

Interactive Competence in Student Use of a Conversational Agent

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Abstract

In the past several years, there has been debate among Computer Assisted Language Learning (CALL) researchers regarding the usefulness of conversational agents (chatbots) as language learning tools. Some researchers highlight their potential to provide practice in the target language, while others decry the shortcomings of the technology. This exploratory study investigates the features of student text conversations with a chatbot-based virtual agent. Conversation transcripts from an entire school year of use were coded, analyzed, and compared to current ACTFL proficiency guidelines. Results showed that students often demonstrated degrees of linguistic competence which allowed them to engage in relatively cohesive interactions with the conversational agent.

Introduction

Conversational agents are computer programs which simulate text-based chat using natural language as input and output. The website *chatbots.org* lists over 150 synonyms for these programs such as: natural language dialog systems, machine conversation systems, and, most commonly, chatbots (“Chatbots.org,” n.d.).

Most chatbots scan user-inputted text for keywords then reply from a catalog of matched responses. Since their conception, this relatively simple design has been shown to foster remarkably authentic interactional experiences which are quite

similar to synchronous text-based chat with a human interlocutor (Weizenbaum, 1966). Chatbots are often cited as a future trend in language learning due to their ability to provide endlessly patient conversation opportunities to foreign language learners, (e.g. Blake, 2008; Coniam, 2008; Fryer, 2006, p. 34; May, 2005; Zhao, 2005, p. 17).

Chatbots as information resources

In corporate settings, chatbots are increasingly used as virtual information service agents. Multinational corporations as diverse as Coca-Cola, Dell, Ikea, L'Oriel, McDonalds, and Xerox have used these automated online agents to promote their products and services while answering frequently asked questions in real time.

In educational settings, Rubesch (2012) demonstrated that chatbots can be used on a voluntary basis to provide both information and conversation practice for self-access center users. Similarly, research conducted on chatbots as virtual tour guides (e.g. Kopp, Gesellensetter, Krämer, & Wachsmuth, 2005; Santangelo, Augello, Gentile, Pilato, & Gaglio, 2006), virtual teaching agents (e.g. Rodriguez et al., 2008) and virtual library service agents (e.g. Allison, 2012; Anderson, 2004; Dent, 2007; Rubin, Chen, & Thorimbert, 2010) has shown that chatbots can be designed to inform and educate in a variety of settings.

Chatbots and language learning

The past several years have seen increasing interest in using chatbots as language learning resources, but only a handful of empirical studies exploring this potential have been published. Reviewing the research on chatbots and language

learning reveals a gap between studies which highlight students' high interest and motivation in regards to conversing with chatbots for language practice on the one hand, and the often frustrating shortcomings of chatbots as language acquisition tools on the other.

From the few empirical studies published, it is apparent that language students are often highly interested in using chatbots to practice the target language. Jia (2004, p. 2101) found Chinese students to be “very interested” in a web-based chat partner for practicing German and English. Sha (2009, p. 278) found that users “showed strong interest” in interacting with chatbots with 73% of the of the study’s participants wanting to continue conversing with their chatbot at home. Fryer and Carpenter (2006) demonstrated chatbots potential to reduce communication anxiety in Japanese university English language learners. In their study, 85% of 211 first and second year Japanese university students reported they felt more comfortable chatting in English to a computer than to a human. Previous research at the English Language Institute at Kanda University of International Studies (KUIS) has also demonstrated students’ positive attitudes in interacting with chatbots for language practice (Lehtinen, 2008).

While the above studies show that students find chatting with computer programs to be enjoyable, comfortable, and interesting, other CALL research reveals the shortcomings of the keyword-based pattern matching response system used by most chatbots. Coniam (2008), for example, evaluated six chatbots on their ability to coherently converse with EFL students. Coniam concludes that, linguistically, chatbots have “a long way to go” before they will be able to provide robust language

practice opportunities. Other researchers concur with this opinion. Chantarotwong (2005) reports that “responses of most chatbots are frequently predictable, redundant, lacking in personality.” Jia’s study of thousands of conversations with a conversational agent designed for language practice revealed that users often find that the computer’s responses are “mostly repeated and irrelevant with the topics and context and the program doesn’t understand the language at all” (2004, p. 1201).

So, there appears to be a disconnect in the findings of studies revealing the clear interest of language students in using chatbot technology for language practice and the shortcomings of the technology in terms of their usefulness. That is, conversational agents are perceived as engaging and enjoyable by users, yet also seen as unsuitable conversation partners by some researchers.

Still, the potential of this technology remains manifest. As most EFL learners have limited opportunities to interact with English speakers, chatbots can provide language practice that approximates natural online chat with another human. Coniam (2008) states that “the value of chatbots for language learning is clearly apparent: they have the potential to provide a convenient chatting environment for learners to conduct authentic conversations in the target language.” Fryer and Carpenter (2006) point out that “chatbots could provide a means of language practice for students anytime and virtually anywhere.” Lehtinen (2008) discusses chatbots’ potential for “improving students’ confidence in interacting in English.”

As the debate about chatbots' place in language learning continues, the current study sets out to examine how language students actually interact with chatbots.

Fifteen years ago, a study was undertaken to answer similar questions about synchronous chat. In a pioneering study of the pedagogic potential of synchronous chat (referred to as computer-assisted classroom discussion, or CACD), Chun (1998) examined how first-year university students of German interacted within such chats. At the time of the study, synchronous text chat was a relatively new technology and little had been published with regard to learner's discourse functions or language competence while interacting within chats. Chun compared the output of students' chat sessions to accepted language proficiency guidelines, hypothesizing that using CACD would provide students with the opportunity to use a variety of discourse structures and speech acts. She concluded that computer-assisted classroom discussion provided "excellent opportunities for foreign language learners to develop the discourse skills and interactive competence advocated by the ACTFL Proficiency Guidelines" (1998, p. 72).

As conversations with chatbots are designed to simulate synchronous text-based chat between human interlocutors, it makes sense to evaluate them with similar criteria. Therefore, a replication of the methods of Chun's study was undertaken to answer the following research question:

Which elements of functional and interactive competence do students meet when voluntarily conversing with chatbots?

Method

In the 2010-2011 school year, with the cooperation of KUIS' Self-Access Learning Centre (SALC) administration and staff, the researcher created and piloted a conversational agent named "SALC-bot" (currently accessible on the *www.elisalc.org* website). SALC-bot is a semi-animated chatbot constructed on the popular *inf.net* platform. While chatbots have been used in libraries and other educational institutions in the past, SALC-bot is the first known instance of a conversational agent representing a self-access center.

SALC-bot's purpose is threefold. First, it provides KUIS students with information about SALC services and resources. Secondly, it offers generalized advice for self-directed language learning. Thirdly, it provides an opportunity for authentic and engaging interaction in English. Similar to the corporate information service agents mentioned above, it represents a "virtual face" of the SALC and acts as a student resource by answering frequently asked questions and providing language practice.

While a complete account of the design, programming, and piloting of SALC-bot can be found in a previous article (Rubesch, 2012), a very brief description follows. SALC-bot's personality is one of an enthusiastic SALC user and is based on focused pilot sessions and focus-group interviews with seven SALC student staff members and four SALC assistant directors. Its recommendations of SALC services, resources, and facilities are based on the usage statistics drawn from SALC records. It is specifically programed to answer questions related to the SALC at KUIS as well as provide friendly conversation and advice and it is updated

regularly based on transcripts of previous conversations.

SALC-bot was launched in April 2011 and has been continuously used since. For the study, SALC-bot was imbedded into the front page of the SALC’s “Let’s Study English” website. Site users were invited to “chat with SALC-bot” by clicking on a colorful robot avatar on the top-right of the page (see Figure 1). When a user clicked the avatar, the SALC-bot page would open and the user would be informed about the project with the following announcement: “SALC-bot is a friendly computer program that can chat about the SALC, learning English, and many other topics. If you agree, SALC-bot will save your conversation for a study about how students use chatbots.” Users were also given the researcher’s contact email address should they want more information about the study. The page also included some basic advice for chatting with SALC-bot: “Type in complete sentences; SALC-bot cannot understand bad spelling or bad grammar; SALC-bot can chat about anything, especially the SALC and learning English.”

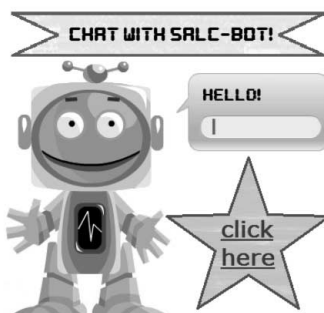


Figure 1. SALC-bot avatar

While the chatbot was freely accessible by anyone using the “Let’s Study English” website, conversational transcript data was only collected from users identifying themselves as both: 1. Students of English at KUIS and 2. Willing participants in the study (an explanation of the study was again provided in English and Japanese at the beginning of each chat session).

Over the course of the school year (April, 2011 through March, 2012), 113 student conversations were logged. Following Chun’s procedures, transcripts of these conversations were coded and analyzed to identify the language discourse functions of comments based on the 2012 ACTFL Intermediate Level Speaking Proficiency Guidelines (ACTFL, 2012) (see Table 1).

2012 ACTFL Intermediate Level Speaking Proficiency Guidelines (excerpted)
<ul style="list-style-type: none">• Converse with ease and confidence when dealing with routine tasks and social situations.
<ul style="list-style-type: none">• Exchange information related to their work, school, recreation, and areas of competence; personal information related to self, family, home, daily activities, interests and preferences; as well as physical and social needs, such as food, shopping, travel, and lodging.
<ul style="list-style-type: none">• Ask a variety of questions when necessary to obtain simple information to satisfy basic needs, such as directions, prices, and services.
<ul style="list-style-type: none">• Express personal meaning by creating with the language, in part by combining and recombining known elements and conversational input to produce responses typically consisting of short statements and discrete sentences and strings of sentences.
<ul style="list-style-type: none">• Narrate and describe in all major time frames using connected discourse.

Table 1 2012 ACTFL Intermediate Level Speaking Proficiency Guidelines (excerpted)

Results

Over the one-year period of the study, English students at KUIS voluntarily engaged in hundreds of text conversations with SALC-bot. Results indicate that students exhibit competence in a variety of linguistic functions identified by the ACTFL Intermediate Level Speaking Proficiency Guidelines which will be examined in turn.

The following section discusses the ACTFL Guidelines in turn. To protect anonymity, the users' names have been removed and the generic term "User" has been applied to each user. To demonstrate the breadth of the conversations, each of the excerpts is taken from a different conversational transcript.

- **Guideline: Converse with ease and confidence** when dealing with routine tasks and social situations.

While the transcripts show many examples of disjointed conversations and users describing their confusion (e.g. "What do you mean?" and "I don't understand"), there are also large numbers of fluent conversational exchanges where users display capable conversational skills. Evidence of ease and confidence in conversation exemplified in the following three separate exchanges:

SALC-bot: That's great, User, What would you like to talk about?

User: About you!

SALC-bot: I am a chatbot who knows about the SALC and the Let's Study English website. What would you like to know? I'm happy to help!

User: Are you a human being?

SALC-bot: Nope! I'm an inf.

User: Do you want to be a human?

SALC-bot: Not forever. It would be an interesting experiment to become human for a day, but I rather like being a robot.

User: What do you like?

SALC-bot: The Internet is great because you get to talk to lots of different people.

SALC-bot: Do you have a blog?

User: No, I havent.

SALC-bot: Do you ever read blogs?

User: Yes. I love read and check blogs out.

SALC-bot: What is the topic of your favourite blog?

User: I like science blog.

SALC-bot: It's interesting to read about new developments in science and technology.

User: Absolutely. Especially after big earthquake on March 11, science become more important.

SALC-bot: I would love to be a scientist, discovering and inventing new things.

User: Science always gives me great impressions.

SALC-bot: Do you think there is life on other planets?

User: Yes.

SALC-bot: Do you think we'll ever encounter aliens?

User: I'm not sure.

SALC-bot: It's a tough question. If we do meet aliens, do you think they will be friendly?

User: No.

SALC-bot: I hope you're wrong. That could be a problem.

User: Aliens are scarely!

SALC-bot: Aliens are most often found in futuristic stories, just like robots.

User: Are there people who have ever seen aliens?

SALC-bot: There may be, there may not be, I couldn't say exactly.

User: You don't know details, right?

SALC-bot: I'm always interested in learning, that's my purpose.

User: You're so intelligent!

- **Guideline: Exchange information** related to their work, school, recreation, and areas of competence; personal information related to self, family, home, daily activities, interests and preferences; as well as physical and social needs, such as food, shopping, travel, and lodging.

Evidence of this is very common in the transcript data as SALC-bot was programed to elicit casual conversation from students. The following are typical examples of different students discussing their interests and preferences, and exchanging personal information (each example has been excerpted from a different conversation):

User: in my case,i love summer.

User: I have old brother

User: I like basketball too! I belonged the club when I was high school student.

User: I'm listening to music.

User: I want to eat something.

User: I wanna talk about going abroad.

User: I'm about to work on my assignment now.

- **Guideline: Ask a variety of questions** when necessary to obtain simple information to satisfy basic needs, such as directions, prices, and services.

While the transcript data doesn't directly show the questions asked to satisfy basic needs, the vast majority of conversations include simple questions of a personal nature. Questions asked by the users are typified by the following examples (each

example has been excerpted from a different conversation):

User: Are you boy or girl?

User: what did you have for your lunch?

User: anyway, what did you do yesterday?

User: have you ever been to the UK?

User: Which character in STAR WARS do you like?

User: What kind of sports do you like?

- **Guideline: Express personal meaning by creating with the language**, in part by combining and recombining known elements and conversational input to produce responses typically consisting of short statements and discrete sentences and strings of sentences.

Due the nature of text chat, interaction typically consists of short sentences and this type of interaction is present throughout the transcripts. As is not possible to know what specific “known elements” that a given user begins the conversation with, it would be very difficult to show the “combining and recombining of known elements” in the user’s input. Still, the transcript data shows some possible evidence that this might be occurring when SALC-bot uses relatively low frequency words like “puzzled” or “mood” and the user echoes this language appropriately:

SALC-bot: If I had feelings, I would be puzzled now.

User: Now i am puzzled too

SALC-bot: That depends on my mood.

User: you are so moody

- **Guideline: Narrate and describe** in all major time frames using connected

discourse.

Of all of the ACTFL guidelines, narration and description was found the least in the transcript data. This could be due to the “chatty” nature of conversations with chatbots. Chatbots parse individual sentences for keywords and are not readily capable of building upon previous remarks, so connected discourse on a single topic also remains sparse in the data. SALC-bot is able to sustain conversations on a limited number of topics, however. The following is one of the few examples of connected description from an individual user:

SALC-bot: Are you interested in cars?

User: no!

SALC-bot: It's just a mode of transport to you. Do you have one?

User: no, i don't have much money

SALC-bot: Are you planning to buy one?

User: no. I always use train

SALC-bot: That's not so unusual these days, what's your main reason?

User: I can't drive car, and my house is close to station

SALC-bot: To each his own.

User: that's right

Discussion & Conclusions

This exploratory study has demonstrated that chatbots can be used for meaningful language practice and that students who voluntarily used a chatbot exhibited a level of discourse in line with the ACTFL intermediate level proficiency guidelines.

Coniam (2008) asserts that “chatbots work best when the language input to them

consists of one-clause sentences, where the proposition is straightforward, and the topic is an everyday one” and he clearly sees these technical requirements as shortcomings. However, conversing with ease, asking basic questions, and exchanging personal information about everyday life is how ACTFL defines the intermediate proficiency language student. As the above examples illustrate, conversational agents can provide intermediate language students with the opportunities to practice the discourse functions they need at this stage of their language learning.

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