
Designing a Conversational Agent for Pragmatics Learning

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ABSTRACT

There is a well-known gap between passing language tests and putting language to use in real-life situations. Pragmatic competence, the ability to use language appropriately in context, is often neglected for language learning. This poses a challenge for students who study in overseas countries to communicate properly. In this paper, we describe a user-centred project that facilitates the design of a conversational agent which is specifically aimed at improving pragmatic skills. Based on comprehensive user studies, we concluded 5 design implications and tested via prototyping. The preliminary results showed that chatbots may be useful for practising pragmatic competence and boosting conversational confidence.

KEYWORDS

CALL; pragmatics learning; user-centred design; conversational agent; chatbot

INTRODUCTION

There is a well-known gap between passing language proficiency tests and putting language to use in real-life situations. For students who study in overseas countries for the first time, even though they met language requirements, many still struggle to communicate with others. Chinese students, in particular, often suffered from poor communication skills [14]. Many of them lack pragmatic competence, i.e., the ability to use language appropriately in daily contexts [10].

The underlying reason for pragmatic incompetence is complicated. English education in China is exam-driven. Teachers and students are not well-motivated to practice communication skills [6].

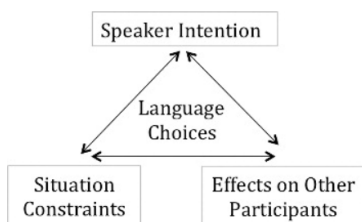


Figure 1: Pragmatics is affected by the speaker’s intention (what they want to communicate and why), the constraints of the situation (where and in which culture they are communicating) and the other interlocutor (common ground).

The conventional expression for making an order in Chinese	你好! 我想要一个这个, 这个, 还有这个。
Direct translation	Hello! I want this, this and this.
The conventional expression for making an order in English	Could I please have X, Y, and Z?

Figure 2: An example of pragmatic failure. A polite sentence in Chinese can be regarded as impolite if translated to English directly.

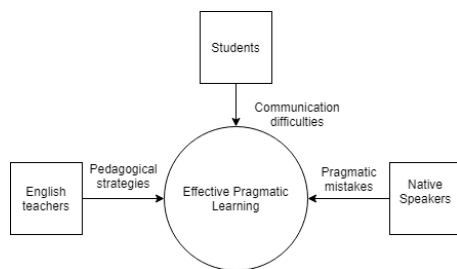


Figure 3: Stakeholders involved in the design process.

Students rarely have the opportunity to use English outside the classroom [13]. Thus, when they come to English-speaking countries, many of them may lack real-world communication experience.

Over the years, information technologies have been widely applied to aid language learning (i.e., Computer-Aided Language Learning, CALL), including vocabulary, grammar and simple conversations. We believe that technologies can also be used to improve learner’s pragmatic skills, i.e., to help learners to use language appropriately across different social contexts.

In this paper, we describe a user-centred project that facilitates the design of a conversational agent as a learning tool for improving pragmatic skills. We prototyped the artefact to support a scenario reported by Chinese overseas students is particularly problematic, i.e., restaurant visits. We discuss the design process of a chatbot system to address the problem of pragmatic incompetence which go beyond simple conversations, and we provide a preliminary evaluation of our system. Our work underlines the importance of design and user research when designing conversational user interfaces, in particular in applications where how something is said is just as important as what is said.

RELATED WORK

Pragmatic competence and failure among Chinese overseas students

Pragmatics refers to the study of how language is used and interpreted in context. Pragmatic competence is one aspect of communicative competence [4]. Aspects of pragmatic competence include the speaker’s intention, awareness of relevant socio-cultural constraints, and knowing the effect of language use on others (Figure 1). Pragmatic failure refers to errors that cause by the unawareness of constraints and the consequence of language acts. Figure 2 illustrates a typical pragmatic failure for ordering food.

Studies have shown that Chinese English learners are often unaware of socio-cultural norms and the implications of language use. In a study of the pragmatic competence of 68 students, [7] found that on average, respondents answered one-third of the questions incorrectly. Chinese students may also be poor at using the correct words to express speech acts [8]. This poses a serious challenge for Chinese overseas students, as they may find it difficult to express themselves in public spaces or in social activities [3].

Learning for pragmatics

Acquiring pragmatic competence is hard. One common approach is to learn pragmatic knowledge through extensive exposure. This implicit learning approach has shown to be time-consuming and ineffective compared to explicit learning [9]. For Chinese students, finding the right person with whom to practice pragmatic skills is also difficult. Textbooks only cover limited interaction patterns, and peers are often not capable of detecting pragmatic errors [13].

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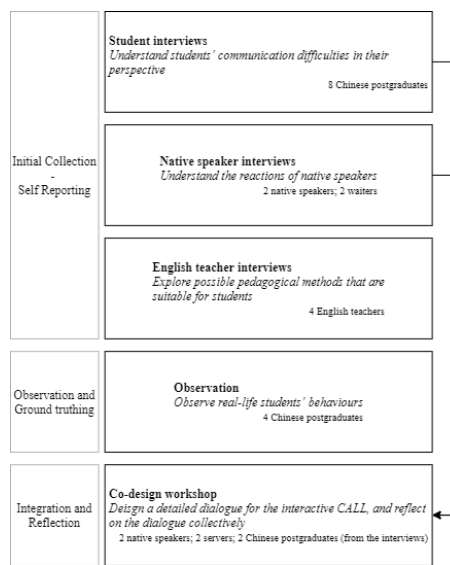


Figure 4: The 3-step study and the design process for the pragmatics learning chat-bot.

CALL applications for communicative learning

There are many CALL technologies to assist individual learning. The most common ones are mobile phone apps such as Duolingo or Memrise. They ask learners to repeat words and sentences so that learners memorise language patterns. There are also applications that focus on communication. The basis of these applications is to provide communication opportunities. Recently, chatbots have gained popularity to assist learners in being communicative [5]. Open-domain chatbots such as “CLIVE” [15] allows learners to interact verbally with a human-like agent to talk about their daily routines. Troussas et al. [12] integrate chatbots into mobile apps to help learners to practice new words in conversation. Tegos et al. [11] treat chatbots as a facilitator for peer learning, where the chatbot is the topic initiator. Chatbots are well suited for practising naturalistic conversations due to their interactivity. However, few studies have explored the design of chatbots as a tool for explicit pragmatics learning. We believe that chatbots can be used to help learners to boost their pragmatic skills.

USER STUDY

To achieve this, we conducted a multi-stakeholder study (Figure 3). The aims were to identify a social context where Chinese students commonly make pragmatic errors, and a suitable pedagogical method for teaching pragmatic skills in the form of chatbots. The study consisted of 3 stages (Figure 4). The first step is a semi-structured interview of 3 groups, Chinese overseas students, native English speakers and English teachers. Chinese students were asked to reflect on their communication behaviour and identify communicative difficulties; native speakers were asked to identify possible pragmatic errors that Chinese students might not be aware of; and English teachers were invited to discuss the cause of pragmatic failures and strategies for learning pragmatics. The second step was an observational study where we observed Chinese students’ communication behaviours in the context identified in the first step, restaurant food ordering. The purpose was to collect pragmatic mistakes that they made in real-world settings. The third step was a co-design workshop (Figure 8) which was used to reflect pragmatic errors and to design dialogue flows for the pragmatic learning chatbot. The recruitment details are listed in Table 1.

FINDINGS

Communication is difficult in unfamiliar circumstances

Many new students reported that they were not used to real-world communications as there are lots of variations. One student reported that she did not know how to react when she paid at the counter and the cashier asked her if she wanted a “cash back”. “This never appeared in the textbook.” While established students said they are confident about daily communications, some admitted to struggling under unfamiliar contexts. One student worried about medical emergencies. Both groups mentioned

Table 1: Recruitment details of the 3-step user study

Step	Recruitment
1	Chinese oversea students: 4 lived in the UK >2 years (Established students) 4 lived in the UK <3 months (New students) CEFR at or above B2
	Native speakers: 2 Native English speakers 2 Waiters worked in family restaurants
	English teachers: All have >1 year experience in English education
2	New students From the previous interview
3	2 Native speakers 2 Waiters 2 Chinese students From the previous interview

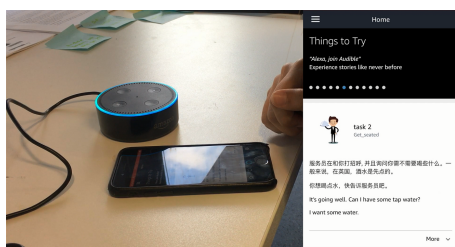


Figure 5: The illustration of the prototype. Firstly, the speaker will produce an utterance for the student to response. At the same time, the app will give a specific intention (i.e. task) for the student to complete. After the student speaks to the voice interface, the speaker will generate a response and then move to the next state of the conversation.

concerns regards to restaurant visits. New students worried about understanding menus. They were reluctant to ask the waiter questions, as they thought they would cause trouble. Established students said that they were afraid of answering waiters' follow-up questions, such as "How shall we cook it?", because they were unfamiliar with conventions.

Behaving "politely" is difficult

New students reported that they did not know the way to express things politely. One student said that she always felt embarrassed when she said "No" to refuse shop assistants for help. While established students are more familiar with this, one said she felt it is hard to express her anger in a polite way in situations where she was dissatisfied with the restaurant's service. One of the native speakers was surprised that when he asked Chinese students "How's your day?" as a simple greeting, Chinese students interpreted it literally. The waiters interviewed often found some Chinese people were "in a hurry", as they try to grab waiters' attention, e.g. raising their hands and repetitively saying "Hello". While these small breaches of etiquette made waiters uncomfortable, they understood that may because of socio-cultural differences and tried their best to be friendly.

In the co-design workshop, we discovered three sources of pragmatic mistakes. The first one was not knowing what to do. Before the workshop, Chinese students did not know that they are allowed to negotiate with waiters about customising dishes. The second type was not knowing what to say. Chinese students struggled to find the correct words to express their intentions. The third one was not knowing situational norms, as Chinese students were not aware that raising their hand to get a waiter's attention was impolite.

Learning pragmatic knowledge is hard, but achievable

Both new and established students reported that they rarely have English conversations before coming to the UK. Many said that their main motivation to practice speaking was to pass language tests. Their main source of "communication" was to read aloud or recite textbooks. For new students, they weren't even aware of pragmatic errors. For established students, most of them were aware of pragmatic mistakes, but they sometimes found it hard to identify the appropriate alternative expression. Some may ask native speakers directly about it, others were more reluctant to do so.

English teachers saw pragmatic knowledge as "tacit knowledge", therefore it was important to practice it explicitly. However, they argued that it was not practical to teach pragmatic knowledge in class. One teacher pointed out that conversations between peers cannot reflect the sociocultural contexts and negotiations between interlocutors. Teachers doubted that an open-ended chatbot would be helpful as the user might be unaware of pragmatic errors. To learn pragmatics effectively, teachers suggested using authentic conversations, as they are flexible and capture dialogue dynamics. Many of them would use the task-based learning approach to instruct learners, i.e., to break the conversation

Chatbot: Are you ready to order?

User: Yes, so what do you like on the menu?

Chatbot: I would say the best one is our warrior burger. It has BBQ beef brisket, smoky cheese and salad on the top.

Chatbot: Is there anything else aside from burgers?

Chatbot: Yes, our steak is also very popular, would you like to try it?

User: That sounds good.

Chatbot: How would you like your steak?

User: I'd like it medium rare.

Sidebar 1: A sample conversation where a student wants to make an order. Student utterances are transcribed as originally spoken.



task 4
During meal

服务员在问他上的菜是不是符合和你的口味，并且问你需不需要任何其他的帮助。

你觉得有点渴，想要点水，快告诉服务员你的需求吧。

Can I have some more water?

I want some more water, please?

More ▾

Figure 6: The instruction materials displayed on the app. They include: situational information (1st sentence) (The server usually checks if you need any help at the middle of your meal), an assigned task (2nd sentence) (You want some water), and a pair of pragmatically correct and incorrect responses as hints.

down into small pragmatic goals and encourage learners to reach these goals during conversations, and provide hints when necessary. This approach lets the learner engage with a piece of pragmatic knowledge and practice it in a targeted way.

DESIGN IMPLICATIONS

We derived the following design implications for the chatbot. **Use authentic materials for the conversation flow.** Both groups of students admitted that conversations may “go wrong” if they encounter unfamiliar scenarios, as variations of real-world conversations go far beyond textbooks. Teachers also suggested using authentic materials to practice communicative skills.

Having unexpectedness. Chatbots should capture variations in conversations. Since students found it difficult to handle “follow-up” questions, chatbots may want to capture this kind of unexpectedness.

Provide situational information in addition to the dialogue. Intent and meaning is often tied to the situational context. From the interviews and the workshop, we learned that students might not know what to do or might not know what they can do. Like being impolite in restaurants, they might also not aware of social constraints.

Micro-tasks with hints. Open-ended conversations might not be effective for pragmatics learning because mistakes are often made implicitly. As advised by teachers, we used task-based learning to break down conversations into sub-tasks and address specific pragmatic errors. In addition, hints should be provided to prevent learners from getting stuck.

Real-time speech interaction. Since many students lack communicative experiences other than reading aloud or reciting textbooks, chatbots with real-time features may help students to gain real-world conversational experience.

Prototyping and evaluation

Based on the implications, we built our prototype on the Amazon Alexa platform. The system has a voice interface that allows real-time interactions and a graphical interface for displaying instructional materials which in sync with the voice. Instructions typically contain an assigned intention (task) for the learner to express, the situational information (e.g., description of the context, sociocultural norms), and its hints. The system uses the material collected from the observational study and the co-design workshop, including scenarios like booking appointments, making an order, finishing up the meal, etc. The dialogue flow is modelled by a non-deterministic finite state machine to simulate unexpectedness such as follow-up questions. Figure 5 illustrates the interactivity of the prototype. Figure 6 illustrates a sample instruction. Figure 7 illustrates a section of the dialogue flow.

We invited 8 students who did not enrol previously to participate in the evaluation, all with English proficiency B2 or above. The evaluation consists of filling out the System Usability Scale (SUS, [2]) and

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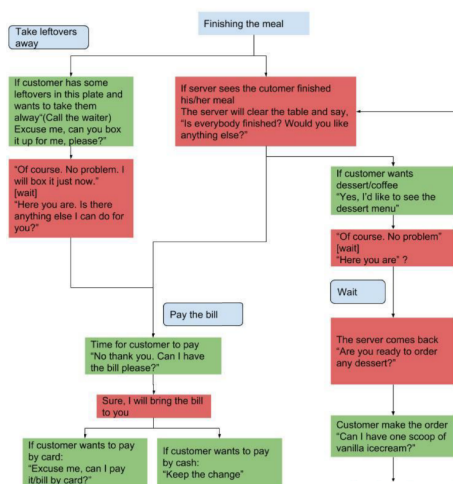


Figure 7: A section of the indeterminate finite state machine. The system pick branches non-deterministically so the learner may run into unexpected situations.

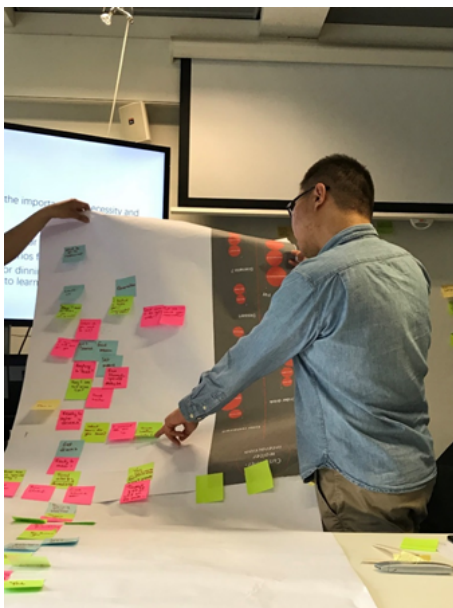


Figure 8: Workshop reflections. Post-it notes highlighted different micro-tasks.

a short interview. The system was rated usable (mean SUS: 71.9, [1]). All students reported that they have learned something through the interaction. This includes awareness of using polite expressions to order food, customising cuisines, and using eye-contact to get waiters' attention. Overall, they stated that the system has boosted their confidence for future restaurant visits.

CONCLUSION

In this paper, we argued that chatbots are promising tools for teaching pragmatic competence. However, this requires the appropriate design of the interactions, featuring explicit task-based learning, and focusing on aspects that present particular difficulties for students from a specific culture, and contexts that are relevant to students' real-life experience.

REFERENCES

- [1] Aaron Bangor, Philip T. Kortum, and James T. Miller. 2008. An Empirical Evaluation of the System Usability Scale. *International Journal of Human-Computer Interaction* 24, 6 (July 2008), 574–594. <https://doi.org/10.1080/10447310802205776> Publisher: Taylor & Francis.
- [2] John Brooke. 1996. SUS: A Quick and Dirty Usability Scale. In *Usability Evaluation in Industry*, P.W. Jordan, B. Thomas, B.A. Weerdmeester, and I.L. McClelland (Eds.). Taylor and Francis, London, UK.
- [3] Yuerong Ching, Susan Renes, Samantha McMurrow, Joni Simpson, and Anthony Strange. 2017. Challenges Facing Chinese International Students Studying in the United States. *Educational Research and Reviews* 12, 8 (April 2017), 473–482.
- [4] David Crystal. 1997. *English as a global language*. Cambridge university press, Cambridge.
- [5] Irina Dokukina and Julia Gumanova. 2020. The Rise of Chatbots – New Personal Assistants in Foreign Language Learning. *Procedia Computer Science* 169 (Jan. 2020), 542–546. <https://doi.org/10.1016/j.procs.2020.02.212>
- [6] Xiaoqing Liao. 2004. The Need for Communicative Language Teaching in China. *ELT Journal* 58, 3 (July 2004), 270–273.
- [7] Zheng Lihui and Huang Jianbin. 2010. A Study of Chinese EFL Learners' Pragmatic Failure and the Implications for College English Teaching. *Polyglossia* 18 (2010), 14.
- [8] Yan Qiao. 2014. A Case Study of Pragmatic Failures Committed by Undergraduates. In *Proceedings of the International Conference on Education, Language, Art and Intercultural Communication*. Atlantis Press, Zhengzhou, Henan, China, 403–407.
- [9] Kenneth R. Rose. 2005. On the effects of instruction in second language pragmatics. *System* 33, 3 (Sept. 2005), 385–399.
- [10] Naoko Taguchi. 2009. *Pragmatic competence in Japanese as a second foreign language*. Mouton de Gruyter, New York.
- [11] S. Tegos, S. Demetriadis, and T. Tsiatsos. 2012. Using a Conversational Agent for Promoting Collaborative Language Learning. In *2012 Fourth International Conference on Intelligent Networking and Collaborative Systems*. 162–165.
- [12] C. Troussas, A. Krouska, and M. Virvou. 2017. Integrating an Adjusted Conversational Agent into a Mobile-Assisted Language Learning Application. In *2017 IEEE 29th International Conference on Tools with Artificial Intelligence (ICTAI)*. 1153–1157.
- [13] Rining Wei and Jinzhi Su. 2012. The statistics of English in China. *English Today* 28, 03 (Sept. 2012), 10–14.
- [14] Jian Yang. 2006. Learners and users of English in China. *English Today* 22, 2 (April 2006), 3–10.
- [15] John Zakos and Liesl Capper. 2008. CLIVE – An Artificially Intelligent Chat Robot for Conversational Language Practice. In *Artificial Intelligence: Theories, Models and Applications (Lecture Notes in Computer Science)*, John Darzentas, George A. Vouros, Spyros Vosinakis, and Argyris Arnellos (Eds.). Springer, Berlin, Heidelberg, 437–442.