

ARTICLE



# Hey Siri: Should #language, 🤨, and *follow me* be taught?: A historical review of evolving communication conventions across digital media environments and uncomfortable questions for language teachers

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## Abstract

*This article presents a study on novel language forms and uses across evolving digital environments, and questions whether emerging digital communication conventions should have a place in language education. The study was motivated by the deepening gap between the content of and approaches to language instruction evident in popular mobile-(assisted) language learning (MALL) apps and the sophisticated evolutions in digital communication over the past 30 years. A team of researchers conducted an environmental scan to locate academic journals publishing on digitally-mediated language and language teaching/learning applications, and to determine topical themes and discussions. This scan was followed by a collaborative in-depth focused literature review to document technological advances and evolutionary changes in social communication across the lifespan of the WWW. The authors posit that language teaching theory and practice must attend to digital convergence and posthumanism, and pose uncomfortable questions for the language teaching profession, such as: What is the place of conversational digital agents in language teaching? Should new media grammar forms be specifically taught? Who is the arbiter of appropriate language use in digital communication?*

**Keywords:** *Multimodality, Mobile Learning, Apps, Posthuman Linguistics*

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## Introduction

The social construction of technology theory asserts that “technology is socially (and politically) constructed; society (including politics) is technically built; technological culture consists of sociotechnical ensembles” (Bijker, 2010, p. 72). This theory grounds our argument that how, when, where, why, with whom, and how often people communicate has transformed and been transformed across historical waves of sociotechnical advancement. But whereas social, cultural, political, and economic life has built up and built in digital communication modes and forums (Bijker, 2010), formal, institutional instruction as well as language apps available on the digital marketplace, for example, Duolingo, have lagged in recognizing and utilizing new forms and ways of using language (Lotherington, 2018). This is evident in the skew of many professional language teaching and testing materials towards a 20<sup>th</sup> century *four skills* paradigm of language skills (i.e., reading, writing, speaking, listening). The four skills model was constructed for print media; it is a poor fit for digital environments built for read/write (R/W) interactivity, digital web cultures,

wiki multi-authoring/editing, multimodal production and posthuman communication, for example, human-digital agent conversation. Furthermore, popular commercial MALL apps have been found to rely on mid-20<sup>th</sup>-century behavioristic pedagogies, cloaked in gamification veneers, to increase user interest in vocabulary and grammar drills (Burston, 2014; Godwin-Jones, 2011; Lotherington, 2018).

Digital devices, such as smartphones and tablets, embed powerful communications technologies (e.g., camera, audio-video recorder, presentation software, word processor) that can be used in combination for multimodal text production. They connect users to other users and sites of information via WIFI and satellite networks, untethering the user from physical location. In this way, mobile communication fosters “both the physical movement of people and technologies, and the digital movement of languages and meanings” (Pegrum, 2019, p. 2).

This review traces and contextualizes the digital movement of language and attendant mobile communication practices, such as on-the-spot selfie-centred multimodal posting to social media sites and consulting conversational digital agents for pronunciation help in posthuman exchanges. The study was motivated by the perceived deepening gap between the content of and approaches to language instruction evident in popular MALL apps and the sophisticated evolutions in language in form and use during the past three decades. Provocative moments in language and literacy evolution are charted across major waves of digital innovation and presented in this paper for debate by language teaching professionals.

## Research Design

To capture contemporary digital language uses not characteristically presented or utilized in popular MALL apps (Lotherington, 2018), we asked the foundational question: How has mobile digital access affected linguistic communication?

This question drove an environmental scan of academic journals to assess which journals were publishing articles on digitally-mediated language and language teaching/learning applications, and to determine topical themes and discussions. This scan was followed by a collaborative in-depth focused literature review to document technological advances and evolutionary changes in social communication across the lifespan of the World Wide Web (WWW).

Our team comprised a senior researcher and two research assistants who worked sequentially on different aspects of the project. We met regularly to discuss and compare search findings tracking established and emergent communicative trends in digital use, which generated directions for further refined searches. The data were documented on a secure website and iteratively summarized using qualitative coding principles to reveal trends. Innovative language forms and functions were cross-checked in popular technology journals, such as [Lifewire](#) and across social media venues, such as [TikTok](#), and [Twitch](#) streams, and then mapped across historical waves of sociotechnical development to provide synchronic and diachronic perspectives.

The results of the research led us to write this article posing to the language teaching profession the question of how linguistic changes should be factored into language education as we advance into the third decade of the 21<sup>st</sup> century.

## Theory and Practice in Language Teaching

Language teaching approaches embed socio-politically prevalent ideals of ‘good’ language. These ideals change with time. [#MeToo](#) is meaning-laden today, but it would have been dismissed as a nonsensical construction fifteen years ago.

Conceptualizations of what language is and how it should/should not be used are framed by existing mediating communication technologies. The traditional *four skills* of 20<sup>th</sup> century language teaching still form the basic framework of consequential gate-keeping language tests, such as the TOEFL (ETS, 2020a). These skills were theorized for an era when static print and unidirectional audio/audio-visual media

prevailed (see Lotherington & Sinitskaya Ronda, 2014, for discussion). Most communication is now mediated digitally (Martin, 2017).

Xia (2014) identifies three broad historical phases in linguistic theorizing that have influenced language teaching approaches:

- *Traditional prescriptivist grammar*, based on the pre-20th century prioritization of written language, focusing on grammatical correctness, which fostered *grammar translation* approaches to language teaching.
- *Structuralism*, based on early 20th century modern linguistics theorizing language as a structure with interlinked constituent parts. The primary focus on speech encouraged *audiolingualism*, a behavioral approach to language teaching, supporting the rote learning of speech habits through repetition.
- *Functionalism*, based on late 20th century theorizing of how language is used in social contexts, which facilitated *functional-notional* and *communicative* approaches to language learning.

We propose a fourth phase for contemporary linguistic theorizing:

- *Digital convergence and posthumanism*.

This label encapsulates *digital convergence*, “an immense but uncelebrated event, when all the old analogue media types coalesced into the one digital medium” (Smith, 2021), coupled with *posthumanism*, which recenters human thought, knowledge, and self-representation beyond classical ideals of the self, engaging multilayered ecological and technological lenses (Braidotti, 2019). It is our contention that conditions of digital convergence have transported (mobile digital) communication firmly into the posthuman sphere wherein humans are communicating, often unbeknownst, with voice-activated software programs. This thinking is in concert with Pennycook’s (2018a; 2018b) repositioning of linguistics in the posthuman spectrum of the Anthropocene and recalls Haraway’s (1991) cyborg manifesto which held that “by the late twentieth century ( ... ) we are all chimeras, theorized and fabricated hybrids of machine and organism.” (p. 150).

In this theoretical stream, we include instrumental research and writing on posthumanism and communication (e.g., Godwin-Jones, 2017; Guzman, 2017; Heller & Proctor, 2014; Pennycook, 2018a; 2018b; Reeves & Nass, 1996), multimodality and spatiotemporality (e.g., Canagarajah, 2018; Chun et al., 2016; Elleström, 2021; Domingo et al., 2015; Herring, 2016; Kress, 2015; Mondada, 2016), and digital language change (e.g., Cope & Kalantzis, 2004; Zappavigna, 2015; Tolins & Samermit, 2016). This historical shift has facilitated *computer-assisted language learning* (CALL), MALL, and *production pedagogies* (Lotherington et al, 2021; Thumlert et al, 2015) utilizing multimodal and posthuman discourses and practices.

Language education is attending to media governing communication in CALL and the surging popularity of MALL; however, attention is uneven. Language researchers have created exciting design-based pedagogies for mobile digital language learning utilizing AR and gaming (e.g., see Holden & Sykes, 2011; Liu, Holden, & Zheng, 2016; Pegrum, 2019). However, the direct-to-consumer digital marketplace has been largely colonized by commercial MALL apps which are designed by software developers for users, not by language educators for learners, although popular apps have sought out post hoc educational affiliations. There are taxonomies to guide language teachers in the selection and evaluation of commercial language apps (e.g., see Reinders & Pegrum, 2017; Rosell-Aguilar, 2017). Also, accounts from teachers who have strategically used activities from MALL apps to support design-based language learning offer valuable models (e.g., see Alm, 2021; Wu, 2016). However, taxonomies require knowledge and agency: teachers must be equipped to determine supportive language learning for their learners’ needs using the affordances of digital media.

We label commercial MALL apps a *disruptive innovation* in the field of language education. Disruptive innovations “offer a novel mix of attributes that appeals to fringe customer groups, notably those near the

bottom of the market” (Christensen et al., 2018, p. 1048). Their direct-to-consumer marketing model sidesteps theoretical scrutiny, professional certification, and peer review, not to mention assurances of consumer protection vis-à-vis data privacy.

Language apps feature in discussions of digital convergence and posthumanism because they are commercial programs that assume the role of the language teacher—a move to the posthuman, feeding technologically determinist learning to the user. Bijker (2010) warns that technical artifacts have no internal logic; they are programmed by designers. Thus, users uncritically employing commercial language apps and programs are following the black box designs of software developers whose pedagogical provenance and language models are unconstrained by professional (and ethical) standards as much as they are driven by profit.

Mobile apps lean heavily on defunct drill pedagogies that are easy to program. These drills are gamified to hold users’ interest in lock-step programs (Burston, 2014; Cunningham, 2015; Godwin-Jones, 2011; Lotherington, 2018; Reinders & Pegrum, 2017). Though prominent commercial MALL apps have been critiqued for dated language philosophies, models, and pedagogies, relying on 20<sup>th</sup> century norms of language (e.g., Cunningham, 2015; Jašková, 2014; Lotherington, 2018), some apps do incorporate Web 2.0 social networking, e.g., HelloTalk (Gajić & Maenza, 2020), Tandem (Nushi & Khazaei, 2020), and Busuu (Pegrum, 2019; Orsini-Jones, Brick, & Pibworth, 2013), though to variable effect.

The tendency to rely heavily on 20<sup>th</sup> century language teaching norms and ideals in formal English language education is highly visible in powerful gate-keeping language proficiency tests, which wield the power to admit or shut students out of further education. This is convincingly demonstrated in García Laborda and Fernández Álvarez’s (2021) comparative study of multilevel high-stakes computer-based tests for English language learners, including the International English Language Testing System (IELTS) and the Test of English as a Foreign Language Internet-based Test (TOEFL® iBT), as well as Duolingo’s English test. They conclude, “the types of items that these multilevel tests deal with are based on an old constructivist model that has been revised and improved for a number of years but has ignored the evolution of language learning, especially through technology” (p. 14).

Basing language instruction on 20<sup>th</sup> century language theory and practice, even in courses accessed via the very digital devices engendering innovative language standards, is counter-productive to social relevance. Sentence-level grammar conventions are not normative in small screen environments, which draw on an enlarged and repurposed symbol sets, for example, #hashtags. However, Web 2.0 social communication evolutions, such as R/W interactivity, multimodal composing, and collaborative editing as well as Web 3.0 artificial intelligence (AI)-driven innovations, such as conversational digital agents, tend to be treated educationally as optional add-ons, or worse, aberrations to 20<sup>th</sup> century language basics, seemingly unfit to appear in formal language instruction. Educational language materials are often recast onto digital canvasses from print versions, utilizing 1990s Web 1.0 capacity, that is, as mediating digital device used primarily as a convenient delivery system (e.g. ETS, 2020a; 2020b). Commercial language apps, for example, Duolingo (2020) also post static teaching materials, primarily employing Web 3.0 smart connection for self-interested, ethically questionable data harvesting (cf. Hintea et al., 2016), and wrapping tedious language drills in dopamine-generating gamification loops.

## **Linguistic Innovations in Historical Relief**

The literacy tools and canvasses moderating communication have morphed from static pen and paper to Web 1.0 electronic posting to participatory, interactive Web 2.0 social media to AI-infused Web 3.0 with surveillance culture and big data harvesting. Though the commercial release of the WWW in 1991 can be stated with confidence as Web 1.0, sequential digital waves emerged in multidirectionally changing media environments. With successive media affordances, users formed novel communication practices.

## **Socio-technical Development Pre-WWW (pre-1991)**

Many forerunners of online linguistic innovations and communicative platforms were developed prior to

the invention of the World Wide Web (WWW), which itself has a lengthy history of development (Kleinrock, 2008; Leiner et al., 2009). Binary coding and the concept of hypertext can both be traced to the 1940s (Berners-Lee, 1996); virtual reality, to the 1950s, linked even further back to 19<sup>th</sup> century developments (Virtual Reality Society, 2017), and video gaming, led by Nintendo, to 1986 (Pruett, 2003). The loss of case-sensitivity as grammatically significant in early coding languages (McCulloch, 2019) and in the early operating system MS-DOS (see Duncan, 1988) invited the conditions for online users to develop conventions meaningful to new media forums. McCulloch (2019) traces *ALL CAPS*, a texting convention indexing strong feelings from happiness to anger, as signifying emphasis to the 1940s, and yelling, as far back as 1984.

The Uniform Resource Locator (URL), developed by computer engineers as an essential building block of digital architecture enabling reliable web storage and searching (Berners-Lee et al., 1994), is now invisible as essential digital grammar. The ubiquitous @ sign, on the other hand, has a curious media evolution. First appearing in print in 1536 for mercantile purposes (Allman, 2012), @ was utilized to address digital routing in 1971 by Ray Tomlinson, who worked on the USA Defense Department's Arpanet, the forerunner to the Internet (Allman, 2012; Partridge, 2008). Fast forward fifty-odd years, and the @ sign is a fundamental syntactic element in digital communication, linking a username to a domain name in an email address, and forming the initial character in a social media handle.

### **The World Wide Web 1.0 (1991)**

Berners-Lee's information and communications technology was conceived as a shared hosting medium in which people and machines could communicate, though it was understood that each would process information differently (Berners-Lee, 1996). The WWW was launched to the public in 1991 (Kleinrock, 2008), creating a *black swan* event: a socially impactful event with largescale unexpected consequences (Aven, 2013). One such consequence has been rapid innovation in communication.

The initial version of the WWW, known by its retronym, WWW 1.0, was essentially an electronic bulletin board featuring static user-generated content: the web as an online directory. Novel genres, games and social communities did emerge in Web 1.0 environments, but it was the evolution of the social Web 2.0, which connected people, not just information, that kick-started a revolution in how we communicate on a daily basis.

### **The Semantic Web 2.0 (circa 2004)**

Kollmann (2018) explains how the chaotic information landscape of Web 1.0 was technologically transformed into Web 2.0 across the turn of the 21st century, creating the capacity for interactive communication utilizing collective intelligence. During the explosion of creativity on the semantic Web 2.0—which generated digital communities built on social participation, multimodal posting, and collaborative interaction—print conventions governing linguistic form and format lost goodness-of-fit. Emerging participatory social media forums, such as, Facebook, designed for modular input, invited text composition not as linear processing of alphabetic writing but as multimodal design (see Kress, 2015).

With digital multimodal input, the basic unit of literacy production migrated from the manually-produced letter to the machine-produced *pixel* (Cope & Kalantzis, 2004), symbolizing digital convergence (Smith, 2021). Web 2.0 housed collaborative authoring tools, enabling many-to-many collaborative composing and new text types, such as wikis, which crowd-sourced collective intelligence for content (e.g., Wikipedia). This challenged sanctioned authority for safeguarding knowledge (though admittedly setting up moderator-contributor disputes). Social media platforms featuring video-streaming services such as YouTube engaged public creation, posting, viewing, sharing, live streaming, and live commenting, which created a panorama of one-to-one interactions before the participating audience. Other novel genres for information sharing and social networking were developed, such as podcasting and microblogging, for example, Twitter (now X). Saliently, digital text types have developed bottom-up grammars requiring appropriate composing skills and posting conventions, governing the formation of a tweet or a social media

post, for instance.

### **The Intelligent Web 3.0 (post 2007)**

Webb et al. (2018) outline the evolution of the flat, static Web 1.0 into the collaborative and connected Web 2.0 towards the smart technology of Web 3.0 and note that, whereas teachers and students have a reasonable command of Web 2.0 tools, their knowledge of Web 3.0 tools is decidedly sparser. The inherent interactivity of Web 2.0 practices is expanded in Web 3.0 AI to include posthuman exchange within the Internet-of-Things (IoT) and with natural language processing digital conversational agents, such as Siri, a program launched with the iPhone 4 (Guzman, 2017).

Of particular interest to this review is the rapid evolution of posthuman exchange in mobile computing. The release of the first Apple iPhone in 2007 pushed fledgling mobile computing into prominence (Sykes, 2014), heralding an explosion in software development that created individually downloadable apps and fast-tracked small-screen innovations. Arminen (2008) describes mobile connection as facilitating shorter, novel multimodal exchanges by enabling “mobile real-time coordination of social action, extended seamless accountability of mobile actors, and distant mobile co-presence” (p. 90). A mere decade after the iPhone’s initial release, smartphones had outnumbered computers around the world (Marler, 2018), becoming in the process the predominant tool mediating online communication (Martin, 2017). Smartphones are powerful pocket computers superseding the computing capacity of yesteryear’s supercomputers (Puiu, 2021).

Digital conversational agents were tailored to provide on-the-spot help functions in mobile devices, where screen space is at a premium for navigation. Increasingly, conversational digital agents are consulted for information and assistance both on our personal devices and in our homes with standalone AI help platforms, such as Amazon Echo (Alexa) and Google Nest. These social interactions are oddly reciprocal if unequal and surreptitious: talking with voice-activated digital agents is captured through satellite surveillance and harvested for big data that goes into the databases of those whose licensing agreements we ‘consent’ to, usually without reading. Speech, it transpires, is no longer ephemeral.

Networked wearable devices, such as, fitness trackers, smartwatches, and extended reality (XR) headsets have linked human-machine communication ever more intimately, signaling a posthuman turn in communication and raising, as Pennycook (2018a) states, “significant questions for applied linguistics in terms of our understandings of language, humans, objects, and agency” (p. 445). These questions are starkly highlighted as Web 3.0 permeation deeply affects social communication and culture through big data harvesting, e-surveillance and biometrics, algorithmic siloing, malicious bots, and the rise of fake news, post-truth, and mistrust of institutional authorities.

### **Textuality and Literacy in Digital Evolution**

Graddol (1994) explains that traditional texts are composed of traditional media; an expansion in semiotic resources results in diverse textual products. Concomitant with expanded semiotic resources are the processes by which these texts are created, accessed, and distributed. Digital networks are now predominantly accessed via mobile smart devices, which connect users wirelessly and on-the-go. The communicative upshot for language and literacy teachers is revolutionary: new tools, canvasses, networks, contexts, texts, discourses, composing processes, language conventions, norms, skills, publication venues and authorship opportunities, social communities, cultures and identities: dramatically new digital literacies.

Kern (2021) traces the conceptualization and evolution of digital literacies across escalating technological development, stretching from the rudimentary multimedia capacities of hypertext in the 1990s across increasing opportunities for R/W creativity, interactivity, multimodality, and learner agency into the 21<sup>st</sup> century, noting:

Not only was this the first time in history that widely-disseminated content had been generated

by the masses, but also, and most importantly, it was the first time that ordinary individuals had the possibility of communicating with potentially hundreds, thousands, or even millions of people around the world. In educational contexts, teachers were no longer gatekeepers of information. (p. 133)

A quarter century prior, the New London Group (1996), a collection of language and literacy scholars from diverse disciplinary perspectives, published a groundbreaking manifesto impelling educators and researchers to redesign language and literacy education for the changing requirements of the digital age and global population spread. They termed this redesign, *multiliteracies*. Their call for multiliteracies pedagogies met widely varying responses in ensuing research, inspiring in the process, novel approaches to digital, plurilingual language, and literacy education (see Lin et al., 2021). Imaginative digital pedagogies appropriate to contemporary media of communication, though, continue to meet 20<sup>th</sup> century gatekeeping language tests that constrain and devalue novel pedagogical development.

### **Multimodality and Mobility**

Applied linguistics and second language teaching skew to social semiotic explanations of multimodality, seeded in the work of Halliday (1978) and Hodge and Kress (1988). Early social semiotic explanations of multimodality identified mode as representational and medium as distribution-related (Kress, 2005), focusing on semiotic and, to a lesser extent, technical dimensions of multimodality over sensorial and spatiotemporal dimensions. Pennycook (2018a; 2018b) questions the assumed primacy of visual and auditory channels of communication over sensorial dimensions in his delineation of posthuman linguistics—which calls for an understanding of linguistics beyond the boundary of the human in the communication landscape. Mondada (2016) counters that multimodality dislodges logocentricity by definition, engaging the sensorial.

As mobile devices grew in popularity, the salience of context to communication became a focus of study. Given that mobility applies to people, technologies, language, and meaning (Pegrum, 2019), affecting “objects, capital, and information across the globe” (Douglas Fir Group, 2016, p. 23), spatiotemporality emerges as an important aspect of multimodality. Canagarajah (2018) promotes a spatiotemporal perspective on multimodality to “consider the semiotic resources from expansive and layered times and places that shape communicative activities” (p. 52). These layers are theorized in Elleström’s (2021) four modalities describing all media: material, sensorial, and spatiotemporal and semiotic, which form a central role in his intermediality paradigm. Working from an interart perspective, Elleström (2021) presents a spatiotemporally-sensitive and sensorially-enriched perspective on multimodality, decentered from but inclusive of linguistic communication, offering a useful alternate theoretical lens.

### **Indexing Spatiotemporality: Selfies and GIFs**

In the 2000s, multimodality was described as mobilizing “the complex repertoire of semiotic resources and organizational means that people make meaning through—image, speech, gesture, writing, 3-dimensional forms, and so on” (Jewitt, 2008, p. 357). With the rapid uptake in mobile computing on devices fitted with powerful mobile toolkits, the now ubiquitous *selfie* has emerged as performance of the self in space-time, an upgrade on gestures, offering a 21<sup>st</sup> century take on subjectivity and a filter on embodiment (literally, in the case of photoshopped selfies and appearance-altering videoconferencing lenses).

Eagar and Dann (2016) characterize selfies as a type of speaking, depicting the individual in space and place. Selfies are image-reflexive (Frosh, 2015), documenting everyday personal experiences, which, according to Lee (2013), must be anchored in textual context for sense-making. Selfies are thus contextually embedded in space-time and distributed through digital networks for social exchange.

Live action photos preserve one second of action in the snapshot, literally indexing space-time, similar to animated Graphical Interchange Format (GIF) files. Tolins and Samermit (2016) argue that GIFs are used in texting to reflect the “texter’s *current* embodied action” (p. 76), representing the interlocutor’s affective

response to the prior remark, or to visually enact something described in the text. They explain that GIFs can be quotative, providing stock responses from popular films or memes, and they note that interlocutors have been found to follow suit, textually quoting from the source generating the GIF. Digital exchanges can combine GIFs (temporally-oriented) and spatially-oriented comments in social media forums. This novel spatiotemporal functionality is only possible in digital multimodal exchanges.

### Environmental Grammar: Twitter (X) as Example

Domingo et al. (2015) explain that multimodal resources are made coherent using grammars particular to digital environments that govern how to communicate. Accordingly, we propose the concept of *environmental grammar*: the employment of medium-appropriate grammar. For instance, Twitter, “a microblog/social network site in which users create their own content, tag, and share it” (Gleason, 2018, p. 166), has developed a genre-specific grammar for its multimodal message space where characters, not words determine appropriate text length.

MacArthur (2020) reports that Twitter leaned on texting conventions in its initial iteration in 2006 by founder Jack Dorsey who wanted to circumvent expensive texting charges by utilizing a similar web-based platform. Labelled *microblogging*, Twitter developed into an important information-sharing network for diverse communities, including (prominently) news reporting offering direct-to-user news-sharing, as evidenced in the Arab Spring revolution and as a potent agenda-setting political tool, as legendarily enacted by former American President Donald Trump (see Ott & Dickenson, 2019; Tufekci, 2017).

Twitter messages, *tweets*, were initially limited to 140 characters to mimic the length of a text as it had evolved to fit the tiny screens of cellphones, plus initial identification (MacArthur, 2020). Tsukayama (2017) notes that Twitter’s original screen capacity catered better to Chinese, Japanese, and Korean, whose more economical scripts delivered maximum information within the 140-character limit. Tweet capacity doubled to 280 characters in 2017, consistent with greater smartphone capacity (Boot et al., 2019; MacArthur, 2020), and, according to Tsukayama (2017), to encourage increased engagement, meaning more *replies*, *retweets*, and *likes*.

### Expanded Linguistic Resources

Concurrent with the development of novel multimodal text shapes, digital tools and canvasses, encoding resources, text-making processes, and the communication skills needed to manipulate these, codified language has outgrown familiar borders.

In R/W participatory culture, participants create digital content, and in so doing, set standard conventions through collective use. For instance, the stable convention of @emailaddress, developed to form @name in social media forums, was imported into the Twitter ecosystem by users to indicate @Twitterhandle, following which site designers programmed @ into Twitter functionality to accommodate emerging use (MacArthur, 2020).

The power shift in gauging language and grammatical correctness from educator to user is professionally confronting. We now turn to rethinking what a word is in environments where novel lexico-grammatical symbols (e.g., #) have salience, cross-linguistic icons nuancing communication (e.g., *emoji*) are threaded through conversations 🤔 and multimodal digital speech acts (e.g., *follow me*) are used to create community.

### Emoji

*Emoji*—cross-linguistic icons that provide emotional nuance to communication—are an essential addition to the digital lexicon. Emoji are pictograms that are read but not spoken; they are not logograms. The emoji keyboard evolved from *emoticons*: the practice of using symbols in the ASCII (American Standard Code for Information Interchange) keyboard to add emotional information in writing, for example, :) . Emoticons were transliterated into Unicode as Japanese emoji, becoming widely available as an iconic keyboard (Dürscheid & Siever, 2017). Emoji can be toggled into text production, irrespective of language, for



example, “Feeling 😊”; “Merci à Jeanne et ses creations 😊”.

Emoji must be shown to be interpretable cross-culturally and in international circulation to be admitted into Unicode (Dürscheid & Siever, 2017). Emoji vary in use across ages, cultural affiliations, linguistic communities (Orsini-Jones & Lee, 2018), and communicative environments, such as Twitch streams, Discord servers, and subscriber communities for YouTube and TikTok *influencers* who use community-specific subsets of emoji to punctuate communication. Nonetheless, as cross-linguistic meaning-making devices, emoji offer a promising modal key to unlock or layer meaning for language learners, including intercultural communication and language learning.

## Hashtags

*Hashtags* are powerful lexico-grammatical tagging devices that developed from participant innovation on Twitter, used to index content under a topic heading (Gleason, 2018; Heilig, 2015; MacArthur, 2020). Hashtags are written as single items with no internal spaces following #. Morphologically, hashtags are agglutinative structures, and this morphology is constant across languages.

Varied linguistic components can form a single hashtag: single word units, for example, #podcast; phrases conjoining whole words like #BlackLivesMatter or #goingbacktoschool, and phrases consisting of partial and/or abbreviated words, for example, #cdnpoli or #instalike. Hashtags can incorporate hybridized symbol strings, including numbers, for example, #Covid19, and, particularly interesting to applied linguists, plurilingual constructions, for example, #愛hk (Lee & Chau, 2018), extending even to faux Latin: #nolitetbastardescarborundorum. Hashtags have also been studied in codeswitching contexts, where a hashtag in one language is inserted into multilingual dialogues (Jurgens et al., 2014). Hashtag formation accepts medial capitalization, for example, #MeToo; no caps, for example, #metoo, and can layer digital conventions, such as ALL CAPS to register shouting, for example, #RESPECTTAYLORSWIFT.

Zappavigna’s (2015) informative study of the semiotic and syntactic functions of hashtags, based on Halliday’s (1978) theory of language as social semiotic, analyzes how hashtags operate as “social metadata” (p. 275). She outlines numerous hashtag functions, including searchable topic markers with catalogue functions; evaluative meta-comments invoking attitude, affect, judgement, and appreciation; mass meme participation, of which #MeToo is a striking example, and as a mechanism for social bonding. Lee and Chau (2018), who researched multilingual hashtags in the Umbrella Movement in Hong Kong, found hashtags functioned powerfully as identity markers by choosing politically marked languages, for example, Cantonese, in their construction.

## Digital Performatives

Digital performatives offer an interesting twist in linguistic pragmatics, which environmentally contextualizes meaning. John Austin’s (1962) posthumously published 1950s lectures detailed how spoken words extended beyond their denotational meaning—the *locution*—according to what meaning the speaker intended—the *illocutionary act*—and, furthermore, what the receiver understood of the message sent—the *perlocutionary effect*. Austin labelled speech a *performative act* and developed speech act theory on the basis of spoken language.

Multimodal performatives flourish online, though there is little available research on digital performatives: *like me* is a directive that results in a specific digital action that is causal, positively affecting popularity ratings on websites and social media platforms, and potentially bringing financial gain. Other common digital performatives on social media include *pin*, *share*, *tweet*, *like*, *follow*, *unfollow*, *friend*, *unfriend*, and *raid* (on Twitch).

Grundlingh (2018) argues that speech acts reinterpreted for digital media must accommodate the principles of multimodal composing, which interweave nonverbal and verbal signs using varied semiotic media and cross-traditional alphabetic and physical speech media. She proposes *memes*—pop media artifacts that are spread via social media—as digital speech acts. Honeycutt and Herring (2009) further note that @ signals a topic-directed tweet, effectively opening a conversation. Thus, digital performatives include repurposed

words imbued with explicit illocutionary force in digital action, memes, and lexico-grammatical symbols, such as @.

## The Permeation of Posthuman Conversations

Pennycook (2018a; 2018b) explores the posthuman turn in applied linguistics, critiquing the anthropocentric and technologically naive assumption that humans are exceptional as linguistic actors. This posthuman turn is evidenced in everyday interactions between humans and conversational digital agents: computer programs built into our smartphones that use a natural language interface, for example, Siri (Apple iOS), Cortana (Microsoft Android), and more recently, ChatGPT.

Voice-activated natural language processing digital assistants are extensive databases built on problem-solving questions (Heller & Proctor, 2014). Digital agents were originally built into smartphones to provide easily accessible help functions to users, given text limits on small screens (Guzman, 2017). Voice-activated software programs extend to purpose-built robotic digital tutors (Herring, 2016; Johnson & Lester, 2016) and, on the other end of the ethical spectrum, malicious bots built to fraudulently engage humans on social media (see Urbina, 2013). Growing in popularity are standalone conversational help devices, such as the Amazon Echo (Alexa), which connects to the IoT to control household appliances by verbal command. These powerful digital agents not only speak but also listen in wait for the keyword that awakens them to digital action (Shulevitz, 2018). Rapidly growing in reach are next generation large language model digital agents, for example ChatGPT.

Voice-activated software programs offer customizable language interfaces, including gender and (limited) variety choices, for example, male Australian English and female Swiss French. Digital voice programs are used to exemplify pronunciation in commercial language apps, which have gained an enormous foothold in language learning: [Duolingo](#), for example, claims hundreds of millions of learners. GPS navigation systems use a voice interface to direct drivers; these programs are often gendered by attendant drivers, for example, “Where is she telling me to turn?”.

Human-media relationships were investigated over a quarter century ago by Reeves and Nass (1996), who demonstrated how people anthropomorphize nonhuman digital media in their interactions: “people were polite to computers. Not only were the computers in these experiments tools for learning new information, but they were also social actors that people reacted to with the same polite treatment they would give another human” (p. 26). Their computers as social actors theory was supported in Edwards et al.’s (2014) tests on the credibility of recognized and incognito bots planted on a Twitter feed with undergraduate students.

Bots and conversational digital agents are software programs that have computational capacity based on algorithmic calculations; they have no inbuilt logic, emotions, aesthetics, or indeed ethics. Guzman (2017) remarks that Siri’s interactions are built to mimic social norms of human communication as revealed in her sassy databank replies. Emotional responses of a different nature are programmed into digital pedagogical assistants to facilitate learning, given the importance of the learner’s emotional involvement in the process of learning (Johnson & Lester, 2016; Lallé et al., 2016).

Whether people are cognizant of their quotidian interactions with voice-activated digital agents varies with program and purpose. Whether recognized or not, language is no longer the exclusive preserve of human beings, and this needs to be taken into linguistic, social, and educational account. Opportunities to engage with digital agents are increasingly available, and many people do so as if these programs were humans, generally without acknowledging how conversations can be stored for purposes other than those motivating the human-machine exchange, including converting seemingly evanescent speech into marketable data.

## Discussion and Conclusion

This article reported on the findings of an extended collaborative literature review and qualitative analysis motivated by the question: How has mobile digital access affected linguistic communication? The results

of our study yielded novel features of language form and function in digitally-mediated communication that raise significant questions for language teachers. Our findings indicate that:

- *Language forms and functions have expanded dimensionally*: Language is growing typological capacity (e.g., emoji in alphabetically encoded text), adapting grammatical conventions to digital context requirements/ affordances (e.g., R/W processing; Tweet grammar), and developing novel lexico-grammatical conventions (e.g., #hashtags; ☺).
- *Linear communication skills and composition processes are a poor fit for digital multimedia environments*: Digital multimodal discourses and genres use digital tools in fundamentally different composing processes from the linear written composition processes of print culture. Composing in/on/with digital media requires media-appropriate grammatical knowledge, communication skills, composing processes, and, indeed, pedagogies. Multimodality is spatiotemporally and sensorially sensitive as well as media complex.
- *Pedagogies for digital environments must take account of posthuman exchange*: As Wang and Vasquez (2012) note, innovative language learning contexts require responsive language learning pedagogies and curriculum design. MALL pedagogies accommodate posthuman interchange, requiring knowledge and agency for ethical use.

We posit that in an era characterized by *digital convergence and posthumanism*, language teaching theory and practice require updating to maintain goodness-of-fit. We question the sufficiency of language as codified for print resources and communicative skills as theorized for pre-digital media as an unwavering standard for contemporary language teaching. Examples of questions raised include:

- What constitutes vocabulary in digital environments, where
  - novel symbols have structural and semantic salience (e.g., #)?
  - emotions are layered onto linguistic messages through the use of emoji and GIFS?
  - words and symbols absorbed from the lexicon have acquired new communicative power (e.g., *friend me*)?
- Should we teach grammar according to media environment?
  - Do selfies constitute statements?
  - Should tweet and text grammars be taught?
  - How can composing processes grammatically accommodate spatiotemporally-mixed media, e.g., text – GIF dialogues?
- Can speech be described as evanescent in posthuman conversation?
  - How is human communication affected by posthuman exchange?
  - How can teachers knowledgeably avoid the technologically deterministic pathways programmed into commercial apps while capitalizing on useful features?
- Who is the arbiter of good and appropriate language use in digital space?

Such questions are easily brushed aside because digital grammars are considered unimportant, to be picked up in practice. But following this reasoning, would students not similarly pick up print media grammar and forms? Educators retort that the English they teach is for formal learning towards the kinds of literacies (and tests) required in school: essay writing, notetaking, intensive reading, and so forth. However, at every level, educational institutions are charged with preparing students to live and work in societies where digital communication is dominant. Altmetrics describe the impact of information in online communication milieu via “views, downloads, clicks, notes, saves, tweets, shares, likes, recommends, tags, posts, trackbacks, discussions, bookmarks, and comments” (Bornmann et al., 2016, p. 1480). Economies urgently call for graduates who are creative, innovative, and entrepreneurial. Given the centrality of multimodal mobile digital proficiencies in social, economic, and political communication, a continued blindered focus on sentential grammar and essay writing in language education is out of touch.

We support Kern's (2021) cogent call "for a rearticulation of goals in language education, and specifically, goals that extend beyond communicative competence" (p. 141). Literacy slipped off the page into a complex world of mixed mediation decades ago. Networked multimedia communication has developed rapidly and in sometimes unimagined directions, including the commercialization of digital space; widespread misinformation, that is, *fake news*; the unethical data harvesting of ephemeral digitally-mediated conversations, and algorithmically-shaped communicative siloes (see Godwin-Jones, 2021), where readers are funneled into like-minded forums. There are serious questions about shifting literacy values and practices. Big tech companies have cornered the social media marketplace with a censorious, clickbait business model to ensure engagement and fuel outrage (Crockett, 2017). Few truly understand how Web 3.0 algorithms work to hack our deep psychology (Kantrowitz, 2020), invisibly shaping and funneling cultural communication, much less how algorithms are evolving via machine learning from the preconceptions of their creators in proprietary black box environments (see Kitchin, 2016).

This article has overviewed provocative transformations in language, literacies, grammar, genres, and competencies. Cultural and entertainment activities have developed digital modes, social identity practices have developed within digital communities, and employment vistas have changed with media affordances (e.g., the rise of 'influencers'). We argue that language learners cannot be reliably or fairly guided by 20<sup>th</sup> century communication standards and measures alone. For educators who had not migrated to digital platforms, the shock of a global pandemic closing off opportunities for in-person teaching in 2020-2021 caused pandemonium. How will language teaching thread digital communication norms into English language learning so learners can survive the real tests of digital integration?

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