



## Bots for language learning now: Current and future directions

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### Abstract

*Bots are destined to dominate how humans interact with the internet of things that continues to grow around them. Despite their still budding intellectual capacity, major companies (e.g., Apple, Google and Amazon) have already placed (chat)bots at the centre of their flagship devices. (Chat)Bots currently fill the internet acting as guides, merchants and assistants. Chatbots, designed as communicators, however, have yet to make a meaningful contribution to perhaps their most natural vocation: foreign language learning partners. This review engages in three questions that surround this issue:*

- 1. Why are chatbots not already at the centre of foreign language learning?*
- 2. What are two key developers of chatbots working towards that might push chatbots into the language learning spotlight?*
- 3. What might researchers, educators, and developers together do to support chatbots as foreign language learning partners right now?*

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**Language(s) Learned in This Study:** *All spoken languages are addressed*

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### Introduction

(Chat)Bots are now in a position to radically change how we interact with our growing digital world (Dale, 2016), from reading and writing to listening and speaking. One of the many revolutions that chatbots will kick off is how (and in many cases whether) we learn a new language. In this review, it is argued that chatbots will eventually be the perfect language-learning partner, potentially enabling us to learn multiple languages anywhere, anytime and at our own pace.

Despite this eventual reality being clearly on the horizon for more than a decade (Fryer & Carpenter, 2006; Coniam, 2004), there is little direct evidence to indicate that a golden age in language learning opportunities is upon us. Other areas where chatbots are destined to dominate, however, have been gathering substantial momentum. Simple internet searches show that adjusting one's home environments (i.e., heat, light, etc.), and navigating one's media (music, movies, etc.) are all becoming seamless interactions with one of a handful of established

conversational agents (chatbots) such as [Google](#), [Siri](#) or [Alexa](#). In addition to the ubiquitous use of chatbots within e-commerce and website support, chatbots have also made inroads into increasingly specific areas such as formal (Cameron et al., 2017) and informal counselling on sites like [Replika](#), specifically in areas such as smoking cessation (Dubosson, Schaer, Savioz, & Schumacher, 2017); broader health care issues (Shah & Philip, 2019); supporting students in course choices (Fleming, Riveros, Reidsema, & Achilles, 2018); educating sensitive populations about sex, drugs, and alcohol (Crutzen, Peters, Portugal, Fisser, & Grolleman, 2011); as well, of course, as personal assistants (Daniel, Matera, Zaccaria, & Dell’Orto, 2018). And yet, in spite of these advances, chatbots are still, at best, weak, supplemental language learning partners (Fryer, Nakao, & Thompson, 2019).

The present prospective review begins by discussing what has changed over the past decade: the user and the interfacing technology supporting interaction. The review will then proceed to discuss two cutting-edge chatbots from the developers’ own perspectives: one, [Cleverbot](#), with more than two decades of developmental history and another, [Mondly](#), which was founded in 2014 and designed specifically to support language learners. These chatbots will be discussed with a focus on their current usefulness in the area of language learning and where they are heading in the next few years. The final component of this prospective review will discuss directions forward. It acknowledges the fact that the technology will continue to grow. However, it notes that we need to start using the tools we have—and, in some cases, fully developed chatbots we already have—rather than waiting for a major breakthrough in AI communication thinking and language skills. In this section, research in the area of multimedia learning generally and chatbot interaction specifically will be discussed, finally indicating how we might get started and steadily build on the still-developing tools at hand.

## **Where We Are**

### **Users and Technology**

Where [Eliza’s](#) (Weizenbaum, 1966) early users might have found communicating through typed text novel, today’s users are thoroughly primed to communicate with an online entity (Jiang, 2018). During the past three decades, communicating online has gone from the fringe to the norm. To suggest that the present generation is comfortable with online synchronous and asynchronous communication via text or speech, is an understatement ([Vogels, 2019](#)).

Chatbots are already readily available online within most messaging applications and many information-orientated websites (e.g., universities, libraries, and museums). The tremendous popularity of two recent chatbots, one in Mainland China [XiaoIce](#) (Zhou, Gao, Li, & Shum, 2018) and one in California, [Facebook’s M](#) (Simonite, 2017) have removed any questions regarding readiness on the part of users to use and trust a chatbot.

During the past five years there has been huge growth in the language learning online software sector with a host of language learning applications, such as [Duolingo](#) and [Mondly](#), joining more traditional applications like [Rosetta Stone](#) in recruiting huge user populations. This suggests that despite the frequent heralding of a future where machine translation will make learning a new language antiquated, there is still a strong appetite for learning languages.

However, it is clear that it is not potential users who are impeding progress toward a chatbot language learning future. It must therefore be weaknesses in the technology itself. Identifying

these weaknesses and how they might be overcome, or at least ameliorated, is the natural next step toward a chatbot language learning future.

Working our way back from the advances that have been made during the past decade, it is important to highlight significant and still rapidly [improving speech recognition software](#). Speech recognition software has made it possible to make everything from short dictations to a broad array of commands and requests to conversational agents. Most online agents have both input and output speech functions, which has enabled the agents to move from being solely text to aural communicants—and with relatively high reliability. Speech recognition and the increasing ubiquity and power of mobile devices are key factors supporting chatbots' use as language-learning partners. Despite these apparent affordances, and the plethora of ways in which speech recognition is already changing how we engage with media (Howell, 2019), embarking on the challenging path of chatbot-centred language acquisition is not a particularly popular venture. This is demonstrated by the scant number of companies building their language learning teaching approaches firmly around this budding area of artificial intelligence (see Mondly and Duolingo for two interesting examples of companies breaking ground in this field).

### **Chatbots and Conversational Agents**

Chatbots have been around for decades. The idea of chatbots as language learning partners is more recent, but is slowly gathering momentum. As far back as the early 2000's, Coniam (2004) reviewed two chatbots with potential as language learning partners. The first was the ALICE Artificial Intelligence Foundation site's [Dave](#), which they claimed to be the "perfect private tutor," since he replied "in perfect English, just like a private English teacher." (Coniam, 2004, p. 160). Attempts at conversing with Dave indicated, however, that while many of Dave's conversational strategies had quite a natural feel about them, there were syntactic infelicities and conversational glitches which indicated that the program was unlikely to pass the Turing Test in the near future.

The second chatbot reviewed by Coniam was Lucy chatbot (now defunct). This chatbot had support for beginners, where incorrect input by L2 learners was manually corrected, so that Lucy was at times able to suggest corrections to certain grammatical errors. The online Lucy chatbot was developed into a standalone piece of software, Lucy's World: [Smallt@lk](mailto:Smallt@lk). This reworking utilised the speech and interactive elements of the *Lucy* chatbot, but controlled the situation in that topics and situations that *Lucy* was able to converse about were restricted. Since these early steps toward chatbots supporting language learning, both potential users and chatbots have substantially changed. Users' willingness to engage in online communication and language learning have become commonplace. Yet, despite the fact that the tools necessary for easy aural communication with digital agents are quickly becoming normal, chatbots are still not dominating or even meaningfully infiltrating how we learn languages. To a reader considering this idea for the first time and having little experience conversing with chatbots, the reason for this gap might not be apparent. Millions of people have spoken with one of the major conversational agents (Alexa, Siri or Google) and perhaps been surprised at their ability to be helpful with straightforward tasks. If these users have ever tried to push the boundaries, however, they know that, despite the name *conversational agent* or *chatbot*, these digital personas can rarely get past a conversation that includes more than two exchanges. The fact is that despite advances in Natural Language Processing (Hirschberg & Manning, 2015) and Deep Processing (Kriegeskorte, 2015), each considered to be crucial to advancing AI technology, major

breakthroughs in chatbots' communication skills have not been forthcoming (Dale, 2016). This has pushed researchers to work towards compensating for AI gaps (Meszaros, Chandarana, Trujillo, & Allen, 2017).

With these issues in mind, it is worth briefly reviewing two chatbots and their developers: Cleverbot and Mondly's chatbots. These two chatbots are from two ends of our current spectrum of free-to-use chatbots. Cleverbot has a considerable history and has had success in competitions (e.g., winning the [Lobner Prize](#)) and with users (it has had millions of exchanges with interested online users). Cleverbot was not designed as a language-learning tool, but has seen considerable incidental use as a language learning partner. The second chatbot is brand new and was specifically designed from the ground up to support language learning. The Mondly chatbot was developed to make the most of the affordances of cutting-edge technologies such as Augmented and Virtual Reality (AR and VR).

## **Two Chatbot Developers, Where They Are and Where They Are Going**

### ***Cleverbot***

As far back as 1988, on a tiny computer with just 1K of RAM, Rollo Carpenter created a program that was able to talk back. In 1996—even before the founding of Google—Cleverbot's predecessor Jabberwacky went online and started talking to and learning from visitors. Over the past 20 years, and with no marketing, millions of people have been talking to Jabberwacky/[Cleverbot](#).

Like many of the chatbots that have followed in its wake, Cleverbot and its precursors learn from their users' language. To date, Cleverbot has had more than 10 billion user communications, on nearly every imaginable topic. If it has not experienced a subject or a context, it will not initially know how to handle it. In this, it is a little like a person interacting socially, who is constantly adapting. Cleverbot was not designed to be useful, but rather to keep people company and to entertain. Cleverbot knows language only in the form of text-based communication. It has never learned anything directly from the world, or from its creators; only from the responses given by its users. It was not designed to support second or foreign language learning, but its abilities to engage and amuse users in a language and on a subject more or less of their choosing, has made it an unintentional digital island for human language learning. Like all chatbots, Cleverbot's strength comes in part from the fact that it is always there, and always replies. Cleverbot may argue with its users, but it is also infinitely patient and non-judgmental. Reviewing its endless stream of interactions with people the world over suggests that there are far fewer social constraints when talking to a machine than is the case with human-human interaction (e.g., see [conversation extracts](#)). It is filtered automatically to ensure it does not repeat the inappropriate language some of its users communicate, but from the perspective of a person learning a language, freedom to communicate at any time, without restraint or social pressure makes it closer to the ideal conversational partner.

Cleverbot has its own brand of Artificial Intelligence software, a key concept of which is context. While the Cleverbot AI outputs sentences said to it verbatim, the manner in which it selects what to say is complex. It considers the last 50 interactions of the current conversation, where available, comparing these non-precisely to millions of past conversations, looking for equivalent contexts, or the optimal summation of small clues as to what might be the most conversationally appropriate next response in the conversation. In January 2019, Cleverbot's pool of potential responses passed 500 million, yet it is still the case that almost every

conversation is unique. Approximately 50% of its data is in English, the remainder mostly representing a range of other European languages.

Carpenter and colleagues at Existor are working on a new version of Cleverbot that will understand the similarity of words, phrases, sentences and wider intentions at a deeper level, entirely independently of the letters of the words themselves, and that will construct outputs more in the manner that humans compose sentences (Carpenter, 2016). While most chatbots currently available have specific purposes, are limited in scope, and are not able to learn, Cleverbot aims to be general, to be a different conversational partner to each user, and to genuinely engage users in conversation.

Using Existor's [tools](#) or others' tools, it is technically possible to purpose-build a bot for language teaching, talking people through known learning sequences, correcting errors and more. The problem with such an approach is that no company—even using the latest Machine Learning techniques—has actually resolved the language problem: The ability of the machine to truly understand. If the machine cannot truly understand, such language teaching modules have to be constructed, or programmed, by hand—a never-ending task that would remain forever incomplete. With billions of user inputs to work with, Carpenter and colleagues are well-placed to create new tools and new machine language understanding. In the meantime, people around the world already do talk at length to Cleverbot for language practice, and are incentivised to do so by its engaging, humorous and always-available presence.

### **Mondly**

In contrast to Cleverbot, whose history stretches back to before chatbots were widely recognised as the future of the internet, the [Mondly chatbot](#) is only four years old. Mondly chatbots—like an increasing number of such chatbots—was developed as part of a language-learning platform, rather than as a means of entertaining human users as was Jabberwacky/Cleverbot. In step with today's users, it operates as smartphone-centred software, and has been downloaded by 40 million users in over 190 countries. When Mondly was launched in 2016, it was the first of its kind in the language learning niche. One year later, Mondly began implementing chatbots with other new technologies (VR and AR) as well. From the very beginning, the Mondly chatbot was designed to interact with users, understand voice input, and reply with a human voice. The chatbot's goal was (and still is) to be engaging and fun. However, at the same time, the Mondly chatbot aimed to provide adaptive lessons (i.e., encourage learning through play; Smith & Pellegrini, 2008) that encourage users to practice the language they are learning in everyday scenarios—such as ordering in a restaurant. Mondly recognizes millions of inputs and creates an adaptive visual response when it recognizes a word or phrase that the user has said, providing feedback that can support users' confidence.

The initial Mondly chatbot software expanded to include 27 new languages (with six initial languages and a final total of 33). Apart from personalized scripts for all its languages, Mondly's most crucial advance has been the development of a key phrase database. This database represents the chatbots' brains. The focus of ongoing work now is machine learning, with the company's aim being to make Mondly's chatbot appear smarter and feel more like an autonomous conversant. Adaptive learning is another frontier Mondly is seeking to push; chatbots need to be able to create specific learning patterns for groups of learners that share certain traits. For example, if a user tends to forget a word—how to say *shark* in Spanish for

example—the chatbot needs to know that it should ask the user that word more often to help them retain the information.

Digital Assistants (such as Google, Siri and Alexa) are slowly enabling humans to control and communicate with our intelligent houses, cars, and the wider world that surrounds us. Mondly developers are operating on the belief we will be able to interact with assistants as intelligent as Joi from *Blade Runner 2049*. While this may seem like a faraway dream, Joi is nothing more than chatbot technology with speech recognition combined with mixed reality and artificial intelligence. Mondly has already created something not too far from this fictional scenario. Mondly's language learning assistant from the AR module uses augmented reality and a chatbot with speech recognition that has the ability to do things like make planets, animals and musical instruments magically appear into a learner's own environment, creating an environment where people can walk up and around these virtual creations and even interact with them. This spatial interaction creates a truly immersive one-to-one experience and is the future of language learning for Mondly.

Currently, the chatbot experience in Mondly's AR module aims to be the closest thing to a real-life interaction. Mondly's chatbot understands spoken language, replies with a human voice, changes outfits to match the topic of discussion, and uses gestures and facial expressions to create dynamic dialogues. All in all, the ultimate goal of chatbot technology is to be as real as possible—to keep memories, think, and speak exactly as a human being—and replicate neural networks that resemble the human nervous system. Mondly is striving to create a chatbot that is our confidant and friend, one that can help and teach us whatever we need, whenever we need it, and to make us feel emotionally connected to it.

### **Steps Forward**

Both of the chatbots discussed here have the propensity to be useful language partners: Cleverbot as a standalone conversant and Mondly's chatbot as part of a broader platform for language learning. Despite their budding usefulness, neither of them—much like chatbots more generally—have yet to make a substantial impact.

As noted, this is in part due to chatbots' still-developing skills for sustained conversation. Given many users' willingness to chat with bots (Hill, Ford, & Farreras, 2015), their potential motivational benefits (Fryer & Carpenter, 2006; Fryer et al., 2019), their budding skills for engaging exchanges (Coniam, 2008, 2014; Fryer & Nakao, 2009; Fryer, Nakao & Thompson, 2019), and increasing opportunities to engage users visually via AR/VR, it is the position of this review that there are as yet still untapped opportunities for developers to make the best of the technology we currently have. Building on the stated directions of the Cleverbot and Mondly developers, the remainder of the discussion will focus on how current chatbots might be structured to make the technology more useful to language learners and meaningfully start us down a road toward the golden age in language learning to which we (i.e., researchers and developers) aspire.

### **Learning in Digital Environments**

Prior to discussing specific strategies for how currently available chatbot technology might be used, a brief highlight first needs to be provided regarding what is known about learning from digital media and agents to ensure that a sound foundation is being set. This field has rapidly grown over the past two decades, maturing into a valuable, but often under-utilised, resource for developers, educators and students. Mayer and colleagues' extensive programme of research in

this area has perhaps made the single largest contribution, with Mayer's extensive set of outputs broadly summarising the state of the field. Many of the findings presented in Mayer's reviews (e.g., Mayer, 2017) are directly relevant to the development and effective use of chatbots as tools for language learning.

The majority of the findings from Mayer's reviews relate to supporting learners' cognitive processing of media delivery via digital means. Cognitive processing refers to how learners process and thereby learn new things in these environments—how these processes are interfered with. This body of work has established that people learn better from words and pictures than words alone. Supporting learning in employing dual channels of learning can be a strong support for acquiring new concepts and this might also support language acquisition and fluency development. As outlined below, Mayer (2017) presents five effective means of reducing extraneous processing (not overloading the user with extraneous information that does not support the learning goal) and three means of supporting learners in learning with multimedia information:

Reducing extraneous processing:

1. Coherence: Individuals learn better when extraneous material is excluded
2. Signalling: Individuals learn better when material is highlighted
3. Redundancy: Individuals learn better from graphics and narration than from graphics, narration, and text
4. Spatial contiguity: Individuals learn better when corresponding words and graphics are connected
5. Temporal contiguity: Individuals learn better when corresponding narration and graphics are presented at the same time

Managing essential processing

1. Segmenting: Individuals learn better when a multimedia lesson is presented in small user-paced segments
2. Pre-training: Individuals learn better when they learn key terms prior to receiving a multimedia lesson
3. Modality: Individuals learn better from multimedia lessons when words are presented in spoken form

The reader is referred to Mayer, 2017 and Clark & Mayer, 2016 for greater detail and examples of applications in this growing field. Mayer and colleagues (see Mayer, 2017 for an overview) also established three specific guidelines that are directly relevant to chatbot development and implementation. Mayer refers to these as fostering generative processing in e-learning:

1. Individuals learn better when the words are presented in a conversational style
2. Individuals learn better from a human voice than a machine voice
3. Individuals learn better when an onscreen agent uses humanlike gestures and movement

Some of Mayer and colleagues' recommendations will be revisited in the section below, which focuses on directions for enhancing the usefulness of current chatbot technology. In the context of broad principles for supporting e-learning, the key factors that Mayer and colleagues isolate would, if addressed, support developers in both reducing extraneous processing as well as supporting learners in managing essential processing. All of these strategies have been rigorously tested, often in both natural and experimental settings, and have been found to substantially

enhance learning outcomes (Mayer, 2017). Present and future chatbot developers should consider addressing these multimedia learning related issues, particularly for chatbots with educational aims.

## **Adjusting How Chatbots Are Used and Organised**

### **Mayer's Principles for Generative E-learning**

The first guideline (i.e., Individuals learn better when the words are presented in a conversational style) is common sense for developers seeking to create a natural conversant, but it also suggests that chatbots whose development is powered by input from learners might have the upper hand over those that are programmed more explicitly. It seems reasonable to assume that there is a middle ground. Mayer's finding that users learn more when interacting with a natural voice lends support to developers creating their own voice synthesis rather than relying on those built into platforms such as Android and iOS: Mondly's chatbot is a good example of positive initial development in this area. Natural (i.e., consistent with human interaction) can be taken further than simply sounding natural, as it might be important for chatbots to have distinctive voices that suit their age and character. This is an unexplored area of development, but one that has enough general evidence to support further innovation and testing. Mayer and colleagues' final suggestion—the importance of human-like chatbots—is key to supporting generative e-learning experiences: The chatbot should utilise non-verbal means of communication, such as gestures and movements. This indicates that animated chatbots (with arms) should be developed and improved alongside the verbal communication software. This is an area in which Mondly's VR/AR ambitions might excel given time, but one that any chatbot developer might include by integrating additional animation into its current avatars.

### **Multiple Chatbots**

Commentators on the current communicative ability of chatbots regularly agree that chatbots have not graduated to coherent communication beyond a few exchanges (Danilava, Busemann, Schommer, & Ziegler, 2013; Höhn, 2017; Knight, 2017), and often only to a single exchange of question-answer. When the chatbot fails to reply clearly or continue along a line of thought, user interest can quickly drop off (Fryer et al., 2019). The obvious solution to this issue (i.e., more robust chatbots) is certainly coming, but until it does, using multiple chatbots simultaneously might fill the gap (Candello, Vasconcelos, & Pinhanez, 2017). Multiple chatbots, each providing different answers, and asking different questions might help learners get enough input to ensure that they persist (which is essential for language learning). One key to making such an approach successful is utilising the right balance of chatbot personalities and working out a clear mechanism for interacting with the group successfully. This is one straightforward addition to how current technology might be used more effectively right now.

### **Chatbots for Specific Audiences**

At the moment, most chatbots are designed to communicate with more or less any kind of user. While current chatbot technology might not be sufficient to develop these kinds of broad, seamless communicators, narrowing the focus to specific kinds of learners could substantially strengthen their usefulness. It is an area that language learning applications like Duolingo and, to a greater degree Mondly, are already exploiting.



For standalone chatbots not part of language platforms, a simple option to enable the chatbot to focus on linear questioning might be of direct benefit to some learners. While simple question-answer interaction might bore adults, it could be a useful tool for children, both learning a new language and developing their native language (Tewari, Brown, & Canny, 2013).

A second line of development has already been explored (Nguyen, Morales, & Chin, 2017), that is, celebrity chatbots. A major issue with educational technology in general (Chen et al., 2016) and language learning situations specifically (Fryer et al., 2017; 2019), is catching and holding learners' interest. The danger of novelty effects and language learners losing interest quickly is a serious issue. If learners can learn about and even be able to imagine they are talking to their favourite celebrity, they may well be more likely to get the language practice they need (Nguyen et al., 2017). Related to this line of chatbot incentives are chatbots with an extensive knowledge of very specific topics that might be important to the user. These topics might be specific sports, countries, movie genres, health or cars. Learners are more likely to forgive a chatbot's weaknesses if they are talking about (and perhaps learning about) topics that they themselves are interested in.

Finally, two important areas that research on chatbots has identified as particularly powerful are language skills confidence (Fryer & Carpenter, 2006) and perceptions of chatbots as an opportunity to practice aspects of language that classroom human partners cannot or will not engage in (Fryer et al., 2019). The preference many language learners have for practising with a chatbot instead of a human partner has its source in the fear of making mistakes and appearing less than competent. The benefits conferred by the fact that chatbots are not humans is supported by early empirical research with language learners (Fryer & Carpenter, 2006) and more recent representative surveys of chatbot users on a broad array of platforms (Brandtzaeg & Følstad, 2017). The second, related area of chatbots being a strong language-learning partner is that the chatbot is willing to participate in endless practice, giving learners the chance to try out new language and solidify newly-acquired vocabulary and grammar. Another positive difference that even most current chatbots bring to language learning situations, which many classroom learning human partners do not, is a wide variety of language. Classroom communication practice is a powerful and important tool, but limited by the fact that generally all of the students are at a similar level and therefore have little new language to contribute to the learning process of the partner (Haines, 1995). Learners facing the communication issues that inevitably arise when seeking to practice their L2 with many current chatbots are far more likely to persist if they see the chatbot as a unique opportunity to learn things they could not learn otherwise (Fryer et al., 2019). Both of these implicit chatbot strengths might be drawn upon, even accentuated, in specific chatbots aimed at supporting learners who lack confidence or need an opportunity to practice more than a classroom partner can or is willing to do. Similarly, specific chatbots as tools for expanding learners' vocabulary and chunked language is another very specific area for development in the short-term.

### **Chatbots' Potential Role in Supporting Critical Components of Interactional Competence**

As increasingly powerful language partners, the long-term aim of chatbots will be to support users' broader interactional competence (IC; Kramsch, 1986), which is an umbrella term for a very broad set of communicative competencies. Another critical, but less often discussed, hope for educational technology (for important exceptions see Chun, 2011), are some of the more nuanced skills beneath this umbrella, such as pragmatics.

The premise for the kinds of immersive experiences which might support such subtle skills (i.e., VILLAGE; Virtual Immersive Language Learning and Gaming Environment) has been around for a few decades (e.g., Hamburger & Maney, 1991). Research regarding the potential role of chatbots in these environments is more recent, but early signs are positive (Wang, Petrina, & Feng, 2015). Chatbots can improve the user experience, making it more immersive as well as setting the scene for the kind of interactions that might support pragmatics development. The visual environment and how a specific chatbot looks are easy gateways to enabling the kinds of culturally contextualized exchanges necessary for language students to progress in the fuzzier areas of communication (i.e., beyond basic vocabulary, syntax and pronunciation).

As reviewed already, Mondly's VR capable chatbot creates similarly immersive experiences, but in a straightforward one-on-one manner. As chatbots like Mondly's become more sophisticated, they will make gestures and facial expressions a clear part of the learning experience. The environment of the chat will be flexible, allowing simulations that make the connections between context and speech clear. Recent evidence suggests that even simple simulations (without chatbots) designed to enhance students' pragmatics can be powerful (Sydorenko, Daurio, & Thorne, 2017; Sydorenko, Smits, Evanini, & Ramanarayanan, 2019), setting the stage for chatbots to potentially dominate this aspect of language learning in the near future.

### **Preliminary Conclusions**

During their first three decades, chatbots grew from exploratory software, to the broad cast of potential friends, guides and merchants that now populate the internet. Across the two decades that followed this initial growth, advances in text-to-speech-to-text and the growing use of smartphones and home assistants have made chatbots a part of many users' day-to-day lives. Users have been trialling well-established chatbots like Cleverbot for language learning purposes for decades. Despite research pointing to the strengths (Fryer, 2006; Hill et al., 2015; Fryer et al., 2019) and weaknesses (Coniam, 2008; 2014; Fryer & Nakao, 2009; Fryer et al., 2017) of casual chatbot conversation partners, scant progress towards chatbots as substantive language learning partners has been made. In the past three years, companies like Mondly and Duolingo have been working to fill this gap by placing chatbots at the center of their online language learning platforms.

The golden age for language learning that chatbots promise is still on the horizon. We (learners, educators, and developers) should not, however, wait for a paradigm shift in machine or deep learning to herald its arrival. Alongside the efforts of current general chatbot and online language-learning-specific developers, there are opportunities for more effective use of what we currently have through innovative arrangements such as multiple simultaneous chatbots (Candello et al., 2017) and celebrity chatbots (Nguyen et al., 2017). Developers might also fruitfully collaborate with researchers in the broader area of digital multimedia learning, which has established a number of small, but impactful measures by which media, generally, and conversation agents, specifically, can be enhanced.

Chatbots are a new, revolutionary stage for foreign language learning. They are currently a useful tool that continues to grow and develop. This review proposes that chatbots can be used more effectively right now with relatively small adjustments and the application of research from the broader field of educational technology. Developers who can work with researchers and

educators, while listening to learners needs and experiences will find fertile ground for innovation and impact.

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