% increase in Internet users between 2016 and 2021 (from 19% to 36%) and a 514% increase in individuals who use the Internet between 2011 and 2021 (from 69

million to 424 million). Thus, adding the 15 new languages is part of Google's commercial strategy to gain an early foothold in an emerging market. Both examples from Amazon and Google align with the logic of supralingualism (Gramling 2020), where the selection of language options for voice technologies appeals to the underlying good of knowledge accessibility and social inclusion while being highly entangled with commercial expansion and political dominance. Languages are measured by their market worth, creating new hierarchies according to the profit-seeking strategies of technology companies.

Conclusion

Voice assistants' language options are an ideological language policy. Through a qualitative content analysis, this study investigates the language options of Amazon's Alexa, Google's Google Assistant, and Apple's Siri alongside corporate and media texts to determine how language beliefs are embedded in voice technologies. The scope was limited to publicly available data and the end-products of corporate language policymaking. A productive next step may include interviews with voice assistant developers to gain insight into their thinking processes during product development. Interviews with voice assistant users can extend the understanding of how the presentation of language options impacts beliefs about languages.

The study's key finding is that traditional monoglossic ideology, which produces and imposes an idealized monolingual norm endorsed by nation-states, is used as a standardized technical innovation in voice assistants. Specifically, voice assistants reproduce the hegemonic legacies of standard language ideologies, nation-states' official and de facto national language policies, English linguistic imperialism, native-speakerism, monolingual orientations, and language commodification. At the same time, the language policy objectives of dominant

technology companies differ from those of nation-states, whereby corporate interests create new power relations and reconfigure language prestige on a global scale. Ultimately, the language ideologies of the dominant social order will recirculate in voice technologies. This will continue to impact language practices, reproduce social inequities, and generate new material conditions, forms of language labour, and configurations of governmentality.

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