Can Home Use of Speech-Enabled Artificial Intelligence Mitigate Foreign Language Anxiety – Investigation of a Concept

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Abstract
The harmful effects of speech-related anxiety among learners and users of foreign language is well documented. Aiming to investigate the potential of reducing anxiety through ad libitum interaction with Artificial Intelligence chatbots, a controlled pilot study was conducted on East Asian staff of a large financial institution over a 4-week period, the sample of 40 divided between a test group using AI and the non-exposed subjects. Variety of measures were employed to gain as comprehensive an insight as warranted given the study limitations of a small sample, brief study period and relatively unsophisticated but freely available AI chatbot. The measures ranged from surveys of anxiety, attitudes toward daily chatbot usage, oral interviews and IELTS testing of English speaking ability. The results were cautiously encouraging: nearly universal endorsement of AI as a non-threatening interlocutor positively impacting subjects' confidence and to the extent limited by time constraint, enhancing individual components of the IELTS paradigm. Moreover, significant linear relationship between individual anxiety survey items and overall IELTS scores at baseline was observed, lending a measure of validity to the construct developed for the occasion. In summary, it is felt that subject to further development and refinement, conversationally enhanced AI chatbots hold a significant promise toward reducing speech-related anxieties and learning inhibitions of English as a foreign language and thus merit further investigation toward this objective.
Keywords: Adult Learning, Artificial Intelligence, Foreign Language Anxiety, IELTS, Non-Human Interlocutor

Introduction
The organic growth and worldwide adoption of English as the most accessible form of international information exchange, in many forms of usage and utility, from scholarly, cultural, social, political as well as commercial and technological, drives home the urgency of its command by the wide swaths of population who are not native English speakers. A major obstacle to how smoothly this process develops is the natural inhibition felt by many people when self-perceived in a position of inadequacy or incompetence, triggering sense of threat, fear of ridicule and lowered self-esteem, namely, the Foreign Language Anxiety (FLA). It basically stems from exposing oneself to potentially negative judgment by one's peers in a given social or business setting requiring efficient exchange of ideas and information, frequently resulting in avoidance of such situations and handicapping the communication channels. One possible approach to dealing with this issue is to expose otherwise fearful subjects to a competent English interlocutor of non-human provenance, thus eliminating the perceived threat of derogatory judgment, in hope that such interaction will liberate the subject from anxiety and inhibition in order to more readily engage in free and meaningful conversation. Thus, the notion of providing the subject with one of the widely available Artificial Intelligence (AI) voice-enabled agents or chatbots as colloquially known is seen to hold promise toward that goal, especially if deployed in the privacy of home environment. Fryer and Carpenter (2006, cited in Shawar & Atwell, 2007) claimed that chatbots could offer a way of language practice for learners without restraint of time and place.

At present, there is a paucity of published data either in support or contradicting this hypothesis and it therefore opens an information gap that this researcher deems worth pursuing. To reiterate, as well as indicate the source of the research question, can data be generated to support the anticipation that ad libitum English-spoken AI interaction can yield a meaningful reduction in foreign language anxiety, FLA. This is the motivation driving the study, design and results reported herein.

Literature Review
Culturally Mediated Anxiety in Thai Society
Ever since Geert Hofstede published his cultural dimensions model in 1970s, it has been the standard for assessing major cultural distinctions. Thus, the culture of a country can be appraised relative to the following six aspects: power distance index (high to low), individualism versus collectivism, masculinity versus femininity, uncertainty avoidance index (high to low), long-term versus short-term orientation, indulgence versus restraint. A closer look at the Thai cultural norms within this context demonstrates why the Thai are so inhibited in terms of oral communication. For one thing, Thailand scores relatively high on the uncertainty avoidance index, and Hofstede suggests that it is common in high UAI-scoring countries for people to undertake risky behavior simply in order to avoid failure, considered the worst possible outcome, with the well-known attendant phenomenon of "losing face". Moreover, from the report on this model issued by Portland State University, several features pertinent to Thai culture can be observed. For example, Thailand scores relatively low in the aspect of individualism, which leads to the construct whereby a collectively oriented society places marked premium on collaboration, maintaining face, and in spirit of reciprocity, a great emphasis on massaging the other person's ego. This dynamics translates into a damaging scenario such that when communication in a foreign language is

unavoidable and presenting potential for errors, the Thai can be subject to great stresses and fears and will go to great lengths to avoid having to speak, regardless of cost.

Foreign Language Anxiety

Parallel to the seemingly inevitable expansion of English throughout the interconnected world, highlighting the communicative competence, many learners report being oppressed, stressed, worried, and anxious (Horwitz & Cope, 1986). Heightened anxiety does not necessarily correspond to lack of competence in other contexts, but within the foreign language learning scenario, a mental clock (MacIntyre & Gardner, 1989, as cited in Occhipinti, 2009; Horwitz, 1986) is turned on to show negative effects on learning outcome. Therefore, many researchers claim that the need for overcoming the foreign language anxiety (FLA) is paramount in order to ensure the learners' maximal benefit from foreign language learning and instruction (Horwitz et al., 1986).

Horwitz et al (1986) developed a measurement tool for calculating levels of anxiety, termed foreign language anxiety scale (FLAS) comprising a 33-item anxiety measuring instrument. The researcher selected MacIntyre's (1992) shortened form of FLAS (Horwitz, 1986), which reduced the original 33 items to 8 as having nearly the same internal consistency as per Alpha testing, as the designing reference for the measuring tool in this study, adapted to the workplace environment plus the addition of extra items to cover other aspects of interest specific to the research question.

The Andragogy Model

Knowles (1980) defines andragogy as the "art of science of helping adults learning" (p. 43). This theory takes as its subject the adult learner who is independent and self-directed. Adults have pragmatic motivation relating to real life. Further, they are goal oriented; learning must be purposeful and practical (Bye, Pushkar, & Conway, 2007). Therefore, adult learners are aware of the learning objectives and ready to take full responsibility for their own learning without teacher's incentive. It is recognized that they will learn what they need to, given the motivation and interest. Another significant element discussed in the said theory is relationship between learner and facilitator. In order to make andragogical approach effective, according to Pratt (1993), it requires a psychological climate of mutual respect, collaboration, trust, support, openness, authenticity, pleasure, and humane treatment whereby it is the responsibility of a facilitator "to provide a caring, accepting, respecting, helping social atmosphere."   (Knowles and Associates, 1984, p. 17). Therefore, and this point needs highlighting within the scope of this study, the relationship shouldn't be suppressing, threatening, or judgmental.

Speech-enabled Artificial Intelligence, chatbot

The artificial intelligence (AI) agent in this study is a speech-enabled, i.e., a chatbot. A chatbot system is a software program that interacts with users using natural language. There are interchangeable terms in the field having the same meaning, such as: machine conversation system, voice assistant, virtual agent, dialogue system. According to Shawar and Atwell (2007), the purpose of a chatbot system is to simulate human conversations, and the design normally integrates a language model and computational algorithms to emulate informal chat communication between a human language user and a computer using natural language. Chatbots have been applied in many fields for different purposes. According to Nordrum (2017) cited in Underwood (2017), voice interaction has improved more in the last 30 or so months than it did in its first 30 years,

word error rate for voice-recognition systems is now on par with humans and one might surmise, soon to surpass them. Currently, there is a process whereby the educators in all disciplines and levels are taking advantage of AI capabilities to harness them in their curricula in order to make the materials more accessible and ensure more efficient dissemination and delivery. Alemi, Meghdari, and Ghazisaedy (2015) state that there was lower anxiety and a more positive attitude among students who claimed to have had great fun, and believed they were learning more effectively. Chang, Lee, Chao, Wang and Chenet (2016) investigate the possibility of using humanoid robots as instructional tools for teaching a second language in primary school. In her study, the students experienced excitement and participated enthusiastically. The positive feeling and motivational level for learning English are reported as higher than the traditional lecturing paradigm involving a human teacher. It can therefore be readily seen that AI has potential to contribute significantly to the pedagogical field in terms of improving learning outcomes, boosting motivation, and reducing foreign language anxiety.

Interestingly, Clark (2018) also described the relationship between chatbots and social constructivism. He states that it is the social constructivists, led by Vygotsky, who should celebrate bots the most. If knowledge is the internalization of social activity, then bots are facilitators to learners in social contexts and communication, since a chatbot is purposely designed to simulate intelligent human language interaction. Thus equipped, the learning processes can be expedited and enriched and the empowered learners fast-tracked toward greater maturity, self-direction and sustainability of knowledge acquisition as a life-long pursuit.

Methods
Participants
A large financial institution was approached and expressed interest regarding the study aims. The employees were canvassed by the Human Resources department and 40 in total were recruited into 2 self-selected parallel arms according to whether they wished to engage daily with the English-speaking AI agent. Those who lacked time or motivation comprised the Control group with the rest joining the AI intervention group. The recruitment took place at the beginning of April, 2019, subject to simple inclusion-exclusion criteria that the prospective participants were not rated at the extremities of IELTS speech testing scale, i.e., neither over-nor-under qualified, whereby they could not draw benefit from the said AI exposure.

Protocol and Interventions
The study followed a non-random, parallel design with two treatment arms of four weeks duration, the test arm consisting of an English-speaking AI agent (chatbot), widely disseminated and freely offered by Google, assigned to the Test group participants with instructions on how to download to their device of choice and to use it on ad-libitum basis, especially at home, in their spare time for pursuit of whichever topic is of interest. The control group were to follow their daily routines, with participation limited to fortnightly completion of a survey, same as the AI-group, designed to gauge their anxiety levels as regards English speaking activities. At baseline, week zero, all subjects took part in an IELTS English language assessment administered by a certified examiner for the main purpose of providing an external, independent mode of comparison with the 10-item anxiety survey developed by the investigator. The AI test group were further given a seven-item survey to establish their relationship and attitudes toward the notion of interacting freely and

privately with an expert non-human, English spoken interlocutor. Furthermore, the AI users were orally interviewed in order to uncover possibly important perspectives but overlooked in the scope of the anxiety and AI usage surveys. While the IELTS tester was blinded to the treatment allocation, the investigator could not be, in light of her survey administration and data gathering tasks. The study timeline saw the participants attending the initial IELTS test, completion of the 10-item anxiety gauging survey followed by downloading and instruction in AI chatbot, Google Assistant to the AI intervention group at week zero. Next, at the week two midpoint an interim seven-item AI attitudes survey was given to the test group. Finally, at week four, the second round of IELTS tests were administered to all 40 initial participants by the same examiner in order to maintain continuity, as well as the 10-item anxiety assessment survey. Additionally, the AI-exposed participants in the test group were given the seven-point AI-attitudes survey to complete as well as an orally administered interview to address any other remarks or insights regarding the use and frequency of AI interactions. As well, a one-time brief interview was administered to AI arm completers to gather their opinions regarding the life with the AI voice-enabled virtual assistant and its further potential. The data lock was applied immediately after collecting all the available completed surveys, although some were missing due to the work and travel requirements of the participants and therefore the analyzable data are somewhat incomplete.

Statistical Analyses

Data entry and production of tables was done through Excel spreadsheet generating program. The statistical analyses were run with the aid of R Core (x64) statistical software version, 3.6.0. The main types of analysis conducted with respect to these data, given their relative paucity that made more complex tasks such as Cronbach alpha and factor analysis to assess internal consistency of the survey items or model building not feasible, were of univariate type such as Pearson Product-Moment correlations and Student t-tests, both for one-sample and two-independent samples. The differences in the ordinal discrete data were assessed by way of Wilcoxon signed ranks test.

Results

The study cohort comprised 27 females and 10 males, 3 participants' gender not recorded, likewise 37 of Thai ethnicity and 3 Chinese, ages from 23 to 50, mean of 33, all with post-secondary education credentials ranging from college to doctoral level. Of the initial 40 participants, 19 on Control and 21 on AI Test arms, their input at the end of study period at week four was as follows: IELTS speech test, 19 and 21 for a total of 40, and on the 10-point Anxiety survey, 12 on Control and 18 on AI Test arm. Moreover, 18 AI participants also responded to the 7-point AI attitudes survey. No difference in either Anxiety scores or IELTS scores at baseline between the two study groups were reported, $p \geq 0.47$ and $p \geq 0.22$ respectively, although the Control group's mean initial IELTS score was higher than the AI test group's, 5.2 vs. 4.5, providing a potential rationale for the participants' self-selection choices. Pronounced linear relationships at baseline between the Anxiety survey items and IELTS scores were observed as follows

Q2	N=40, r=-.63, p≤0.000	it embarrasses me to provide answers in English at my workplace
Q5	N=40, r=-.55, p≤0.000	I feel confident when I speak in scenarios which require English

Q6   N=39, r=-.42, p≤0.008   I always feel that other colleagues speak English better than I do

Q8   N=40, r=-.35, p≤0.027   I don't enjoy practicing speaking English in my spare time

Q9   N=40, r=-.60, p≤0.000   I think my speaking ability is at the level of …

Q10   N=40, r=-.58, p≤0.000   I think the others perceive my speaking skills at the level of …

Moreover, the following correlations reaching significance at p<0.05 were recorded between changes from baseline to the study endpoint at week 4 between individual Anxiety items and IELTS overall scores

Q1   N=18, r=.66, p≤0.003   I am usually at ease in workplace where I need to speak English

Q2   N=18, r=.52, p≤0.028   it embarrasses me to provide answers in English at my workplace

Q4   N=18, r=.69, p≤0.001   I get nervous and confused when speaking or presenting in English

In terms of summing up changes from baseline, the Control group reported a cumulative drop in Anxiety items of -5, an increase in IELTS score of 2, whereas the AI group registered a cumulative reduction in total Anxiety of -31 and increase in IELTS of 10. A one-tailed Wilcoxon signed ranks test of between-group comparisons of changes reached conventional significance of p<0.046 (Table 1), offering a degree of support for the paradigm of the extemporaneous use of speech-enabled AI agents to lower the sense of speech anxiety and aiding in quality of English conversational ability. The subject group assigned to AI exposure were asked to fill in responses to 7 additional survey items in order to gauge their attitude toward AI. Since there was no basis for comparison with the unexposed control group, no tests of hypothesis were carried out, and only the descriptive statistics are shown (Table 2). In addition, oral interviews were conducted on the AI participants to collect some of their impressions not otherwise recorded in either the Anxiety or AI questionnaires. These results were not analyzed statistically due to their essentially qualitative nature, only the frequency counts for the AI usage are presented (Tables 5 and 6). Nevertheless, it is felt that the content and frequency counts of comments were quite informative.

Tables and Figures

Table 1. *Summary statistics by study group and week for anxiety survey items and IELTS scores, changes from baseline and non-parametric test of anxiety changes for 2 study groups*

Group	Week	N	Q01	Q02	Q03	Q04	Q05	Q06	Q07	Q08	Q09	Q10	N	FluCoh	Lex	Grm	Pnun	overall
						ANXIETY survey items (10)									**IELTS categories**			
Control	0	19	2.1±0.8	3.2±1.4	3.6±1.2	3.5±1.2	3.0±0.9	3.5±0.9	2.8±1.3	2.3±1.1	3.3±1.0	3.3±1.0	19	5.3±1.5	5.1±1.5	5.0±1.4	5.3±1.4	5.2±1.4
	4	12	2.3±0.9	2.3±1.3	3.4±0.9	3.2±0.9	2.6±0.9	3.4±1.0	2.5±1.2	1.9±0.9	3.1±1.1	3.0±1.2	19	5.3±1.5	5.1±1.4	5.0±1.5	5.4±1.4	5.2±1.4
change	4-0		.3±.6	-.2±1.0	.3±1.0	.0±1.0	-.2±1.0	.0±1.0	-.3±.9	-.3±.8	.0±.7	.0±.7		.0±.3	.0±.5	.0±.3	.1±.3	.0±.2
	t-statistic		1.33	-0.59	0.86	0.00	-0.54	0.00	-0.96	-1.42	0.00	0.00		0.00	0.00	0.00	1.42	0.68
	p<		0.159	0.323	0.264	0.390	0.334	0.390	0.241	0.142	0.390	0.390		0.393	0.393	0.393	0.144	0.309
	net sum		**3**	**-2**	**3**	**0**	**-2**	**0**	**-3**	**-4**	**0**	**0**		0	0	0	2	0.5
AI	0	21	2.9±1.1	3.1±1.2	3.5±1.2	3.6±1.0	3.4±0.8	3.7±1.0	2.6±1.1	2.6±1.2	3.6±1.0	3.5±1.0	21	4.5±1.7	4.5±1.6	4.4±1.4	4.8±1.6	4.6±1.5
	4	18	2.6±0.8	2.8±1.1	3.7±1.0	3.4±1.0	3.1±0.7	3.9±0.6	3.0±0.8	2.3±1.1	3.6±0.8	3.3±0.8	21	4.7±1.8	4.6±1.5	4.4±1.4	5.0±1.5	4.7±1.5
change	4-0		-.4±1.3	-.4±1.4	.1±.9	-.2±1.3	-.5±.8	.1±.6	.4±1.2	-.3±1.5	-.2±.9	-.2±.9		.2±.5	.1±.4	.0±.3	.1±.5	.1±.3
	t-statistic		-1.20	-1.16	0.24	-0.73	-2.65	0.42	1.53	-0.94	-1.04	-0.97		1.98	0.98	0.00	1.34	1.60
	p<		0.189	0.197	0.381	0.299	0.018	0.357	0.123	0.248	0.225	0.242		0.061	0.242	0.394	0.161	0.111
	net sum		**-7**	**-7**	**1**	**-4**	**-9**	**1**	**8**	**-6**	**-4**	**-4**		5	2	0	3	2.5

Wilcoxon Signed-Ranks Test
comparing changes (shaded sums) in Anxiety scores for Control and AI groups

no Wilcoxon Signed-Ranks Test possible due to small sample size

p<   0.093   2-tailed test of z-value

p<   0.046   1-tailed test of z-value

Item codes: (highlighted items reverse-coded to provide ontological uniformity with other items)

Q1   I am usually at ease in workplace where I need to speak English
Q2   it embarrasses me to provide answers in English at my workplace
Q3   I can feel my heart pounding when I am going to be asked to speak English in discussions or meetings
Q4   I get nervous and confused when speaking or presenting in English
Q5   I feel confident when I speak in scenarios which require English
Q6   I always feel that other colleagues speak English better than I do
Q7   I prefer using English to Thai in meeting and discussing with my foreign colleagues
Q8   I don't enjoy practicing speaking English in my spare time
Q9   I think my speaking ability is at the level of …
Q10   I think the others perceive my speaking skills at the level of …

Table 2. *AI-Attitudes items summary statistics on 5-point Likert scale*

	Week 2 (n, mean±std)	Week 4 (n, mean±std)
Q11 I enjoy being in charge of conversation with my AI	21, 3.7±0.8	18, 3.6±0.9
Q12 Talking with AI improves my speaking	21, 3.6±0.7	18, 3.4±0.8
Q13 I don't feel nervous while talking to AI	21, 4.0±1.1	18, 4.2±0.9
Q14 I like interacting with AI	21, 3.7±0.7	18, 3.5±0.9
Q15 AI provides me with human-like conversation	21, 2.9±1.1	17, 3.2±1.0
Q16 I keep trying when AI has trouble understanding me	21, 3.9±0.8	17, 4.0±0.6
Q17 Talking to AI at home makes speaking English with humans less scary	21, 3.4±0.9	17, 3.7±0.7

Table 3. *Pearson correlations of anxiety survey items with overall IELTS scores*

Correlations at baseline (week 0)

	Q01	Q02	Q03	Q04	Q05	Q06	Q07	Q08	Q09	Q10
N	40	40	39	40	40	39	40	40	40	40
r	-0.27	-0.63	-0.41	-0.28	-0.55	-0.42	-0.28	-0.35	-0.60	-0.58
t	-1.71	-4.96	-2.71	-1.77	-4.01	-2.80	-1.82	-2.31	-4.66	-4.44
p≤	0.095	**0.000**	**0.010**	0.085	**0.000**	**0.008**	0.076	**0.027**	**0.000**	**0.000**

Table 4. *Correlations of changes in anxiety survey items with changes in overall IELTS scores*

	Q01	Q02	Q03	Q04	Q05	Q06	Q07	Q08	Q09	Q10
N	18	18	18	18	17	17	18	18	18	18
r	0.66	0.52	-0.06	0.69	0.04	0.05	-0.11	0.10	0.42	0.30
t	3.54	2.42	-0.25	3.87	0.15	0.18	-0.45	0.39	1.83	1.24
p≤	**0.003**	**0.028**	0.803	**0.001**	0.882	0.861	0.662	0.699	0.086	0.232

Highlighted survey items reverse coded for Anxiety hypothesis testing.

Table 5. *Oral interviews regarding AI usage not covered by the Anxiety or AI surveys*
Frequency of daily use (number of sessions with AI chatbot)
(1) 1 - 5   7
(2) 6 - 10   7
(3) 11 - 20   0
(4) >20   1
Frequency and type of topics of interactions with AI and their respective frequencies:

1	Sports
2	Fashion/clothes
3	History/culture/science
2	Health
8	Music/movies/entertainment
8	Travel/geography
9	Food
12	News/weather
9	Other (please name it)

Table 6. *Final feedback*
Brief interview regarding the AI participants' opinions of AI future prospects as a conversational tool to alleviate anxiety and promote English learning skillset:

| Response	Total			Full question wording
Y	19	20	95%	(Y/N) Does interaction with AI make you feel more relaxed or confident in speaking English?
N	1	20	5%	
				What is your overall impression of interaction with AI:
	16	20	80%	• I can learn English with AI
	7	20	35%	• Chatting with AI cheers me up
	13	20	65%	• Useful because AI provides relevant information in a conversational setting
	1	20	5%	• I dislike talking with AI because it doesn't provide correct answers
Y	17	19	89%	(Y/N) Do you feel AI can help improve your spoken English in the long term?
N	2	19	11%	
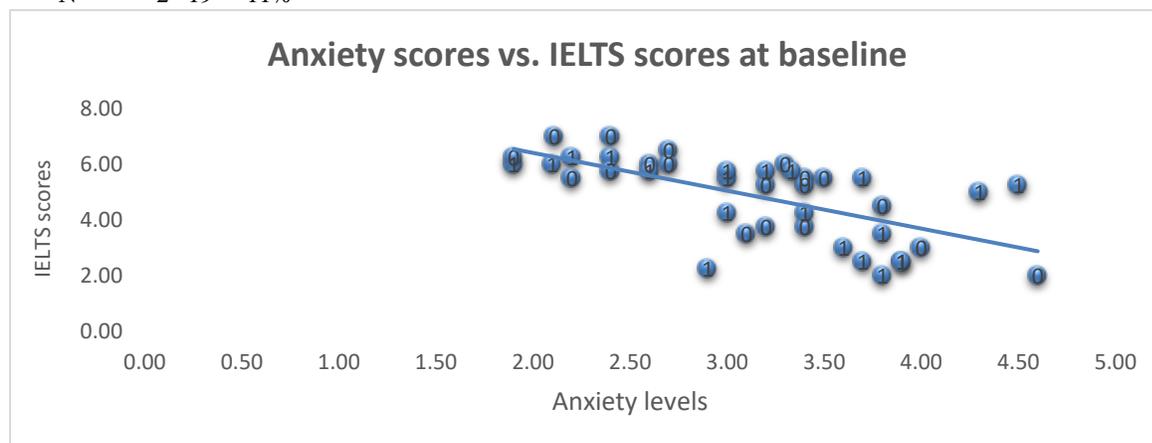
Figure 1. Linear relationship at baseline between Anxiety and IELTS levels (40 data points)

Discussion

The issues touched upon in this article, even though studied within a narrowly defined location and sampled segment of the general population, are likely to be to a significant portion representative of the global circumstances. That is to say that with ever encroaching importance of English, both for its own sake as a repository of world's literature, culture, history and social sciences, as well as a lingua franca in commerce, politics, media and technological and scientific networks, it exerts a powerful incentive to a learner to master its various elements, including speech as assessed by IELTS test. The results may be somewhat skewed by the fact that the participants were self-selected according to their preference to either use or avoid exposure to English AI chabot. The reasons may be manifold, including their attained level of language control, whereby those who felt sufficiently comfortable saw no need for further exertion or due to busy work schedule including travel abroad, conflicting with study requirements, provided self-invigilated control, i.e., were unwilling to engage with English-speaking AI agents in their free time. However, their English speech competence did not significantly differ at baseline. The principal motive behind this research question and study design is to address the feedback-driven linkage between speech anxiety and speech performance in a live environment as it relates to conversational English, whereby the psychological and physiological effects deprive the would-be user of even that degree of fluency of which they are otherwise perfectly capable. This relationship is exacerbated in East Asian cultures by the fact that extraversion and assertiveness are not necessarily regarded as positive personality traits and yet these cultures form the significant bulk of English as a second language (ESL) learners. Hence, the idea that if these populations were exposed to a capable English-speaking interlocutor that was at the same time socially benign, i.e., incapable of personal judgment and opprobrium, the learners would be able to devote more unimpeded time and effort to immerse themselves in free spoken English interaction. Even within the number of limitations constraining this study, namely small sample size, short time frame, paucity of financial and staffing support, relatively unsophisticated nature of the English chatbot, which is to say, Google Assistant as the best freely available option, the basic question posed has to an extent been answered in a largely positive way. To be noted is that all the baseline correlation coefficients relating anxiety to IELTS score are negative, which is to make two points: that the participants, insofar as they represent adult population are able to accurately coordinate their perceived speech anxiety to their actual English speaking ability as measured by IELTS and moreover, that the 10-item anxiety gauging survey designed specifically for this occasion functions satisfactorily, further refinements subject to internal tests of the construct consistency and validity notwithstanding. On the other hand, the coefficients corresponding to changes are positive, providing retrospective justification for the reverse coding of a number of Anxiety item scales and even more importantly, demonstrate the three-way linkage between extended use of AI chatbot, anxiety reduction over 4 week period (expressed as a positive number as per Likert scale coding of items tracking a negative emotion, so that subtracting a larger negative from a lesser one ends up on the plus side of zero) and actual, albeit small improvement in IELTS assessment. The claim is not promoted here that the modest speech improvement as measured by IELTS is due to salutary action of AI chatbot exposure but rather through reduction of anxiety that frees up the user's already existing capacity for meaningful English discourse. This is still to be considered quite an encouraging development despite the aforementioned study limitations of sample size, study duration and AI shortcomings. To gain further insight into this dynamic, consider that Moore (2017) states: "How long does it take to improve an IELTS score? To go up 1 band in IELTS takes

most students approximately 200 to 300 hours of study, consisting of face-to-face tuition and guided self-study …" (P. 4). Referring to the "Fluency and Coherence" IELTS component in Table 3, while the Control group showed no change, the AI group presented 5 single band increases, almost reaching a statistical significance at $p<0.061$. Fluency and coherence would be the speech element most rapidly affected through free-wheeling conversational exchanges with the AI agent and of course, 4 weeks of intermittent exposure to AI cannot compare to 200-300 hours of intensive, directed language study facilitated by face-to-face tutors. Hopefully the results presented herein provide the proof of concept, vectors of further inquiry into the subject as well as pilot data for future study design, including sample size calculation and requisite time frames. As the development of AI abilities proceeds apace, the future research endeavors will have the advantage of a much more satisfactory potential for human-non-human AI interaction, hopefully offering in-depth, involved conversations rather than the present question-answer exchanges, a feature considered a hindrance to more binding engagement by the present participants. To this end, the AI users' responses to the final brief interview and request for personal input of choice regarding their experience of the 4-week involvement with the AI chatbot are illuminating in the level of anticipatory, enthusiastic support for further improvements and prospects, in that 95% felt that the experience left them with a greater sense of confidence, i.e., lessened anxiety regarding their approach to oral English communication and 89% felt that it can improve their English speaking ability in future. It is the investigator's opinion that this should inform the future efforts in this direction.

Conclusion

The present study was conceived and designed to address the question whether the detrimental effect of social anxiety or stage fright on acquisition and use of a foreign language, English in particular, can be palliated through extemporaneous exposure to a non-human, non-threatening, yet competent conversational partner, specifically, a speech-enabled artificial intelligence (AI) agent, commonly known as a chatbot. To this end, a relatively brief and limited experiment was designed involving 40 adult participants, self-selected into two equal sized groups, an unexposed control and an AI-provided group to freely interact with in privacy to see whether this unsupervised exposure aids in providing a degree of relief from public speech-related anxiety and thus, an associated improvement in English speaking ability. A variety of instruments were developed tailored to this aim, primarily a 10-item survey to record speech-related anxiety, concurrent with IELTS speech test administered by an independent, blinded, licensed examiner in order to establish correspondence between the two instruments over a 4-week period. The main conclusions drawn from this arrangement are as follows: the validity of the 10-item anxiety survey is supported by the IELTS results and furthermore, the test group of participants exposed to the AI agent reported markedly reduced anxiety levels after 4 weeks of usage compared to the unexposed control group as well as a mild trend in actual speaking improvement as reflected in IELTS test scores. A supporting range of questionnaires and interviews geared towards the AI test group was established for control purposes, the responses mostly demonstrating enthusiastic attitude toward the AI experience. It is felt that this brief experiment can provide further incentive toward future research based on larger samples, longer time frames and more advanced AI agents.

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APPENDIX A
Questionnaire

Background information:

Name: Nickname:

Gender: M/F   Age:

Educational level: (Bachelor, Master, Doctorate)

Speaking anxiety related items: For each item, indicate whether you (1) strongly disagree (2) disagree (3) neither agree nor disagree (4) agree or (5) strongly agree. Please choose the answer most suitable for you.

1 I am usually at ease in workplace where I need to speak English

1   2   3   4   5

2 It embarrasses me to provide answers in English in my workplace.

1   2   3   4   5

3 I can feel my heart pounding when I am going to be asked to speak English in discussions or meetings.

1   2   3   4   5

4 I get nervous and confused when speaking or presenting in English.

1   2   3   4   5

5 I feel confident when I speak in scenarios which require English.

1   2   3   4   5

6 I always feel that other colleagues speak English better than I do.

1   2   3   4   5

7 I prefer using English to Thai in meeting and discussing with my foreign colleagues.

1   2   3   4   5

8 I don't enjoy practicing speaking English in my leisure time.

1   2   3   4   5

Please choose the level accordingly. Beginner=1, Lower-intermediate=2, Intermediate=3, Upper-intermediate=4, Advanced=5

9 I think my speaking ability is <u>at the level of   </u>.

10 I think the others' perceive my speaking skills <u>at the level of   </u>.

AI (Artificial Intelligence) related questions: For each item, indicate whether you (1) strongly disagree (2) disagree (3) neither agree nor disagree (4) agree or (5) strongly agree. Please choose the answer most suitable for you.

11 I enjoy being in charge of conversation with my AI.

1   2   3   4   5

12 Talking with AI improves my English speaking.

1   2   3   4   5

13 I don't feel nervous talking with AI.

1   2   3   4   5

14 I like interacting with AI.

1   2   3   4   5

15 AI provides me with human-like conversation.

1   2   3   4   5

16 I keep trying when AI has trouble understanding me.

1	2	3	4	5

17 Talking with AI at home makes speaking English with human less scary.

1	2	3	4	5

APPENDIX B
Interview questions along the experiment period (week 2 and week 4):
1. Approximately how many sessions per day did you have with AI this week?
   a. 1-5
   b. 6-10
   c. 11-20
   d. More than 20

2. What are the main topics of conversation with AI? (please check all that apply)
   - Sports
   - Fashion/clothes
   - History/geography/culture/science
   - Health
   - Music/entertainment/movie
   - Travel/places
   - Food
   - News/weather
   - Other (please name it)

3. Can you give me some examples or experience that you feel interested/useful/ funny/misunderstood with AI?

4. Are you feeling comfortable speaking English with AI? Why?

Final interview questions (week 4):
1. Does interaction with AI make you feel more relaxed or confident in speaking English? Yes/ No
2. What is your overall impression of interaction with AI:
   a) I can learn English with AI
   b) Chatting with AI cheers me up
   c) Useful because AI provides relevant information in a conversational setting
   d) I don't like talking with AI because it doesn't provide correct answers
3. Do you feel AI can help improve your English speaking in the long term? Yes/ No