Chatbots in language learning: AI systems on the rise

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Abstract. The use of chatbots in language learning has been on the rise. In recent Computer-Assisted Language Learning (CALL) research, there is a consensus that rule-based, scripted voice systems are optimal for language learning. Such systems integrate well into instructed language learning in that interactions with the user are predictable and controlled. Open, AI-based voice systems (such as in personal assistants like Siri) do not provide that degree of task-oriented learning. However, the argument is made here that they have the potential to provide open-ended conversational practice and language development which aligns with an ecological, usage-based perspective on language development.

Keywords: chatbots, artificial intelligence, voice systems, intelligent personal assistants.

1. Introduction

Most dialogue-based projects in CALL involving voice have utilized rule-based, limited-domain systems (Fryer, Coniam, Carpenter, & Lăpușneanu, 2020). Such systems have been available in text-based dialogue systems going back to the 1960's. Experimentation with these systems for language learning began in the 1980's, particularly through work in tutorial CALL. More recently, a number of chatbots for language learning have been released, including Mondly and Eggbun (Alm & Nkomo, 2020). General-purpose chatbots have also been used, such as Cleverbot (Fryer et al., 2020). Interactions in such systems are based on scripts deployed as decision trees, which supply predetermined responses to user input. This provides a high level of control, leading to relatively predictable exchanges. Using such voice systems, particular areas of language study can be targeted, and

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the level of language adjusted for learners with different degrees of proficiency. This kind of controlled practice aligns with skill acquisition theory and has proven to be a widely used approach in integrating chatbots into structured language learning environments. Free-flowing conversations with a bot can be a frustrating experience, as many studies have shown. Bibauw, François, and Desmet (2019) argue that "free dialogue should not be seen as the ultimate target of dialogue-based CALL" (p. 856). That position is echoed in most studies of voice systems in CALL. This paper argues, however, that open-ended conversations with a spoken dialogue system should not be quickly dismissed as a viable alternative to scripted systems. In particular, Intelligent Personal Assistants (IPA's), such as Alexa, offer the potential to combine the advantages of language practice through open-ended conversation with features enhancing both learner willingness to communicate and implicit, usage-based learning.

2. AI-based systems

Dialogue management in scripted systems is handled in a variety of ways, through implicit or explicit mechanisms. Bibauw et al. (2019) offer a typology of constraints used in dialogue-based CALL. Typically, exchanges are based on a question-answer format, with responses controlled with multiple choice or other closed response options. In that way, the systems supply pattern drills in chosen language use situations, with limited opportunities for multiturn exchanges. They are not designed to provide practice in meaningful exchanges outside the subject area and language limits imposed by the system. Such systems function as tutors, carrying out a specific pedagogical role. While this is certainly useful for language learners, particularly at early stages of development, chatbots offering open conversation can do more, namely provide both practice in linguistic forms and socialization into situated language use. That can be especially useful at later stages of language development. Recent developments in voice technologies, fueled by advances in AI and big data collection have led to dramatically improved performance of general-purpose chatbots, such as Google Assistant. These IPAs are built into smartphones and enable users to access through voice many services available online including search or translation. They are increasingly becoming available in other connected devices such as earbuds, home speakers, and car consoles. This developing Internet of Things (IoT) heralds the arrival of ambient intelligence, with voice services available almost anywhere, at least for affluent populations. This represents one of the singular advantages of IPAs for language learning, namely that rather than being a scheduled learning task, they integrate into the everyday lives of learners as available second language partners.

While voice services are available in the most widely spoken languages, not every language is represented. The range of services may be limited by language as well, with the most up-to-date and robust support for speakers of English. Voice recognition services are designed for mainstream speakers of the language and will likely struggle with non-standard speech including dialects and learner language. Nevertheless, there has been considerable experimentation with the use of IPAs in language learning, with generally positive results (Bibauw, François, Van den Noortgate, & Desmet, 2022). Their use has been shown to be effective for novice learners, who are able to practice pronunciation and basic conversations. The systems can serve as models of expert speakers, and, compared to humans, possess infinite patience, allowing for extensive trial and error without judgment. In that way, they have been shown to help overcome anxiety and encourage a willingness to communicate (Alm & Nkomo, 2020). Most studies report on IPA use in instructed learning environments; little research has been published on their use by autonomous learners or in informal learning settings. Yet that use is likely to hold considerable promise for both independent language learning and language maintenance. That will particularly be the case as more personal devices such as smartglasses are released, which allow interactive engagement with users' surroundings mediated by language.

3. Expanding voice systems for language learning

While IPAs in their current configurations have been shown to be potentially beneficial to language learners, there are developments and add-ons that can make them more useful for that purpose. One of the options is to add functionality to a commercial system through a third-party app. That may be possible if an appropriate API service is available or if the system is set up to integrate add-ons, as is the case with Alexa. That Amazon-created IPA allows for 'skills' to be added to its core functions. Several language learning apps have been created in that way (Maria, 2021). One of the more promising directions for chatbots is to use and customize a social bot. A prime example is XiaoIce from Microsoft Asia. While mainstream IPAs are designed to function as transactional agents, i.e. to reply succinctly to user queries, social bots are programmed to serve as artificial companions. They are endowed with a distinct personality profile and are capable of engaging in multiturn conversations. One of the enablers of that functionality is the maintenance in the AI system of a distinct user profile. This allows a chatbot to recall and use information from prior dialogues. XiaoIce is typical of social bots in that it is not just reactive, but proactive, asking follow-up questions, and even suggesting conversation topics. Studies using XiaoIce describe conversations lasting over half an hour (Zhou, Gao,

Li, & Shum, 2020). In contrast, IPAs currently maintain a minimal user profile, usually limited to information about subscribed services. On the other hand, they are moving in the direction of developing greater social skills, with some ability to engage in small talk, improved dialogue management, and synthetic voices which sound much less robotic.

In order for chatbots to move from the role of tutor to that of conversation partner, the AI system needs to be able to converse on a broad array of topics. One of the developments in AI that is moving in that direction are large language models such as LaMDA (from Google) and GPT-3 (from OpenAI). These are systems based on incredibly large datasets, which are converted into artificial neural nets using machine learning (Godwin-Jones, 2021). They have been shown to be capable of generating texts on a large variety of topics, in different genres, and in various languages. Hybrid systems, built upon extending existing large language models, have the potential to combine the advantages of language practice through open-ended conversation with features enhancing both learner motivation and implicit, usage-based learning.

4. Conclusion

Using a mainstream IPA, deployed through a dedicated app or a commonly used messaging system, shifts the dynamics of exchanges from an artificial academic setting to an experience integrated into everyday life. That is likely to make the service more universally available (including through IoT devices) and enhance motivation. That persistent and individualized, always-available status holds the promise of new options for language learning/maintenance, especially for autonomous learning. This aligns with ecological approaches to CALL as well as emergentist views of second language acquisition, which move away from linear and pre-defined pathways to language learning in favor of a more dynamic and holistic approach.

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