Can Conversational Agents Foster Learners' Willingness To Communicate in a Second Language? : Effects of Communication Strategies and Affective Backchannels

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Abstract: Willingness to communicate (WTC) in a second language (L2) is believed to have a direct and sustained influence on learners' actual usage frequency of the targeted language. To help overcome the lack of suitable environments to increase L2 learners' WTC, our approach is to build conversational agents that can help L2 learners overcome their apprehension towards communication in L2. In this paper, we focus on the dialogue management aspects of our approach and propose a model based on set of communication strategies (CS) and affective backchannels (AB) in order to foster agents' ability to carry on natural and WTC friendly conversations with L2 learners. An evaluation of the proposed method led to two main findings. First, combining CS and AB empowers the conversational agent, making possible highly significant WTC gains among L2 learners in English as a foreign language context. Secondly, even a single implementation of AB proved to have the potential to enhance L2 learners' WTC to some extent.

Keywords: Willingness to communicate in L2, conversational agents, communication strategies, affective backchannels, intelligent tutoring

1. Introduction

One of the fundamental goals of second language (L2) learning is to provide learners with the ability to communicate effectively using their L2 when given the opportunity to do so. The key factor to ensure such communicative readiness is the willingness to communicate (WTC) defined as the "readiness to enter into discourse at a particular time with a specific person or persons, using an L2" (MacIntyre, et al., 1998). Following the finding that learners with a higher WTC tend to perform better than others in producing the target language, MacIntyre and his colleagues suggested that increasing learners' WTC should be the ultimate goal of L2 learning. Moreover, they proposed a pyramidal heuristic model of variables affecting WTC in which it appears that the environment where learners experience or practice the L2 plies an important role in motivating them to actively take part or not in L2 conversation. However, as pointed by Reinders and Wattana (2014), many learners feel a genuine anxiety about performing in front of others, and many classrooms do not, as a result, offer learners much in the way of communicative practice as would be desirable.

The ultimate goal of this study is to contribute in enhancing L2 learners' WTC by providing them opportunities to freely simulate and enjoy immersive daily conversations using a computer-based conversational environment. However, L2 communication is also problematic because it involves learners' ability to communicate within restrictions on their own vocabulary, grammar, etc. Thus, unlike communication between L1 learners, breakdowns or pitfalls in communication occur more often here. Therefore, any conversational agent intended to support communication in L2 should adopt some strategies adapted to such interactions.

In this paper, we propose and evaluate a dialogue management model, based on a set of specific conversational strategies, namely Communication Strategies (CS) and Affective Backchannels (AB), in order to foster dialogue agents' ability to carry on WTC effective conversations with learners in English as a Foreign Language (EFL) context.

2. Related Works

Some L2 learners despite excellent linguistic competence tend to avoid using L2 for communication where as some others with only minimal linguistic competence seem to communicate in the L2 whenever possible. MacIntyre et al., explained such differences arguing that the intention or willingness to engage in L2 communication, rather than linguistic competence, is determined by a combination of immediate precursors such as learners' perception of their own second language proficiency (perceived competence), the opportunity to use the language (context), and a lack of apprehension about speaking (L2 anxiety). Following these findings, many researchers from different countries, such as Yashima in Japan (Yashima, 2002), Peng in China (Peng, 2007), or Oz in Turkey (Oz et al., 2015) have intensively investigated the validity of the WTC model in their own respective contexts. Although some differences, mainly due to each country's cultural and social specificities, may exist, it's generally admitted that the variables identified by MacIntyre and his colleagues can be seen as a basic and universal reference model of key factors influencing WTC in L2. Furthermore, WTC studies have shown that learners displaying high WTC are more likely to show more improvement in their communication skills (Yashima et al., 2004) and to acquire higher levels of language fluency (Derwing et al., 2008).

However, it is interesting that even though research investigating computer-mediated communication in the context of second language acquisition (SLA) has proliferated since more than two decades now, only few of them have actually investigated or proposed practical ways to enhance L2 learners' WTC. Compton (2004), for example, revealed that chatting helped students to feel confident and consequently, willing to participate orally in class discussions. However, its impact on WTC varied from learner to learner and was dependent on a number of factors, particularly the topics of discussion and the attitudes of their partners. Nakaya and Murota (2013) developed a mobile conversation learning system, which aimed to motivate Japanese EFL learners. In their system, conversation topics were based on learners' life logs or related to situations that learners often experience in their daily life. Still, the "conversations" were mainly system-driven so that learners were just limited to answer questions generated without any possibility for them to get help from the system when they face difficulty in answering some questions. But difficulties and breakdowns do occur in L2 conversation. In our previous work, we proposed an embodied conversational agent based on MacIntyre's WTC model to help increase L2 learners' WTC by providing learners with opportunities to naturally simulate daily conversations in various social contexts (Ayedoun et al., 2016). Our evaluation of the system demonstrated its potential to simulate efficiently natural conversations in a specific context as well as the feasibility of improving learners' WTC using such a computer-based environment. Nevertheless, conversation opportunities alone are not enough to effectively motivate learners towards communication in L2. That is why we mentioned that a good level of conversation smoothness, to be achieved by implementing strategies to keep the conversation going on especially when learners face some difficulties, are desirable since they contribute to creating a friendly conversational environment and reduce learner's anxiety.

As pointed out by Mesgarshahr and Abdollahzadeh (2014), language learners, especially at lower levels, are highly likely to experience some difficulty when communicating in the target language. They added that too much difficulty during communication might make them abort their attempt to carry on and, consequently result in dissipating the desire to communicate. Thus, being able to help learners overcome difficulties when communicating in L2 can be considered as an essential ability for any conversational agent intending to increase WTC among L2 learners. Communicative strategies known as CS are defined as "a systematic technique employed by a speaker to express his [or her] meaning when faced with some difficulty". For example, *approximation* is a CS which consists in using a term that expresses the meaning of the target lexical item as closely as possible (e.g. "the thing you open bottles with" for "corkscrew"). CS have been an object of intense research in the area of SLA, Dörnyei and Thurrell (1991) referring to this ability as strategic competence. Strategic competence is considered by Canale and Swain (1980) as one component of communicative competence. It is conceivable that an underdevelopment of this competence may account for some L2 learners' lack of the ability to overcome interactional pitfalls, which may adversely affect their WTC.

As indicated by Mesgarshahr and Abdollahzadeh, in the case of learners with a low WTC, achievement of communicative competence does not automatically guarantee L2 usage. This is because L2 WTC is also directly affected by affective variables such as anxiety or self-confidence, which

contribute to determine the psychological preparedness to communicate at a particular moment. It might therefore also be necessary for the dialogue partner (for instance the conversational agent) to provide frequent dialogue feedbacks, also known as backchannels, which reassure the learner and makes him willing to pursue the interaction. Previous works by Kopp et al., (2007) as well as Morency et al., (2010) have amply demonstrated the importance of such backchannels in human-agent conversation but here, we are interested in a specific category of backchannels that we call "affective backchannels" (AB). We believe that they might provide an effective support to WTC affective variables in a computer- mediated interaction with L2 learners.

3. Conversational Strategies to Increase WTC

3.1 Contribution and Novelty

When it comes to propose practical ways to make learners more willing to communicate in L2, most of the significant contributions have been conducted in the fields of communication studies or language learning studies. In the fields of computer assisted language learning (CALL) and artificial intelligence in Education (AIED), the topic seems to be a conspicuous rarity in the literature since traditional spoken dialogue frameworks seem to not particularly take into consideration aspects related to L2 learners' WTC. Besides, among the few research studies dedicated to propose a computer-based approach to increase levels of L2 WTC, less effort has been expended on investigating usage of virtual realistic interfaces such as embodied conversational agents, which yet seem to have the potential to be an efficient alternative to real interactions. Following our previous work (Ayedoun et al., 2016) in which we showed that a dialogue agent based conversational environment might be useful to increase L2 learners' WTC, we propose a dialogue management model dedicated to facilitate the implementation of intelligent conversational agents that are effective in increasing L2 learners' WTC. The originality of our approach lies in the fact that the proposed model takes into consideration both aspects related to communicative breakdowns that occurs very often in L2 learners-agent interactions and those related to affective variables influencing L2 WTC according to MacIntyre's WTC model.

Many studies in various fields such as education and psychology have contributed to proposing several theories regarding teaching and learning processes between human teachers and learners. Although researchers such as Nass, Steuer and Tauber (1994) have amply demonstrated that the human-computer relationship is fundamentally social, the above mentioned teaching and learning theories may not be similarly applicable in agent-human learning situations, for the simple reason that it is still not clear whether all learners react similarly to computer agents, as they would do with human partners. Thus, through this research, we aim not only to contribute to enhancing L2 learners with a computer agent based system but also whereby to collect quantitative and qualitative data about the relationship between conversational agents and L2 learners, which might be useful to propose a generic model of the characteristics of such interactions (long term goal).

3.2 Proposed Dialogue Management Model

The model aims first, by the way of Communication Strategies (CS) to foster the dialogue agent's ability to autonomously detect and robustly handle recognition errors as well as learners' pitfalls in L2 communication, making possible achievement of more or less smooth interaction between L2 learners and dialogue agent. Secondly, by the way of Affective Backchannels (AB), this model aims to make possible achievement of a warm interaction where learners feel less anxious about L2 communication and progressively get confidence about their own linguistic proficiency.

Communication Strategies (CS): CS are "a systematic technique employed by a speaker to express his or her meaning when faced with some difficulty" (Dörnyei and Scott, 1997). These difficulties might arise either from the speaker (lack of linguistic resources) or from the interlocutor (impossibility to understand the speaker). It is worthwhile for learners to have a repertoire of such strategies at their disposal, whereby they achieve a degree of communicative effectiveness beyond their immediate linguistic means (Thornbury, 2005). Nevertheless, in the case of learners with a low WTC, mastering such strategies does not necessarily guarantee that learners will be able to use them when they face

some trouble during conversation. On contrary, the use of CS might help dialogue agents not only to overcome their own difficulties (impossibility to understand the learner…) but also and more importantly to anticipate or handle more effectively communication pitfalls (difficulty in understanding or answering) that learners may encounter during conversations. When learners know that they can rely on a supportive dialogue agent to help them recover from difficulties, they may feel a "sense of security" that can reduce their communication apprehension, leading to a higher level of WTC. In the present study, we targeted about 9 strategies among those defined in the comprehensive review of definitions and taxonomies of CS (Dörnyei and Scott, 1997). The selected strategies were chosen according to two criteria: (i) their effectiveness towards encouraging WTC and (ii) the feasibility of their implementation from the technical standpoint. Table 1 shows a non-exhaustive list of the selected strategies as well as examples of their usage in this study.

Table 1: Example of CS implemented in this study.

Strategy	Description	Example
Simplification or Approximation	Use an alternative or a shorter term, which expresses the meaning of the target lexical item.	**Agent**: May I have your order please? **Learner**: ... (*silent*) **Agent**: Order please
Code switching	Use a L1 word with L1 pronunciation or a L3 word with L3 pronunciation in L2.	**Agent**: May I have your order please? **Learner**: ... (*silent*) **Agent**: Go chūmon wa ikagadesu ka? (Code switching from English to Japanese)
Ask clarification	Request explanation of an unfamiliar meaning structure.	**Learner**: One xxx please. **Agent**: What do you mean?
Suggest AP (Answer Pattern)	Provide an example of answer that could fit the current discourse context	**Agent**: What would you like to drink? **Learner**: ... **Agent**: For example, you may say one beer please to order a beer.

Affective Backchannels (AB): Backchannels are generally defined as a type of short utterances or feedbacks such as *uh-huh*, *yeah...* given by the listener to show interest, attention or a willingness to keep the communication channel open. They play an important role in human agent conversation [Smith 11]. Although actual competence might encourage communication, it is the perception of that competence that will ultimately determine the choice of whether to communicate or not (Clément, Baker and MacIntyre, 2003). Thus, L2 learners who don't get enough supportive feedbacks from their interlocutors may perceived themselves as being incompetent communicators and therefore tend to be reticent to communication. All this gives much evidence that it might be effective for a conversational agent intending to enhance learners' WTC, to be able to convey a sufficient amount of interest or sympathy to learners during the interaction since doing so might contribute to creating a WTC friendly atmosphere. In order to achieve such empathetic support, we identified and defined a set of backchannels that we call Affective Backchannels (AB). Table 2 shows the different categories of AB that we defined in order to cover a wide range of situations the learner may experience during the interaction.

Table 2: Implemented AB in this study.

Strategy	Description	Example
Congratulatory AB	Employed when the conversation with the learner is going well as expected	Okay, that's nice!
Encouraging AB	Employed when the learner seems to hesitate to the extent that he/she remains silent.	Come on, you can do it!
Sympathetic AB	Employed when the learner's utterance does not match the agent expectations.	Sorry I couldn't get you…
Reassuring AB	Employed when the learner seems to face much difficulties in the conversation.	Don't worry…

4. Conversational Strategies Enhanced Dialogue Management

The core architecture of our conversational agent was developed in our previous work (Ayedoun et al., 2016) and is composed of two main components (the dialogue manager and the multimodal response generator) connected to several external web-services and resources as shown in figure 1(top). The overall conversational flow is under the supervision of the dialogue manager, which controls the various phases of dialogue and their timing, as well as the level of system initiative, in an integrated fashion. As described in figure 1 (bottom), the dialogue strategies management routine goes from *Start* to *End* (top to bottom of the figure) passing through checking of the different possible dialogues states represented in the diamond symbols. The occurrence of each of such dialogue states automatically leads to triggering of adapted conversational strategies (as indicated in square symbols) that are pull out from their respective databases (as indicated by dotted lines) in order to keep the learner motivated using AB (represented in pink color database symbols), and try to move the dialogue forward using CS (represented in blue color database symbols). The decision to engage a specific conversational strategy is mainly based on the following triggering events or dialogue states:
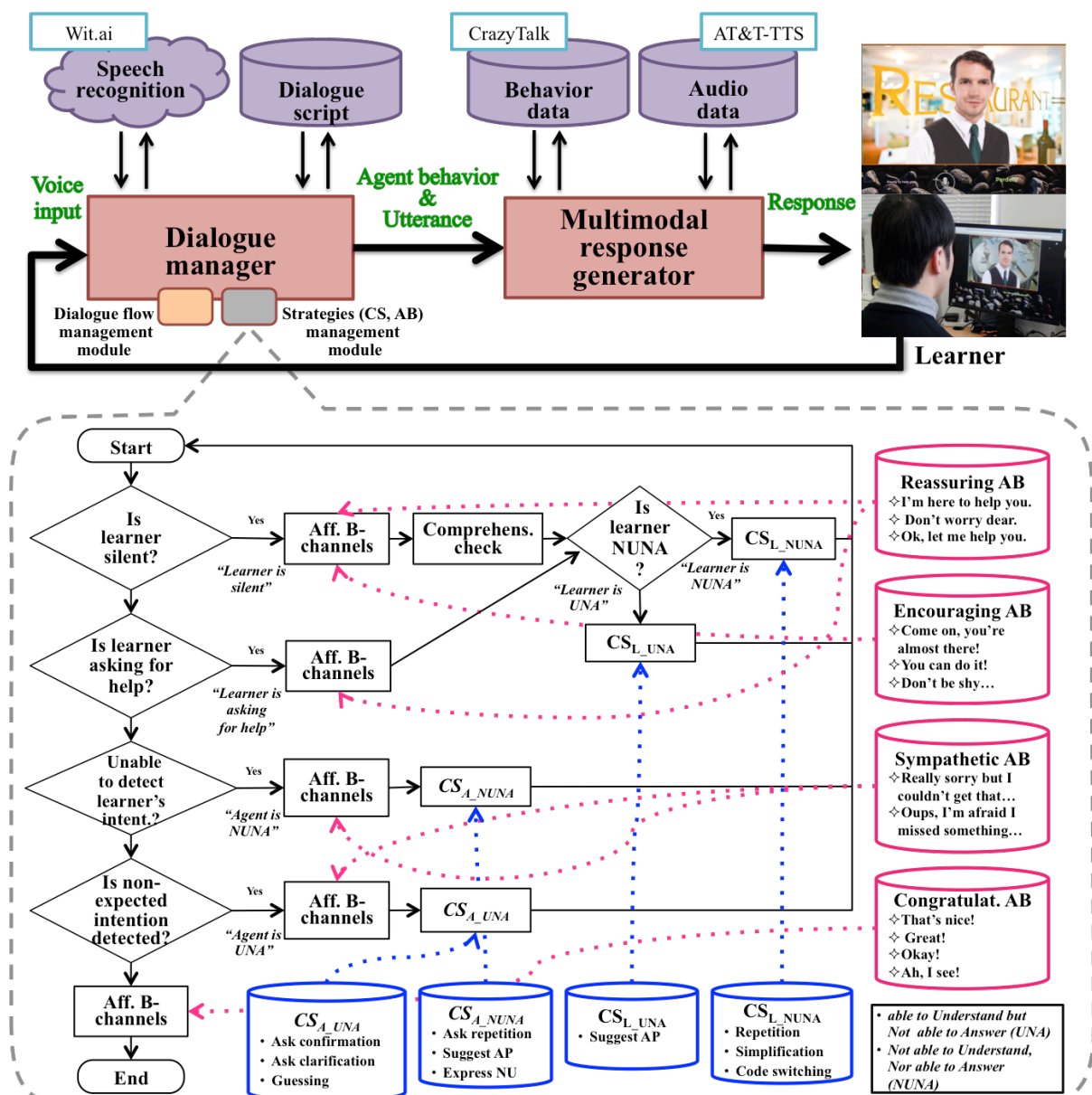

Figure 1. System architecture showing interface (top), Dialogue management model based on AB and CS (bottom)

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The learner is silent: when the system is expecting some input from the learner but cannot get any after a certain amount of time is elapsed. In such case, the system will first apply a *Reassuring* or *Encouraging* AB and then investigates the reason why the learner remains silent by asking appropriate questions.

The learner is NUNA (Not able to Understand, Nor to Answer): when the learner is not able to understand what the agent is expecting from him. In such case, the system will fire up specific CS such as *Simplification* in order to let the learner understand and hopefully utter the expected information.

The learner is UNA (able to Understand but Not able to Answer): when the learner understands what is being requested from him but can't or don't know how to answer. In this case, CS such as *Suggest an Answer Pattern* will be applied in order to give the learner a hint about how to overcome his current difficulty.

The learner is asking for help: when the learner expresses that he is *NUNA*, *UNA* or specifically requests a CS such as repetition or simplification. In this case, the system will fire up a *Reassuring* AB and then apply appropriate CS according to the nature of the help requested by the learner.

The agent is NUNA: when the system is unable to detect the learner's intention due to a very low confidence score or the occurrence of a recognition error in the processing of the learner's utterance. In this case, the system will first output a *Sympathetic AB* and then try to recover by applying CS such as *Ask repetition* in order to give the learner another chance to express his intention.

The agent is UNA: when the system is able to detect the learner's intention with an acceptable confidence rate but is not expecting such intention in the current dialogue context (for example, the learner asking for the nearest supermarket while the agent is expecting him to make an order in a restaurant context). In this case, the agent will first apply a *Sympathetic* AB and then try to get the learner reformulate his intention by using CS such as *Ask confirmation* in order to make sure that what the system understood from the learner's utterance is actually what the latter actually meant.

We expect that the modular and domain independent nature of the proposed dialogue management model will not only facilitate its reusability across different dialogues domains, but will also make easier the development of conversational spoken languages interfaces that are more adapted to L2 learners from the WTC standpoint.

Figure 2 shows an excerpt of conversation between a learner and the agent depicting how AB (in pink) and CS (in blue) are called into action according to the different dialogue states (in gray). As shown, the successive interventions of the system are successful in gradually help the learner overcome his initial breakdown following the question "*Would you prefer smoking or non smoking table?*" As illustrated, it is the successful detection of the occurring pitfalls combined with the help provided by the agent through usage of appropriate AB and CS that ultimately led to the conceivable answer "*Non-smoking please*" from the learner. Without the use of such strategies, the conversation would have probably ended up just after the agent's first question since the learner seemed to be unable to go further into the interaction. It is this kind of support that our dialogue agent aims to provide to L2 learners through usage of AB and CS.

Agent: Good evening. Do you have a reservation?
Learner: No.
  Agent: Ah, I see! *[AB: Congratulatory]*
          Would you prefer smoking or non
                smoking table?
Learner: ... *("Learner is silent")*
  Agent: Come on, don't give up! *[AB:Encouraging]*
          Do you understand? *[Comprehension check]*
Learner: No . *("Learner is NUNA")*
  Agent: Which area do you prefer.
              [CS$_{L\_NUNA}$: Simplification]
Learner: I don't know area. *("Learner is UNA")*
  Agent: Don't worry, I'm here to help you.
              [AB: Reassuring]
          For example, you could say: "Non-smoking
              area please!" *[CS$_{L\_UNA}$: Suggest AP]*
Learner: xxx xxx please! *("Agent is NUNA")*
  Agent: Sorry, I'm afraid I missed something.
              [AB: Sympathetic]
          Could you please repeat that?
              [CS$_{A\_NUNA}$: Ask repetition]
Learner: Non-smoking please.
  Agent: Great! *[AB: Congratulatory]*
          Please come this way…

Figure 2. Excerpt of actual dialogue between the agent and a learner illustrating use of AB and CS

5. Experimental Study

We conducted an evaluation of the proposed dialogue management model in this paper to clarify the following preoccupation: *Does the usage of CS and AB really have the potential to empower the conversational agent to the extent to foster L2 learners' WTC?*

5.1 Procedures and Materials

Conversational agent: We employed a conversational agent based on the system architecture proposed in our previous work (Ayedoun et al., 2016), and enhanced it with the management model described above. The system makes possible spoken dialogues between the conversational agent personified as Jack, on one hand and learners on the other.

Table 3: Overview of the evaluation flow.

Procedure	Group 1 (n=10)	Group 2 (n=10)	Group 3 (n=10)	Group 4 (n=10)
Procedure 1	First WTC questionnaire (Pretest)			
Procedure 2	CS+AB[1]	CS+AB[2]	CS	AB
Procedure 3	Second WTC questionnaire (Posttest)			
Procedure 4	CS	AB	CS+AB	CS+AB
Procedure 5	System preference survey			

Participants: The study was conducted with 40 Japanese undergraduate and graduate students currently attending a Japanese university. In terms of language background, participants were fairly homogenous; all of them were native Japanese speakers and none had experience of living in an English-speaking country. They were informed that their participation to the study was voluntary and the results would be anonymised.

The evaluation was conducted following 5 procedures as described in Table 3.

Procedure 1 and Procedure 3 (Measures of WTC): We employed a widely used survey developed by Matsuoka (2006) and inspired from Sick and Nagasaka's WTC test (2000) to evaluate learners' WTC before (procedure 1) and after (procedure 3) they interacted with the system in procedure 2. It is worth to mention here that we privileged such a self-report estimation of learners' WTC before and after the interactions because it is the common approach used in related works to measure L2 learners' WTC. Moreover, the literature teaches us that it is learners' perception of their own competence that will ultimately determine their choice of whether to communicate or not, so that inquiring directly learners about their WTC might actually give a good indication about their future behavior in actual communication situations. The WTC questionnaires targeted three variables: *confidence*, *anxiety* and *desire to communicate* considered as the immediate precursors of WTC (MacIntyre and Charos, 1996). In the WTC questionnaires, participants were asked to rate each of these variables in 30 scenarios (e.g., Making a telephone call in order to make a reservation at a hotel in an English speaking country) related to using English in various circumstances with a four-point Likert scale. All participants were given as much time as required to complete the questionnaires. Data were collected anonymously via an online survey service and participants were told that their answers would be kept confidential. In order to minimize order effects, we carefully designed learners' interactions with the system in each group applying the counterbalancing method proposed by Howitt and Cramer (2011).

Procedure 2 (First Interaction with Jack): All the participants were initially asked to interact with Jack, who would teach them how to pronounce some words in English. They were requested to listen and repeat the words according to Jack's instructions. In reality, our intention here was to let all the learners sympathize with Jack and understand how the system works. Then, participants were split into four groups (Group 1 to Group 4) of 10 participants each, making sure that there were not statistically significant WTC differences in the pretest results among all the four groups. Doing so ensure an homogeneity in the starting conditions, which suggests the validity of comparing WTC gains among the different groups after the interactions with the agent. Participants in each group were then asked to interact with the system, the conversation being held this time in a restaurant context with Jack interacting with them as a waiter. We prepared 3 different versions of the system: the CS+AB version (with both CS and AB implemented), the CS version (with only CS implemented) and finally the AB version (with only AB implemented). Participants interacted with a version of the system according to their group. For example, participants in Group1 interacted with the CS+AB version, those of Group 3
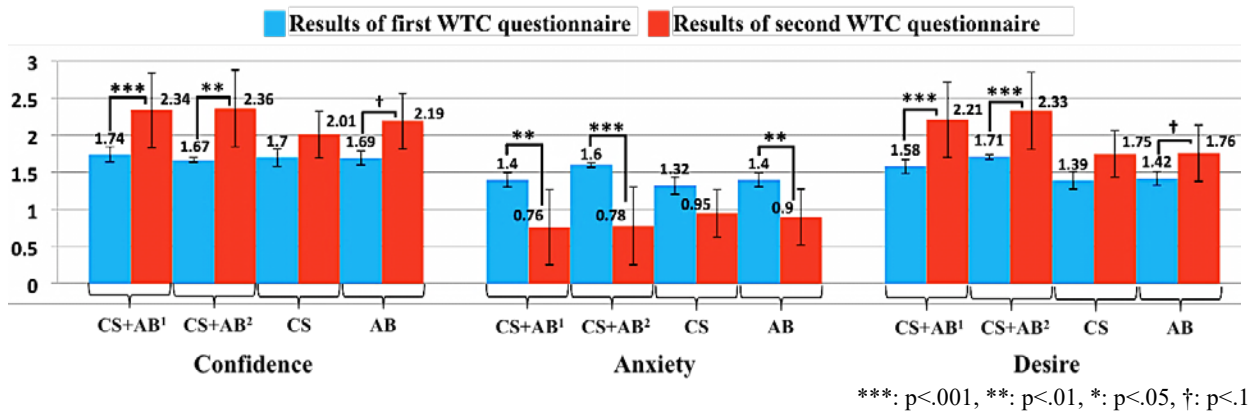
Figure 2. WTC variations among participants according to their groups
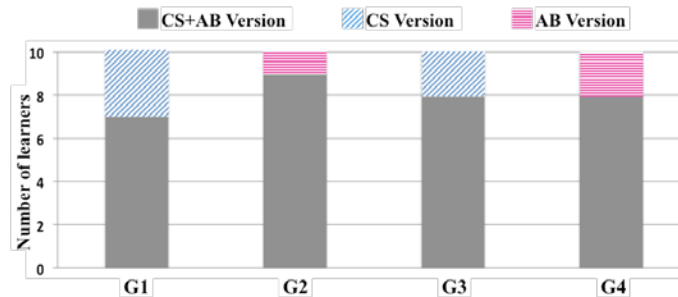
***: p<.001, **: p<.01, *: p<.05, †: p<.1

Figure 3. System preference survey results

with the CS version and so on, as indicated in Table 3. It is also important to mention that participants interacted individually with the system in a room specially prepared for the evaluation and were given as much time as they wish to enjoy the conversation with Jack until they were requested to pay the bill. They were also informed that they were free to interrupt the interaction at anytime in case they feel to do so.

Procedure 4 (Second Interaction with Jack): After taking the second WTC questionnaire (posttest) in procedure 3, participants were asked again to interact with the system in a restaurant context. As in Procedure 2, participants interacted with different versions of the system according to their groups but were not informed that the system is different from the one they used in their first interaction.

Procedure 5 (System preference survey): After procedure 4 described above, all participants were asked to choose which one of the two interactions (i.e.: which version of the system) they preferred the most as well as the reason supporting their choice. For example, participants in Group 1 had actually to choose between the CS+AB and the CS version, those of Group 2 between the CS+AB and the AB version, and so on for participants in Group 3 and Group 4.

From the WTC standpoint, we assume that the results would be viewed as positive if the interactions with the conversational agent led to improving participants' *confidence* and *desire to communicate* while reducing their *anxiety*.

5.2 Results

Figure 2 shows variations observed among participants of each group before and after interacting with the system in terms of WTC variables (confidence, anxiety, desire to communicate). These results indicate that WTC gains (increase in confidence and desire to communicate with decrease in anxiety) were observed across all groups, irrespectively of the system version (CS+AB, CS or AB). Then, we performed paired samples t-tests and measures of effect size (using Cohen's d) to evaluate how significant were the WTC gains in each group.

There were **statistically highly significant differences** between the first and the second WTC questionnaires administered to participants in Group 1 and Group 2 after they interacted with the CS+AB version. Actually, their confidence and desire to communicate increased respectively by +0.60 [$t(9)$=-8.91, $p<.001$, d=2.3] and +0.63 [$t(9)$=-5.80, $p<.001$, d =1.7] in group 1, by +0.70 [$t(9)$= -4.53, $p<.01$, d=1.6] and +0.64 [$t(9)$ = -8.05, $p<.001$, d=1.3] in group 2, while their anxiety decreased by -0.64 [$t(9)$=4.42, $p<.01$, d=1.6] in group 1 and by -0.82 [$t(9)$=6.63, $p<.001$, d=1.8] in group 2.

There were not statistically significant WTC gains among participants in Group 3.

There were **statistically significant differences** between the two WTC questionnaires among learners in Group 4 after they interacted with AB version. Actually, their confidence and desire to communicate increased respectively by +0.50 [t(9)=-2.82, p<.1, d =1.6] and +0.33 [t(9) =-2.35, p<.1, d=0.6] while their anxiety decreased by -0.58 [t(9)=3.48, p< .01, d=1.2].

Besides, the preference rate of the **CS+AB version was constantly high** across all the 4 groups being preferred by 32 participants out of 40 (80%) in total, while the CS and AB version have been preferred respectively by 5 participants out of 20 (25%) and 3 participants out of 20 (15%) as shown in figure 3. It is important to mention that this tendency has been observed across all the 4 groups no matter the order in which learners interacted with the CS+AB version. Actually, participants who preferred the CS+AB version, for example, frequently mentioned that they found natural and warm the way Jack showed some empathy throughout the interactions and appreciated the help they got from him when facing difficulties in understanding or expressing what they have got to say.

5.3 Discussion and Limitations

The results above allow us to draw a number of preliminary conclusions. Firstly, the combination of CS and AB proved to be really effective in motivating L2 learners, much more than just implementing CS or AB alone, as described above. This confirms our initial beliefs that making possible smooth and interactive conversations by using CS is not, by itself sufficient to increase effectively L2 learners' WTC, which also requires the ability to convey a sufficient amount of warmness or sympathy to learners during the interaction via AB. The proposed dialogue management model in this paper covered both of these requirements and the results obtained are meaningful in terms of validating our approach. More interestingly, the results suggest that even a single implementation of AB could be quite effective in significantly reducing learners' anxiety and contribute to increasing their WTC. This is a really interesting finding since it seems to reveal that the affective support that learners get during interactions might be the most important key factor influencing their WTC, so that a conversational agent able to provide a careful empathic support to learners might be quite beneficial for them.

Nevertheless, a possible limitation of this study is that the current version of our system is limited to conversations in only one context (restaurant context). We understand that learners' WTC, of course, do not increase overnight and a certain amount of continuous usage of the current system with the possibility for learners to converse in various contexts is certainly necessary before we can collect more reliable data to support our findings, not to mention that we will certainly have to increase the sample size.

6. Conclusion and Future Research Directions

This paper has described a dialogue management model based on a set of two conversational strategies (CS and AB) aiming to empower conversational agents in order to foster L2 learners' WTC in EFL context.

The evaluation results showed that the combination of CS and AB as proposed here is particularly effective considering the high WTC gains observed among participants who interacted with the CS+AB version of the system. We also found that even a single implementation of AB has the potential to enhance L2 learners' WTC to a certain extent. Future research should be directed to confirm the tendencies evoked above by evaluating in more details effects associated with each strategy (CS or AB), determining approaches for strengthening their impact in enhancing L2 learners' WTC, and carry out mid-long term evaluations about the outcomes of our approach on learners' actual involvement in communication. We hope that this work will have genuine value and make a small contribution for proposing more effective computer based intelligent approaches to enhance WTC among L2 learners.

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