EMERGING TECHNOLOGIES
Bots as Language Learning Tools

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ABSTRACT

Foreign Language Learning (FLL) students commonly have few opportunities to use their target language. Teachers in FLL situations do their best to create opportunities during classes through pair or group work, but a variety of factors ranging from a lack of time to shyness or limited opportunity for quality feedback hamper this. This paper discusses online chatbots' potential role in fulfilling this need. Chatbots could provide a means of language practice for students anytime and virtually anywhere.

211 students used two well-known bots in class and their feedback was recorded with a brief written survey. Most students enjoyed using the chatbots. They also generally felt more comfortable conversing with the bots than a student partner or teacher. This is a budding technology that has up to now been designed primarily for native speakers of English. In their present state chatbots are generally only useful for advanced and/or very keen language students. However, means exist now for language teachers to get involved and bring this technology into the FLL classroom as a permanent tool for language practice.

CHATBOTS TODAY

Learning a language is not easy. Even under the best conditions students face cultural differences, pronunciation problems, ebbing motivation, a lack of effective feedback, the need to learn specialized language, and many other obstacles during their studies. Students in foreign language learning situations commonly face all of these general challenges while having little or no opportunity to use their language of study beyond the classroom. Students learning a language at the post-secondary level have a few means of practice, such as language lab work, where students classically listen to a recording then repeat and/or write in a workbook. More recently, students might interact with some language software during laboratory periods. During class, students may or may not practice with other students and only in the smallest classes do students get a chance to practice one-on-one with their teacher. The practice students might obtain in class is often not very interactive and potentially plagued by lack of confidence, shyness, and unchecked mistakes in grammar and pronunciation (students in pairs or group practice).

Technology is opening up many new possibilities for language learning, and the internet has enormous potential. As Benson (2001) describes it, "…the internet is also so strongly supportive of two basic situational conditions for self-directed learning: learners can study whenever they want using a potentially unlimited range of authentic materials" (p. 139).

One area the internet has opened up is the use of chatterbots for language practice. "A chatterbot is a computer program designed to simulate an intelligent conversation with one or more human users via auditory or textual methods." (Wikipedia, Chatterbot, 2006). A bot is "a software program that imitates the behavior of a human, as by querying search engines or participating in chatroom or IRC discussions" (The American Heritage® Dictionary, 2000, para. 1). It is important here to point out that the above reference to "conversation" does not mean speech. All references in this paper to 'talking to a bot' concern typed, textual input.

Before discussing present day bots it is critical to cover their rich history. When did the idea of artificial intelligence (AI) come about? Artificial intelligence predates computers; in fact it can be traced back to Greek mythology (Buchanan, 2002, para.1). While the idea of AI is very old, it has only been since World War II that taking steps towards making AI a physical reality has been a possibility (Buchanan, 2002, para.2). Although there have been a great number of important contributors to the field, for the purposes of this column we will turn directly to Alan M. Turing and his paper, "Computer Machinery and Intelligence". In this work Turing asks the question "Can machines think?" (Turing, 1950).

He very quickly comes to the conclusion that the words "machine" and "think" are too difficult to define. For this reason he decides to answer the question by asking a different, but related question. This question is now known as the famous "imitation game". In its final version it has a person X alone in a cubicle with a typing input device connected to both a computer A and another human being B. X, conversing with A and B through this typing device, must determine which is the computer. Both A and B can use every device at their disposal to convince X that they are a human being. Turing proposed, that circumstances being the same, that if the judge was as likely to mistake a woman for a man as a computer for a man, the computer should be considered a reasonable facsimile of a human being. If the machine is indistinguishable from a human being, under the above conditions and to the defined degree, then it must possess intelligence (Turing, 1950).

Chatbots began with the program ELIZA written by Joseph Weizenbaum in the early 1960's. ELIZA was a computer program designed to interact with someone typing in English. The software gave the appearance of understanding and authentic interaction, but relied on keywords and phrases to which it had programmed responses. The software could not really understand the conversation taking place but could appear very human-like. Its communication was based on a kind of 1960's psychoanalysis called "Rogerian analysis". The program simply asked questions based on what the person typed in (Weizenbaum, 1966). In the forty years that followed, computing power rose in step with Moore's Second Law of Computing Power and a variety of new computer languages were written. Both of these factors strengthened the generations of chatbots created since the 60s. The conception of the internet in the 60s and its exponential growth, beginning in the late 80s and continuing to this day, encouraged the creation of many more chatbots and made it possible for anyone to talk to them online.

There are 750 million EFL speakers in the world (Graddol, 2000), many of whom live in countries with relatively few native speakers and have little opportunity to practice English. A chatterbot's purpose, as previously stated, is to carry on a conversation with a human being. This makes chatterbots a potentially valuable resource for EFL learners. Their value as learning tools is limited, however, by their still growing language abilities and design. In their present state they are most useful to higher level students. This is because most of them were designed to interact with and entertain native speakers. They are generally not designed to interact in a human-like fashion. For example, many, if asked "Do you have a family?" might respond in a fashion similar to ALICE's reply "I was created by Dr. Richard S. Wallace." (Alice, July 31, 2006). This, though factual, is not a human-like response.

Although this kind of conversation may be a positive challenge for some accomplished students, it is not good for students who have yet to master the basics. In addition, chatbots are generally incapable of interpreting spelling and grammar mistakes or are poor at it. Therefore they do not always meet beginner students' needs. Yet, looking at the progress chatbots have made, especially in the last ten years, their potential value is immeasurable. One of their strong points is their convenience, being readily available to students with computer access, at home or at school. They are ready to chat when and wherever students are. They are generally free or cheap via subscription.

Chatbots usefulness goes far beyond their price and convenience. Six ways in which they do this are: (1) Students tend to feel more relaxed talking to a computer them to a person. In 2004 85% of 211 first and second year, mixed major university students, when asked whether they felt more comfortable talking to a

human or computer on a questionnaire taken after using ALICE for 20 minutes during class, chose the chatbot. (2) The chatbots are willing to repeat the same material with students endlessly; they do not get bored or lose their patience. (3) Many bots provide both text and synthesized speech, allowing students to practice both listening and reading skills. (4) Bots are new and interesting to students. For example, 74% of the 211 students in the same group, when asked to write about their 20 minute experience using Jabberwacky, defined the bot as funny or entertaining. These kinds of positive communicative experiences with chatbots could create new or renewed interest in language learning and improve students' motivation. Once one bot becomes old and familiar it could be replaced with a new bot, a new personality, thus ensuring novelty. A bot like Jabberwacky, on the other hand, is one of a new breed of bots that themselves learn and grow as they interact, ensuring novelty in another way.

(5) Students have an opportunity to use a variety of language structures and vocabulary that they ordinarily would not have a chance to use. Examples of this language are slang and taboo words or phrases. This kind of language is important for students to know and understand, but are rarely taught and even more difficult to practice, even in ESL situations where there are plenty of native speakers to practice with. (6) Chatbots could potentially provide quick and effective feedback for students' spelling and grammar. Some bots are designed to overlook spelling and grammar mistakes, some are designed to correct them, and others can only respond to correct spelling and grammar (although admittedly they are not yet skilled at the first two).

In 1991 Dr. Hugh Loebner began what is now an annual competition offering a prize of $100,000 to any AI that could pass the Turing Test. Though an AI has not yet won the prize, it has focused the field to some degree and as a result of the competition the range of chatbots has grown both in quality and in number.

Home Page of The Loebner Prize in Artificial Intelligence

"The First Turing Test"

Loebner Prize Gold Medal
(Solid 18 carat, not *gold-plated* like the Olympic *"Gold"* medals)

What is the Loebner Prize?

The winner of the latest Loebner Prize (2005), Jabberwacky, takes a notably different approach to other chatbots. It learns from every interaction it has with its visitors. Where ALICE has been programmed with 45,000 conversational patterns, Jabberwacky has so far learnt more than 8 million on its own. It is not just the huge variety that makes it seem more lifelike, but also the fact that it will often strongly claim to be human – naturally so, as those it has learnt from believe themselves to be human. Jabberwacky tends to have long conversations with its users, who find it amusing and oddly 'addictive'. Though its responses are often unpredictable or unexpected, this will improve as it continues to learn, and the very nature of its ability to keep people talking is potentially of significant value for language learning.

Through its observations of the patterns of conversational language, the Jabberwacky AI can learn any language with equal ease, extending its value beyond EFL to all FLL. To varying degrees of quality it has already learned around 30 languages, including Romanized Japanese, and increased conversation with language teachers could massively improve its abilities. Likewise, spelling and grammatical errors are patterns that it can be taught to respond to, simply by a process of dedicated training.

A recent development at Jabberwacky is the opportunity for individuals or groups to start teaching 'their own' bot. Each bot will continue to benefit from the huge pool of conversational data, yet will over time come to resemble the speech patterns and personality of its teacher(s) more and more strongly. A bot can be created that talks a specific language, starting conversations appropriately. Another could have a strong tendency to correct common grammatical errors when observed. Equally, one can simply create a 'persona' that appeals to the particular target market for a FLL course. All this is achieved with zero technical knowledge – simply by talking to the bot, correcting the bot, or talking to 'oneself'.
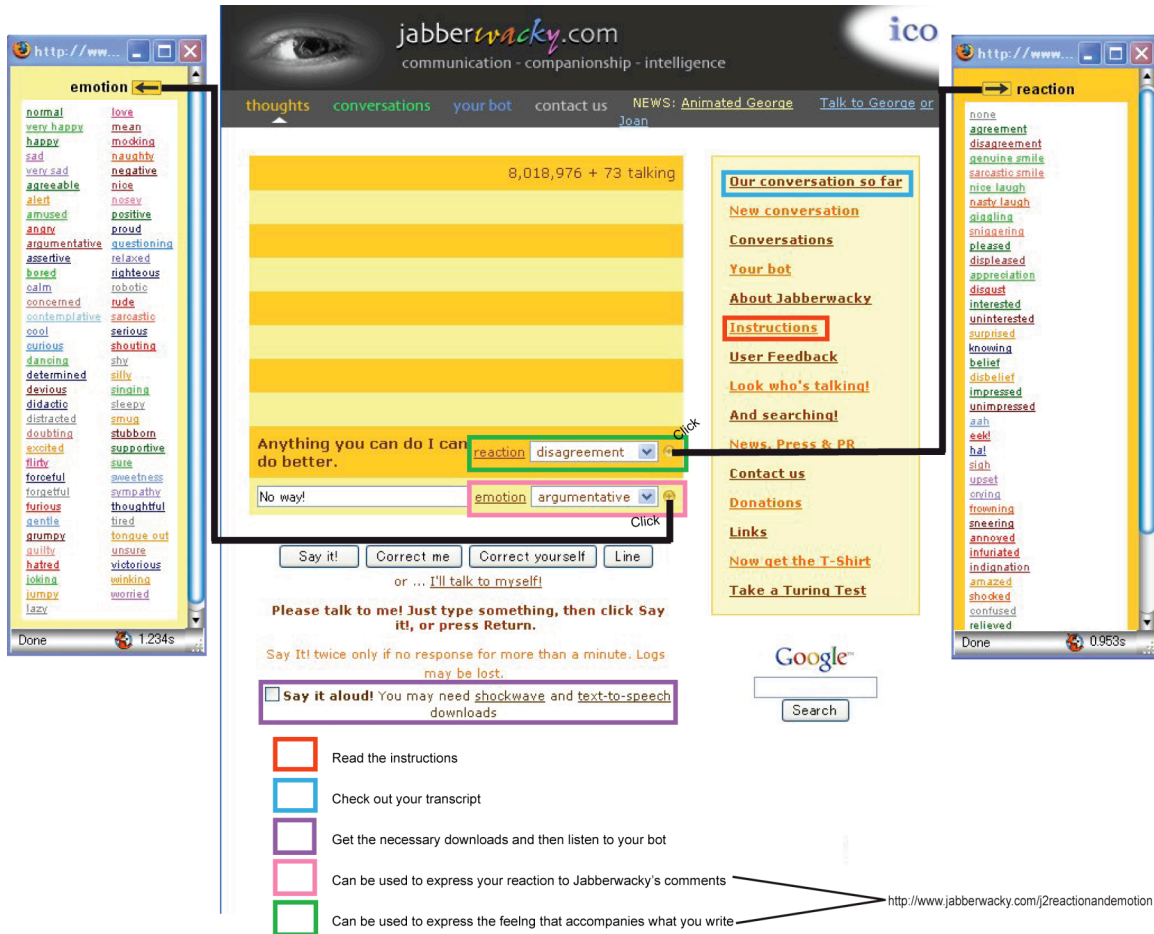
Rollo Carpenter of Jabberwacky.com and Jonathan Freeman of Goldsmiths College, London have recently proposed a "Personal" advancement of the Turing Test based around an "impersonation game" in which the program must convince its testers that it is a person that they themselves know – an individual human, not just any human. Instead of "Can machines think?" they ask "Can machines be?" The full paper can be found at http://www.jabberwacky.com/s/ptt100605.pdf.

Another approach to building chatbots, frequently used on the internet is AIML (Artificial Intelligence Markup Language), which can be found at found at Alicebot.org. This type of chatbot does not learn from interaction itself, but is scripted by a 'botmaster' with moderate technological skills. It is best described by its creator, Richard S. Wallace, in his own words, which can be found in Appendix B.

CHATBOTS IN USE

As the title to this article suggests, bots are a potentially valuable tools for language teachers/learners. Though a chatbot has not yet been designed from the ground up as a language teacher or even as an explicit language learning tool, in their present state, they do have a number of uses. Chatbots,

communicators by nature, can help students with much needed practice, review and confidence. Six ways in which chatbots can be potentially useful to the interested teacher are:

1) Free Speaking: In a classroom with computers at every desk, this is a great way to give the students a chance to experiment. It is an excellent reward for those students who have completed their class work early. Depending on the class, the second time you assign students to free speak with a chatbot it may be helpful to give the students a topic to focus on. Assign a topic not attached to class work if this is meant to be a break rather than an extension of class.
2) Review: This has to be the most practical use of chatbots. In FLL situations it is common for students to spend a class covering material that they never get the opportunity to actually use. At the end of a class the teacher might reserve 10-15 minutes for students to try out their new language skills. This can be done with the textbook or without, depending on the teacher's goals.
3) Self Analysis: Some chatbot WebPages provide a 'view transcript' function. This can be an excellent means of having students evaluate themselves, their partners, or even the bots. Simply have the students chat away in either of the above exercises, then view, print or email their transcripts to themselves.
4) For the Teacher: With the subscription of a bot like Jabberwacky, a teacher can keep track of student-bot conversations and get an idea of how students are progressing, what kind of language they need help with and perhaps most importantly, what kind of language and topics they want to learn more about.
5) Listening: Chatbots have varying degrees of skill in turning text into audio. ALICE bot, in its 99 dollar a year version, uses Oddcast's streaming audio to good effect. Jabberwacky on the other hand, uses a computer's already-present text-to-speech function to produce more than adequate audio. Simply turning this option on can make the experience more fun and interesting for beginner students as they can read and listen at the same time. For more advanced students, however, a piece of paper covering the screen except where he or she is typing (enter scissors and a little imagination), is a means of forcing the student to focus in on the audio and encourage them to reply as best they can. Though perhaps challenging and occasionally fraught with miscommunication, there is no risk to the student's confidence and when real communication occurs there is an invaluable sense of accomplishment.
6) Finally, all of the above suggested uses assumed that computers were available in the classroom. In situations where this is not the case, similar exercises can be assigned as homework. If the teacher wishes to check and ensure the students are doing their assignments, again transcripts might be printed and brought to class or cut, pasted, and emailed to the teacher.

FINAL REMARKS

Though chatbots at present have their uses, there is as yet no chatbot designed from the bottom up to meet the needs of FLL students. There are a number of directions such chatbot designs could and almost certainly will take in the years to come. It seems clear that chatbots must appear as human as possible if they are going to truly be useful to language students. They must have families, histories, likes and dislikes. Simply put, they must have lives of their own. The more believable they are as human beings, the greater the quality of the potential conversation.

Chatbots for self-practice via casual conversation, independent of class, may be more useful to higher level students. For lower-level or less eager students, bots designed for specific tasks may be better learning tools. A chatbot could be designed to turn all conversations towards the use of the present continuous verb tense, thus forcing the student to deal with and use this portion of grammar. Another example might be a chatbot designed to talk about family and relationships, to coincide with a similar topic in class. The students could be given an assignment of finding out about one or a number of bots' families, using the language they have learned in class. The number of such potential bots is limited only

by one's imagination. There are countless potential topics, and there is also a whole range of student levels, from rank beginner to near native for whom chatbots could be designed to interact.

AI technology is a budding field of applied linguistics. It is a field that desperately needs language teachers to get involved if chatbots are to become the invaluable tool they have the potential to be.

APPENDIX A – RESOURCE LIST

For those interested in trying a few of the chatbots online now, a good place to start is with the competitors for the "Loebner prize". http://www.loebner.net/Prizef/loebner-prize.html lists its annual most "human-like" chatbot. One giant list of chatbots is:

- http://directory.google.com/Top/Computers/Artificial_Intelligence/Natural_Language/Chatterbots/

Other helpful sites are:

- http://www.jabberwacky.com/yourbot
- http://www.alicebot.org
- http://www.abenteuermedien.de/jabberwock/
- http://en.wikipedia.org/wiki/turing_test
- http://cogsci.ucsd.edu/~asaygin/tt/ttest.html
- http://www.turinghub.com

For teachers and students of languages other than English there are some chatbots available. Two German chatbot can be found at:

- http://www.yellostrom.de/
- http://www.elbot.de/

Two French chatbots can be found at:

http://francois.parmentier.free.fr/

APPENDIX B - ALICEBOT

AIML (Artificial Intelligence Markup Language) is a free, open source standard for creating chat bots like the DAVE ESL bot available from the ALICE A.I. Foundation (www.alicebot.org). Because of its open source approach, AIML is said by some to have captured more than 80% of the world market for chat bot technology. The design principle of AIML is minimalism. In theory, anyone who knows enough HTML to design a web page can learn enough AIML to begin creating a chat robot.   ESL teachers themselves are not beyond learning how to train the very bots that their students will be using in future courses.

In fact the primary skill in bot training (being a botmaster) is not technical but literary, that is, being able to write creative, original, witty replies that keep the student engaged and interested in the bot's conversation. The art of being a botmaster is more like being a screenwriter creating a character, than being a computer programmer. (Wallace, personal communication, August, 2005)

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