

THE ROLE OF SPEAKING ANXIETY ON L2 ENGLISH SPEAKING FLUENCY, ACCURACY AND COMPLEXITY

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Many L2 learners find speaking-oriented activities to be highly anxiety-evoking. Speaking to a native interlocutor or perceiving negative attitudes from them has been shown to generate speaking anxiety. However, the influence of speaking anxiety on L2 speaking performance is still under-researched. This study examined the effects of speaking anxiety on L2 speaking fluency (time-based speed and breakdown fluency measures), phonological, lexical and grammatical accuracy (error rates), and grammatical complexity (Guiraud's index and clauses per AS-Unit) under two interlocutor-related speaking conditions: nativeness and collaborativeness. L2-English speech was elicited from L1-Spanish/Catalan learners ($n=34$) through two film scene retelling tasks. Nativeness was manipulated by having participants interact in an oral task with different interlocutors, a native English speaker (native) and a Spanish accented L2 English speaker (non-native). Half of the learners were assigned to a collaborative (helpful and kind) interlocutor and half to a non-collaborative (unhelpful and unkind) interlocutor. Speaking anxiety levels were assessed through Likert-scale-based questionnaires immediately after task performance and physiological measures of emotional arousal (heart rate and electrodermal activity). Results showed that interacting with non-native speakers produced higher anxiety and more complex language. Speaking to a collaborative native interlocutor resulted in less accurate language compared to the collaborative non-native interlocutor.

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INTRODUCTION

Foreign Language Anxiety (FLA) is a complex psychological construct which can be defined as “a distinct complex of self-perceptions, beliefs, feelings and behaviors related to classroom language learning arising from the uniqueness of the language learning process” (Horwitz et al., 1986, p.128). Anxiety in SLA has been typically measured subjectively through questionnaires, but increasingly studies are beginning to use physiological response measures such as heart rate (HR) and electrodermal activity (EDA) (Croft et al., 2004; Lee, 2020). EDA refers to the electrical changes in response to the sweat secretion made by the eccrine sweat glands. Nowadays, different types of anxiety have been identified for every language skill. Consequently, different scales have been developed to tackle how anxiety is related to any language skills, such as L2 listening anxiety (Elkhafaifi, 2005), L2 reading anxiety (Saito et al., 1999), L2 writing anxiety (Cheng, 2002) or L2 speaking anxiety (Gkonou, 2014; Woodrow, 2006). In the current study, we focused on L2 speaking anxiety which refers to feelings of stress or nervousness while speaking a second or foreign language (L2).

L2 speaking anxiety is still an under-researched emotional factor that may have an important impact on L2 speech acquisition and language learning in instructed and naturalistic SLA, both short and long-term. Given the importance of English as an international lingua franca, communicative language teaching has made the presence of speaking tasks essential in classroom language learning contexts.

L2 speaking anxiety has been investigated mostly in reference to testing situations and its short-term effects on course marks (Horwitz et al., 1986; Teimouri et al., 2019). However, other aspects which may trigger L2 speaking anxiety, such as interlocutor-related factors (e.g., nativeness and collaborativeness) are currently under-researched. Nativeness refers to the interlocutor being a native speaker (NS) or a non-native speaker (NNS) of the learners' L2. Talking to a NS generates more stress than communicating with a NNS (Woodrow, 2006) in the L2. Learners feel more uneasy and self-conscious about their limitations in the L2 when talking to a NS than a NNS. This may be because with NNS, learners may share similar language learning experiences. Collaborativeness refers to an interlocutor being helpful and kind or not. When performing an oral task, L2 learners rely on their interlocutor's visual response (e.g., facial gestures such as nodding or frowning) to monitor the communicative success of their speech (Lindberg et al., 2021). Therefore, receiving signs of misunderstanding or indifference as one speaks may generate stress (higher HR and self-reported anxiety levels), as one gets a negative response from an audience to one's speech (i.e., constant frowning or an unfriendly response in a dialogue) (Hartanto et al., 2014).

Speaking anxiety has been shown to negatively affect the quality of L2 speech in a variety of ways. Several studies have shown negative correlations between anxiety and assessments of spoken performance (Hewitt & Stephenson, 2012; Phillips, 1992; Woodrow, 2006; Young, 1990). When anxious, learners are less fluent and produce more filled pauses (Christenfeld & Creager, 1996; Goberman et al., 2011; Pérez Castillejo, 2019), or they perform more poorly in terms of grammatical accuracy and complexity (Hewitt & Stephenson, 2012). Such effects on language performance suggest that anxiety interferes with the learners' use of the attentional resources since they need to attend to their own output and consequently speak the L2 accurately (Kormos, 2015).

Despite the growing interest in anxiety in the SLA field, to our knowledge, no study has analyzed the effects of nativeness and collaborativeness on speaking anxiety and the quality of L2 speech (fluency, accuracy and complexity). Understanding the sources of L2 speaking anxiety and its effects on L2 speech is crucial for L2 teaching and learning in SLA. While communicative tasks are the main source of L2 speaking development in FL classrooms, learners' level of achievement in performance may be affected by the levels of distress they experience when using the L2. The current study, therefore, addressed the following research questions (RQs) in the context of an oral narrative task performed by instructed L2 learners.

Research Questions

RQ1: To what extent does the interlocutor's nativeness and collaborativeness affect L2 learners' speaking anxiety levels?

RQ2: To what extent does the interlocutor's nativeness and collaborativeness affect L2 learners' speaking fluency, accuracy and complexity?

RQ3: Is there an association between L2 learners' anxiety levels and the fluency, accuracy and complexity of their speech?

METHODS

The role of speaking anxiety on L2 speech was explored by manipulating two independent variables, nativeness (speaking to a native vs. non-native interlocutor) and collaborativeness (speaking to a collaborative vs. non-collaborative interlocutor). L2-English speech was elicited in the presence of a male interlocutor, through two video scene retelling tasks from a Charlie Chaplin video (Chaplin, 1936). One of the oral tasks was performed in front of a native interlocutor and the other in front of a non-native interlocutor. Before each task, the interlocutor held a short interview with the learner (1 minute approx.) to indicate to the learner whether the interlocutor was native (by speaking with a native British accent) or non-native (by speaking with an obvious Spanish accent). In addition, the two interlocutors were instructed to be collaborative or non-collaborative with the learners, who had been previously and randomly assigned to a collaborative or non-collaborative condition. Prior to data collection, a 5-point Likert scale questionnaire was used to explore the interlocutors' friendliness based on the interlocutors' looks with a picture and a muted video of them speaking. This was carried out by 10 acquaintances of the researcher. When collaborative, the interlocutors explained the instructions kindly, smiled often and during task performance nodded often in sign of understanding. When non-collaborative, the interlocutors explained task instructions seriously and often frowned, showing lack of understanding during task performance.

Participants

Thirty-four L1-Spanish/Catalan undergraduate students of English Studies (Table 1) participated in the experiments for course credit. They were randomly assigned to one of two groups (collaborative vs. non-collaborative) with 17 participants each, who were comparable in testing age and L2 proficiency. The interlocutors were a 28-year-old British English NS with a London accent and a 26-year-old L1-Spanish English NNS from Murcia (Spain) with a strong Spanish accent. Both interlocutors were EFL teachers. Interlocutors were trained prior to data collection on how to perform their roles.

Table 1.

Participants' demographics (N=17).

	<i>Collaborative</i>			<i>Non-collaborative</i>		
	<i>M</i>	<i>SD</i>	<i>Range</i>	<i>M</i>	<i>SD</i>	<i>Range</i>
Age	24.41	9.88	18-52	23.94	6.30	18-37
Oral Proficiency (0 - 120) ¹	104.82	16.21	55-115	104.05	14.09	60-120

¹Obtained through an Elicited Imitation task (Ortega et al., 2002)

Procedures

After signing a consent form, the participants were individually led by a research assistant to a quiet testing room where one of the interlocutors was waiting for them. There, the interlocutor introduced himself and carried out a short interview about general background information with the learner (name, university studies, travelling to English speaking countries, and similar topics). He then explained what the oral task was about (re-telling an excerpt from a silent film) and helped the learner attach the NeuLog sensors,

which are computer-based modules with a data logger, by wrapping the Velcro connectors around the bases of the fingers. Afterwards, the film clip was played and the subjects were audio recorded while re-telling the story of the film excerpt they had watched. When finished, the research assistant led the learner to another testing room where the other interlocutor was waiting, where the interlocutor and learner went through the same procedure. The two film clips that participants had to re-tell were different excerpts from the same Charlie Chaplin movie, *Modern Times*. The order in which the clips were retold was counterbalanced across interlocutor conditions, so half of the participants performed their task with the NS and then the NNS, and the other half did the opposite. Immediately after each one of the film-retelling tasks, a questionnaire with six 7-point Likert scale items was administered to assess how much distress participants had felt during task performance (see Appendix). Finally, to obtain an L2 proficiency measure, participants performed an elicited imitation task (Ortega et al., 2002).

Measures

Speaking Anxiety

Speaking anxiety levels were assessed through a six-item post-task questionnaire administered immediately after task completion ($\alpha=.886$). The 7-point Likert questionnaire generated an anxiety level score that could range between 6 and 42 points (Appendix). Speaking anxiety was also assessed through physiological response measures of emotional arousal (HR and EDA) with the Neulog sensor. The HR measures were obtained in an arbitrary analog measure (in a wave function) ($min. = 0, max = 1023$). Arbitrary analog values display the wave signal of a heartbeat, and it measures the blood volume in the finger. As for EDA, data was obtained in microSiemens (mS) ($min. = 0, max = 10$), which capture the electrodermal changes in the skin. Both sensors recorded the data at 10Hz (10 data points per second). With the aim of exploring the association between the quality of learners' speech in their oral narratives for overall fluency, accuracy and complexity, and individual speaking anxiety levels, average individual HR and EDA scores for the whole speaking performance were computed, one per oral narrative, as in previous studies (Croft et al., 2004).

Speaking Fluency

Speed and breakdown fluency (Table 2), rather than repair fluency, was opted for based on findings from previous research exploring the link between anxiety and oral production. For example, breakdown and speed fluency have specifically been shown to be related to FLA (Christenfeld & Creager, 1996; Goberman et al., 2011; Pérez Castillejos, 2019). Fluency measures were obtained by running a Praat script (Boersma & Weenink, 2020; De Jong & Wempe, 2009) on the speech samples. The script generated TextGrid tiers segmented into silent and sounding intervals. The lower boundary for silent pauses was set at 250 milliseconds. These tiers were then manually adjusted and re-labelled as appropriate, to avoid oral closures (e.g., /k/), word-final devoiced vowels, and low-intensity fricatives being labelled as silent intervals, and to avoid filled pauses being labelled as sounding intervals. The TextGrids were further manually annotated to distinguish filled and silent pauses that occurred clause-internally from those occurring at clause boundaries.

Table 2*Fluency measures* (classification based on Tavakoli & Wright, 2020)

<i>Type</i>	<i>Label</i>	<i>Measure</i>	<i>Definition</i>
<i>Speed</i>	SR	Speech rate	Syllables per minute including pause time
	AR	Articulation rate	Syllables per minute excluding pause time
<i>Breakdown</i>	PhR	Phonation ratio	Proportion of time spent speaking
	PF	Pause Frequency	Pauses per minute
	PF-I	Internal Pause Frequency	Pauses per minute within AS-units
	PF-E	External Pause Frequency	Pauses per minute between AS-units
	PD	Pause Duration	Average pause duration
	PD-I	Internal Pause Duration	Average internal pause duration
	PD-E	External Pause Duration	Average External pause duration

Speaking accuracy and complexity

Learners' oral narratives were orthographically transcribed in a Praat TextGrid tier for accuracy and complexity analyses. Accuracy measures (Table 3) included ratios of error-free units as well as error rates (Hewitt & Stephenson, 2012), all of them based on analysis of speech units (AS-units). An AS-unit is a “single speaker's utterance consisting of an independent clause, or sub-clausal unit, together with any subordinate clauses associated with either” (Foster et al., 2000, p. 365).

Lexical and structural complexity measures (Table 3) were based on the Praat TextGrid orthographic transcriptions, which were extracted and analyzed in CLAN from CHILDES (MacWhinney, 2000) to compute a word list containing all the tokens and types from each one of the transcriptions of the participants' oral narratives. These lists were revised not to include proper names or incomplete words and loose syllables since they do not show lexical diversity.

Table 3*Accuracy and complexity measures*

	<i>Label</i>	<i>Measure</i>	<i>Definition</i>
<i>Accuracy</i>	ErrFreeASU	% of Error-Free ASU	% of AS-units without errors
	ErrASU	Errors per ASU	Errors per AS-unit
	LexErr	Lexical errors ratio	% of AS-units with lexical errors
	GramErr	Grammatical errors ratio	% of AS-units with grammatical errors

	PronErr	Pronunciation errors ratio	% of AS-units with pronunciation errors
	Guiraud	Guiraud Index	Types/square root of tokens
Complexity	TTR	Type-Token Ratio	Types/Tokens
	SNxASU	Sentence node per ASU	Number of sentence nodes / ASUs
	WDxASU	Mean length of ASU	Words per AS unit
	TxCL	Tokens per clause	Clausal Complexity

Proficiency

The elicited imitation task consisted of 30 test sentences in English, ranging 7-19 syllables in length and varying in lexical and grammatical complexity. Participants were asked to listen to and repeat as much of the sentences as they could and as accurately as possible. The proficiency score was based on the extent to which sentences were accurately repeated, reflecting degrees of parsing and comprehension. The participants' recorded sentences were assessed following the rubric by Ortega et al. (2002) to obtain a score per sentence (*min.* = 0, *max.* = 4) up to a maximum total score of 120 points.

RESULTS

All variables included in the analysis were normally distributed, except for the following measures, which were log-transformed: HR and GSR, error per ASU and grammatical, lexical and pronunciation error rates, sentence nodes per ASU and words per ASU.

Speaking Anxiety

Learners' HR was higher with the NNS than with the NS interlocutor both under collaborative and non-collaborative conditions. This was also the case with EDA, but only when the NNS interlocutor was collaborative (Table 4). This was consistent with the anxiety questionnaire scores, which indicated learners had experienced slightly higher anxiety levels when interacting with the NNS than the NS confederate and under the non-collaborative than the collaborative condition. However, overall scores were low, suggesting that learners did not experience high levels of distress during task performance. The significance of these differences was tested by submitting the HR and EDA scores and the anxiety questionnaire scores to a series of mixed ANOVAs, with *nativeness* as a between subjects factor and *collaborativeness* as a within-subjects factor.

Table 4*Speaking anxiety by interlocutor and condition.*

	<i>Native Speaker (NS)</i>				<i>Non-native Speaker (NNS)</i>			
	<i>Collaborative</i>		<i>Non-collaborative</i>		<i>Collaborative</i>		<i>Non-collaborative</i>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
<i>HR</i>	320.43	22.1	309.64	11.3	340.18	22	353.36	2
<i>EDA</i>	3.29	1.7	2.90	1.8	2.64	1.5	2.94	1.4
<i>Questionnaire</i>	18.14	4.2	20.23	6.5	19.41	6.1	22.53	9.8

The ANOVA yielded a significant main effect of *nativeness* for *HR* ($F[1, 32] = 63.26, p = .000, \eta^2 = .99$), but neither the main effect of *collaborativeness* ($F[1, 32] = .36, p = .552, \eta^2 = .01$) nor the *nativeness* x *collaborativeness* interaction reached significance ($F[1, 32] = 2.67, p = .125, \eta^2 = .07$). For the *EDA* measures none of the main effects (*nativeness*: $F[1, 32] = .35, p = .357, \eta^2 = .01$; *collaborativeness*: $F[1, 32] = .016, p = .898, \eta^2 = .01$) nor the interaction ($F[1, 32] = 3.14, p = .086, \eta^2 = .09$) reached significance. For the questionnaire measures none of the main effects (*nativeness*: $F[1, 32] = 1.23, p = .275, \eta^2 = .03$; *collaborativeness*: $F[1, 32] = 3.72, p = .221, \eta^2 = .04$) nor the interaction ($F[1, 32] = 2.49, p = .125, \eta^2 = .02$) reached significance either. These findings suggest that learners' anxiety levels (as captured with the HR sensor) was higher when interacting with a non-native than with a native interlocutor, irrespective of the collaborativeness condition they performed the oral task in.

Fluency, Accuracy and Complexity

Fluency, accuracy and complexity measures were found to be similar when learners interacted with the NNS and the NS interlocutor and did not appear to vary substantially between the collaborative and non-collaborative conditions (Table 5). However, it is worth noting that learners produced longer pause durations (PD, PD-I and PD-E) when interacting with a non-collaborative NNS interlocutor, and that grammatical and pronunciation error rates were higher when interacting with a non-collaborative NS. Additionally, AS-units were more complex (contained more sentence nodes) when interacting with a NNS, irrespective of the collaborative condition.

Table 5*Fluency, accuracy and complexity by interlocutor and condition.*

	<i>Native Speaker (NS)</i>				<i>Non-native Speaker (NNS)</i>			
	<i>Collaborative</i>		<i>Non-collaborative</i>		<i>Collaborative</i>		<i>Non-collaborative</i>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
<i>Fluency</i>								
<i>SR</i>	2.70	0.3	2.65	0.4	2.74	0.3	2.60	0.5
<i>AR</i>	4.25	0.3	4.17	0.4	4.19	0.5	4.08	0.6
<i>PhR</i>	63.08	11.4	63.56	7.3	65.93	8.5	63.54	8.7
<i>PF</i>	21.53	3.0	21.01	2.8	22.54	5.7	20.88	3.9
<i>PF-I</i>	13.23	3.6	12.43	3.0	14.49	4.7	11.86	3.4
<i>PF-E</i>	8.30	1.9	8.58	1.8	8.05	1.9	9.01	2.0
<i>PD</i>	.77	.05	.67	.03	.66	.03	.74	.04

<i>PD-I</i>	.74	.05	.63	.04	.60	.04	.91	.17
<i>PD-E</i>	.76	.03	.82	.06	.79	.06	.80	.05
<i>Accuracy</i>								
<i>ErrFree</i>	81.74	16.8	77.22	18.4	79.56	11.2	85.49	10.7
<i>ErrASU</i>	0.19	0.2	0.24	0.2	0.24	0.1	0.15	0.1
<i>LexErr</i>	6.12	14.9	4.84	5.7	3.12	5.77	3.37	3.9
<i>GramErr</i>	12.40	9.6	15.77	13.78	15.33	11.3	7.61	7.2
<i>PronErr</i>	1.08	2.5	4.05	7.06	5.58	6.88	4.10	5.3
<i>Complexity</i>								
<i>Guiraud</i>	6.74	0.6	6.70	1.56	6.34	0.87	6.51	0.83
<i>TTR</i>	0.430	0.08	0.436	0.1	0.46	0.08	0.43	0.1
<i>SNxASU</i>	1.47	0.1	1.41	0.1	1.54	0.2	1.55	0.2
<i>WDxASU</i>	12.16	8.4	9.53	6	8.60	5.4	10.89	8.5
<i>TxCL</i>	6.88	1.1	8.24	1.3	5.74	1.02	7.1	1.3

Fluency, accuracy and complexity scores were submitted to a series of mixed ANOVAs, with *nativeness* as a within-subjects factor and *collaborativeness* as a between-subjects factor. Due to space limitations, only outcome measures for which significant effects were observed are reported.

For the speaking fluency measures, neither the main effects of *nativeness* and *collaborativeness*, nor their interaction, reached significance. Concerning accuracy, the ANOVA yielded a significant *nativeness x collaborativeness* interaction for *errors per ASU* ($F [1, 32] = 8.87, p = .006, \eta^2 = .23$) and for *error free ASU* ($F [1, 32] = 6.72, p = .014, \eta^2 = .17$). Bonferroni pairwise comparisons revealed, for both these accuracy measures, that learners produced more errors when speaking with a collaborative NS ($M=84.7$) than when speaking to a collaborative NNS ($M=79.5$) (mean difference of -5.2% ; $CI = -10.8 - .4$). However, in the non-collaborative condition, learners produced more errors per ASU when speaking to the NNS ($M=85.4$) than when speaking with the NS ($M= 80.5$) (mean difference of 4.9% ; $CI = -10.6 - .6$). This suggests that learners' accuracy was most affected when interacting with a non-collaborative NNS.

Finally, regarding complexity, results revealed a significant main effect of *nativeness* for *sentence nodes per ASU* ($F [1, 32] = 5.14, p = .030, \eta^2 = .13$) driven by learners producing higher syntactic complexity when interacting with a non-native than a native interlocutor, irrespective of the collaborative condition in which they performed the oral task.

Speaking anxiety and fluency, accuracy and complexity

Finally, a series of *Pearson-r* correlations were run between speaking anxiety measures (HR, EDA, and questionnaire scores) and the fluency, accuracy and complexity measures. Results revealed no significant ($p > .05$) correlations ranging $r = .0-.2$ in strength, suggesting that HR, EDA and questionnaire measures were unrelated to fluency, accuracy and complexity measures.

DISCUSSION AND CONCLUSION

The first research question asked whether L2 speaking anxiety could be influenced by nativeness and collaborativeness. Questionnaire data showed that almost all the participants did not report experiencing high levels of speaking anxiety. Physiological

response measures, however, revealed that participants experienced more distress when interacting with the NNS than the NS interlocutor. Participants were expected to feel more nervous with the NS, as in previous research. It is possible that, compared to the NS, the NNS was seen as less friendly, or their look was more serious under both collaborative and non-collaborative conditions, and this created more distress for the participants. This, however, was undetected by a friendliness rating of the interlocutors' looks (both obtained 4 out of a 5-point friendliness scale).

The second research question asked whether nativeness and collaborativeness affected speaking fluency, accuracy, and complexity. Speaking fluency was unaffected by speaking anxiety levels, so although learners were more distressed with the NNS, this was not reflected in fluency measures (e.g., longer pausing time, as in Pérez Castillejo, 2019). The manipulation of nativeness and collaborativeness may not have generated enough distress to affect learners' speaking fluency. Regarding accuracy, learners were more accurate when interacting with a collaborative NNS, whereas in the non-collaborative condition they were more accurate when speaking with the NS. This suggests that learners' accuracy was more sensitive to the NNS than to the NS interlocutor so that error rates very noticeably decreased when collaborative and increased when non-collaborative. Finally, participants produced more complex output with the NNS, with whom they experienced more distress, unlike Hewitt and Stephenson (2012), who found that more anxious learners produced less complex output and more grammatical errors. Perhaps, the participants' proficiency together with the feeling of distress with the NNS made the participants try their best when speaking to him.

The third research question aimed to investigate whether there was an association between L2 learners' anxiety levels and their fluency, accuracy and, complexity. Results did not reveal a relationship between speaking anxiety measures and fluency, accuracy, and complexity. Such null results are likely attributable to the interaction conditions we set up, which may not have succeeded in generating enough stress levels in the learners, as indicated by the self-perceived levels of anxiety they reported post-task. The outcome of the study suggests that nativeness and collaborativeness manipulations had few small effects on anxiety measures (nativeness for HR), accuracy and complexity, and no effect on speaking fluency. Future studies could investigate whether different proficiency levels would result in similar results.

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APPENDIX

Questionnaire: Anxiety while performing the task (max. score 42)

1- From 1 to 7, being 1 totally relaxed and 7 the highest anxiety you have ever felt, how did you feel when performing the story retelling from the video with Chema (non-native speaker of English)?

	1	2	3	4	5	6	7	
extremely relaxed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	extremely anxious

2- From 1 to 7, being 1 totally relaxed and 7 the highest anxiety you have ever felt, how did you feel when performing the story retelling from the video with Kiran (native speaker of English)?

	1	2	3	4	5	6	7	
extremely relaxed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	extremely anxious

3- From 1 to 7, being 1 totally relaxed and 7 the highest anxiety you have ever felt, how these factors made you feel when performing the tasks:

- The reactions of the person I was speaking to
- Speaking English (regardless to whom)
- Speaking English to a native speaker of the language
- Being recorded

* Did any other factor that does not appear on the previous list make you anxious? If so, please specify it.