

EXPLORING NATURAL SPEECH ACCOMMODATION IN L1-L2 INTERACTIONS: IMPLICATIONS FOR PEDAGOGY

Tema

Sprachakkommodation in der Zweitsprache (L2) beinhaltet die Veränderung der eigenen Sprache während der Kommunikation mit Nicht-Muttersprachlern. In solchen Situationen sprechen wir oft langsamer, einfacher, und deutlicher. Während L2-Sprachanpassung ein wichtiges Instrument für SprachlehrerInnen sein kann, um SchülerInnen beim Lernen zu helfen, kann eine unangemessene Anpassung den Lernprozess behindern. Um diese Frage weiter zu untersuchen, haben wir ein Experiment entworfen, welches L2-Sprachakkommodation in einer natürlichen Umgebung testet. Dazu analysierten wir Gesprächssequenzen zwischen L1-EnglischsprecherInnen und L2-SprecherInnen des Englischen, während sie ein kooperatives Computerspiel spielten. Unsere Ergebnisse zeigen, dass L1-SprecherInnen ihre Sprache anpassen, wenn sie mit L2-SprecherInnen interagieren. Insbesondere neigen sie dazu, Wörter mit höherer Häufigkeit und großer kontextueller Vielfalt zu benutzen, und sie sprechen tendenziell lauter. Darüber hinaus offenbart die Beziehung zwischen Sprachakkommodation und Angststörungen emotionale Verbindungen zwischen den StudienteilnehmerInnen. Diese Ergebnisse weisen darauf hin, dass eine Unterrichtspädagogik, die Sprachakkommodation beinhaltet, in den kommunikativen Bedürfnissen der SchülerInnen im Klassenzimmer verwurzelt sein sollte. Es bedarf jedoch weiterer Forschung, um das Bewusstsein für eine natürliche L2-Sprachakkommodation zu schärfen und geeignete pädagogische Richtlinien zu entwickeln.

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Introduction

Natural language is complex. Communication encompasses *what* we say as well as *how* we say it based on *who* we are talking to. We often adjust our language use when communicating with children, friends in noisy environments, or L2 (non-dominant) English speakers. L2 speech accommodation, or foreigner-directed speech, is identified as a distinct register and includes speech adjustments such as higher frequency words, higher pitch, fewer idiomatic expressions, and hyperarticulation (Scarborough et al., 2007). In the context of the language classroom, speech accommodation towards L2 language learners is mostly viewed as positive, rapport-building behavior (Nguyen, 2007). Teachers help L2 learners understand expressions by using simplified language and speaking more clearly and louder than an L1 speaker would with other L1 speakers. When learners feel comfortable and confident using the target language, they are more likely to engage in meaningful conver-

sations and practice their language skills (Gass & Selinker, 2001). However, L2 accommodation can have negative consequences if it is overdone (*overaccommodation*) or not done enough (*underaccommodation*). Overaccommodation can seem patronizing and make the L2 learner uncomfortable, while underaccommodation can leave the L2 learner feeling frustrated and unsupported (Duggan et al., 2011; Gasiorek & Dragojevic, 2017; Zuengler, 1991). The L1 speaker may themselves experience frustration in seeking the right balance of accommodation (Margić, 2017).

Communication Accommodation Theory and the Language Classroom

Communication Accommodation Theory (CAT) is a valuable framework for identifying effective communication strategies for L1 and L2 speakers (Beebe & Giles, 1984). CAT explains how speakers adapt their language use to achieve their social and communicative goals at both personal and group levels in any setting (Gasiorek & Dragojevic, 2018), but it is particularly relevant for teaching pur-

poses. CAT demonstrates the factors that contribute to communicative success between L1 and L2 speakers: teachers could use this model to modify their speech in ways that support L2 learners while still exposing them to a range of language structures and vocabulary. There are two prominent strategies that CAT proposes in the context of speech accommodation: convergence and divergence. Convergence occurs when a speaker adjusts their words or acoustic speech to be more similar to their conversation partner and is often used as evidence of a social connection (Lewandowski & Jilka, 2019; Natale, 1975; Pardo, 2006). In contrast, divergence occurs when a speaker seems to increase linguistic distance with their audience. Thus, convergence seems to be the best strategy to achieve positive L2 speech accommodation. Teachers could use convergent adjustments to align with their classroom; modifying their language to be more like their students' language facilitates comprehension and creates a more positive and inclusive classroom environment (Suffill et al., 2021). However, L2 learners seek exposure to complex language structures and vocabulary beyond their current ability to achieve higher L2 proficiency (Krashen & Mason, 2020). Approaching their classroom, language instructors must strategically address both the goal of emotional connection and to maintain a fluency level when teaching that remains aspirational for their classroom relative to their current level of language ability. These two goals are not, however, diametrically opposed.

Accommodation remains a crucial aspect of establishing rapport in a language classroom and promoting teaching effectiveness. Research consistently shows that teacher-student rapport predicts students' motivation and academic success by creating an emotionally safe environment (Frisby et al., 2017; Krashen & Mason, 2020; Nguyen, 2007; Park, 2016). Frey and Lane (2021) found that non-accommodation negatively impacted student-teacher rapport. Their research suggests that teachers must be aware of their accommodation strategies to promote successful language learning. Krashen's Optimal Input Hypotheses (Krashen & Mason, 2020) highlights the importance of effective communication and teaching practices that consider both linguistic and emotional factors. This educational model comprises 5 hypotheses for second

language learning, emphasizing that a teacher's input should scaffold with the learner's current abilities and be comprehensible, compelling, rich, and abundant (Krashen & Mason, 2020). In particular, the *affective filter hypothesis* emphasizes how anxiety, confidence, and motivation are related to language learning. According to Krashen's hypotheses, learners benefit most from accommodated language input tailored to their context, both linguistically and emotionally.

Background of research on accommodation in the classroom

How has speech accommodation been studied in language teaching and social communication research? In a recent study (Weizheng, 2019), English teachers in a Chinese classroom strategically controlled conversations with their students through accommodation, which is demonstrated at the discourse level. Instructors reduced social distance in their classrooms through discourse maintenance, use of high-frequency words, casual language and topic choice, conversational repair and longer response wait times, giving clear conversational turns to students, and providing encouraging verbal feedback (Weizheng, 2019). The more CAT strategies a language teacher used, the better their classroom interactions became (Weizheng, 2019). This and other studies (Ansah & Lomotey, 2022; Manuaba & Putra, 2021) focus mainly on discourse management factors, such as changing the topic in the classroom based on the students' interests. What seems to be lacking are experimental studies capturing the instructional format of a classroom while focusing on aspects of language such as word choice and acoustics that unite CAT and Krashen's hypotheses.

While previous studies have delved into the acoustic properties of L2 speech accommodation, such as pitch changes and speech rate, fewer have analyzed lexical choice (for recent reviews, see Piazza et al., 2022; Rothermich et al., 2019). Accommodated speech towards L2 speakers typically has a higher pitch, a larger vowel space, and slow rate compared to casual speech (Henzl, 1979; Jiang & Kennison, 2022; Kuperman & Bresnan, 2012; Quené, 2008). A few studies have analyzed lexical measures of accommodated speech for L1-L2 interactions (e.g., Rodriguez-Cuadrado et al., 2018; Tweissi,



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1990), for instance suggesting a salient speech register specific to the language classroom (Henzl, 1973). More research is necessary to confirm the relationship between speech accommodation and lexical choices such as word frequency, contextual diversity, and syllable length. Additionally, previous work has addressed how speech accommodation may be a rapport-building behavior in medical caregiving contexts (Duggan, Ashley P. et al., 2011; Pretorius, 2018) and socially (Rothermich et al., 2023), but more research is needed to confirm and extend how speech accommodation impacts the interactants, such as its relationship to anxiety.

rea. We recorded and transcribed their speech interactions while they played a cooperative online game. The results of our study will have implications for language learning, generate hypotheses for studies in a pedagogical setting, and provide evidence-based recommendations for estimating the communicative needs of another person.

Hypotheses

Our first hypothesis was that L1 speakers would accommodate L2 speakers by changing their speech through word choice and articulation in a natural setting without being instructed to; this would manifest in more common vocabulary, slowed-down speech rate, a louder voice, and fluctuating pitch. Our second hypothesis was that these adjustments would lower the anxiety of the L2 speakers over the course of playing the game.

Methods

Participants

Six L1 English speakers and two L2 English speakers took part in a two-condition pilot study playing a cooperative game with an L1 and an L2 speaker. All participants were university students between the ages of 17 and 23 who were naïve about the purpose of the study. Of the six L1 speakers recruited, three were female and three were male. All L1 speakers spoke American English. Of the two L2 speakers recruited, one was female, and one was male. Each L2 speaker was of Korean origin and had high English proficiency. Extra credit was provided to participants as applicable, and participants were entered into a raffle for a \$15 gift card. The study was approved by the local ethical review board. Participants also filled out the State-Trait Anxiety Inventory (STAI) before and after participating in the game (Spielberger et al., 1970).¹

Procedure

Participants played a computer game together called “Keep Talking and Nobody Explodes,” in which one participant instructs the other to defuse a virtual device as the “expert”. Only the expert’s computer screen shows how to defuse the device, and they must direct the “defuser” to disarm it before time runs out. Each participant was provided with a computer and an instruction manual. Participants first completed the STAI questionnaire,

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Current Study

In the current study, we aim to provide evidence for speech accommodation by L1 speakers toward L2 speakers in a naturalistic experimental setting and evaluate L1 word choice and articulation. Previous research preferred the use of confederates who are aides to the experimenter and pose as another participant in order to elicit speech samples in participants naive to the design of the study, while other studies used pre-recorded, imagined interactions with an L2 speaker (Biersack et al., 2005; Bobb et al., 2019; Hazan et al., 2015; Rodriguez-Cuadrado et al., 2018; Scarborough et al., 2007). While they are approximations of natural speech, such study designs lack ecological validity in measuring the dynamics of a real conversation. Previous research has often relied on classroom *observations* to provide ecologically valid data, but observations limit our understanding of acoustic and lexical aspects of natural accommodation. To capture acoustic and lexical properties of speech in a naturalistic setting, the current study placed L1 English speakers in an interactive setting with other L1 speakers from the US or L2 English speakers originally from Ko-

¹ Additionally, participants completed several more questionnaires related to personality, language ability, and internal bias to control for potentially confounding factors such as neuroticism and racism: the Ten Item Personality Inventory (TIPI) (Gosling, 2003); a modified Language Experience and Proficiency Questionnaire (LEAP-Q) (Marian et al., 2007); the Lexical Test for Advanced Learners of English (LexTALE) (Lemhöfer & Broersma, 2012); and the Asian American Implicit Association Test. From this data, only the anxiety measures were analyzed for this manuscript.

then played three rounds of the game in succession. There were two conditions for this study. In Condition A, both interactants were native American English speakers randomly assigned to their roles in their pair (L1 x L1). In Condition B, the defuser was a native Korean speaker fluent in English (L1 x L2). The study design is described in Table 1.

To address our first hypothesis, we measured the lexical diversity and frequency of utterance, word length, volume, and pitch of the expert. Word frequency was based on how often a word occurred in a large (51 million word) corpus of movie and television subtitles, while contextual diversity was determined by the number of media references for a particular word (SubtleXus, 2019). The length of a word refers to the number of letters in it. All lexical analyses were based on the first 15 utterances of the first game and last 15 utterances from the third game. Duration, intensity, and pitch were measured through custom scripts developed with the phonetic software Praat (Boersma, 2001). The second hypothesis was addressed by measuring the change in state anxiety (STAI) scores before and after interpersonal interactions. After playing the game, participants in both conditions were asked to complete the STAI questionnaire a second time, along with the other remaining measures of personality and language proficiency.

Data Analysis

Utterances from the L1 speakers playing the experts were analyzed lexically through frequency, diversity, and word length and acoustically through duration, intensity, and pitch. A multivariate Analysis of Variance (ANOVA) was conducted on word frequency, contextual diversity, and letter length for the first and last 15 utterances of each test session. A multivariate ANOVA was also run for acoustic factors: duration, or the length of time one utterance took, intensity, or the emphasis and volume levels in an utterance, and pitch of an utterance.

Results

Based on lexical analyses, L1 English speakers spontaneously adjust their word choice when addressing L2 speakers. L1 English speakers used significantly more frequent words with L2 speakers than L1 speakers ($F(1,1023) = 7.82, p = .005, \eta p2 =$

$.008$). L1 speakers also used significantly more contextually diverse words with L2 speakers than L1 speakers ($F(1,1023) = 12.15, p = .001, \eta p2 = .012$). For Word Length, there was no effect of Condition ($F < 1, p = .743$). For pitch and duration, we did not find significant differences ($p > 0.05$). Table 2, below, displays the means and standard deviations for each lexical factor.

Based on acoustic analyses, L1 speech toward L2 speakers also consisted of significantly greater acoustic intensity ($F(1, 58) = 34.93, p = .0001, \eta p2 = .376$). However, we noted no significant change over the course of the interaction from the first set to the last set of utterances. Table 3, following, shows the means and standard deviations for each acoustic factor.

Pair Design			
Test	Condition	Expert	Defuser
1	A	F L1	F L1
2	B	F L1	F L2
3	A	M L1	M L1
4	B	M L1	M L2

Table 1
Study Design

Condition	A (L1 x L1)		B (L1 x L2)	
	M	SD	M	SD
Frequency	4.82	1.17	5.00	0.97
Diversity	3.63	0.59	3.74	0.41
Length	3.53	1.50	3.50	1.59

Table 2
Multivariate ANOVA for Lexical Analysis

Condition	A (L1 x L1)		B (L1 x L2)	
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Frequency	4.82	1.17	5.00	0.97
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Table 3
Multivariate ANOVA for Physical Speech Characteristics

Descriptive data from before-and-after State-Trait Anxiety Inventory (STAI) scores suggest that anxiety scores increase or decrease in the same direction for both conversation partners. In test pairs, anxiety scores lowered for both participants, while in pairs 2, 3, and 4,

scores rose for both participants. Figure 1 below illustrates how anxiety scores rose or fell for each participant according to their pairing.

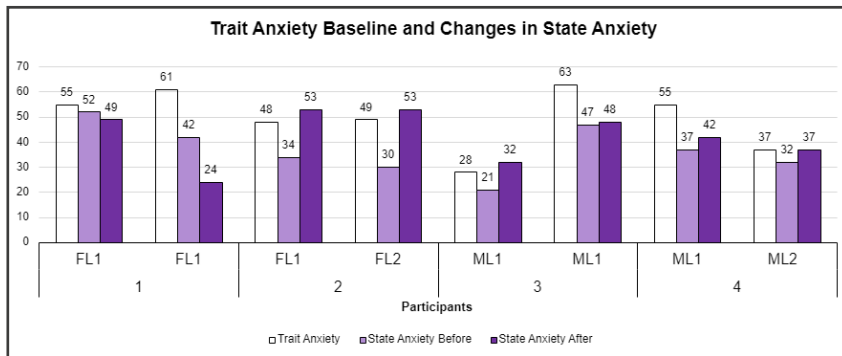


Figure 1
Trait and State Anxiety Results by Participant in Pairs

All participants reported higher trait anxiety than state anxiety before playing the game. For three participants, state anxiety after playing the game was reported above their trait anxiety levels. Our first hypothesis – L1 speakers accommodate L2 speakers by changing their speech through word choice and articulation – was partially confirmed. L1 speakers used more diverse and frequent words while using a relatively louder voice when interacting with L2 speakers compared to speaking to another L1 speaker. However, they did not change their rate of speech or pitch. Our second hypothesis – that these adjustments lead to lower the state anxiety in L2 speakers – could not be confirmed. Instead, we found that state anxiety levels changed similarly for each pairing.

This is what we found: when addressing L2 speakers, L1 participants used language that is presumably easier to understand for English learners.

Discussion

As rising international migration leads to increased numbers of L2 speakers, there is a need to revisit speech accommodation and to provide a renewed perspective on how and why people accommodate. Speech accommodation is an important naturalistic behavior that serves to smooth social interactions through interpersonal connection and promotes communicative success. The current

study identified significant features of L2 speech accommodation and tested how accommodative behavior may influence anxiety levels. While our sample size was small, it represents a homogeneous linguistic minority (Korean students) at the undergraduate level and is well-balanced for gender effects. The data collected can be used to inform further research on how L1 and L2 speakers of a language adapt to each other. Our long-term goal is to develop training modules on speech accommodation that can be employed in teacher education and training for health professionals.

Based on previous studies, we predicted that accommodation for L2 listeners would include lexical and acoustic adjustments (Hazan et al., 2015; Piazza et al., 2022; Scarborough et al., 2007; Suffill et al., 2021; Ulbrich, 2021). This is what we found: when addressing L2 speakers, L1 participants used language that is presumably easier to understand for English learners. They produce more frequent words that are used in more contexts of conversation to increase the likelihood that the L2 speaker would be familiar with the vocabulary. Note that L1 participants were never instructed about their partner's existing language proficiency differences or about using accommodation with their conversation partner. This suggests that certain speech accommodation adjustments occur automatically (see Lee & Baese-Berk, 2020). The analyses of acoustic speech characteristics revealed that L1 speakers significantly increase their volume with L2 conversation partners but do not tend to vary their pitch or change the length of their utterances. Previous studies on speech accommodation corroborate that speakers at any proficiency level will change how they speak based on their conversation partner's needs; however, proficiency does seem to influence the magnitude of L2 speech accommodation (Snow et al., 1981; Suffill et al., 2021). Thus, it is possible that the L1 participants in the current study did not determine a need to vary every aspect of their acoustic speech for the Korean L2 speakers due to their relatively high proficiency. In the context of CAT, the choice from an L1 participant to speak louder as an accommodation strategy could backfire and be perceived as overaccommodation by the L2 speaker. In the present experiment, participants were under timed conditions, which

could have heightened anxiety and stress levels. In those situations, using a louder voice might have been a way to clarify instructions and grab attention as an accommodative strategy.

Most of the participants became more anxious over the course of the interaction. We hypothesized that natural speech adjustments would establish a positive emotional relationship between the L1 and L2 speakers by reducing feelings of anxiety in L2 speakers. Contrary to what we expected, the exhibited accommodation strategies did not consistently lower anxiety for the L2 speakers. Instead, regardless of their trait anxiety (how anxious they are in general), state anxiety (at the day of testing) was mirrored across conversation partners. This is an intriguing observation about how conversation partners may be emotionally engaged with the other person during communication. It seems that conversational partners align with each other over the course of an interaction, which has been shown in previous studies (e.g., Trofimovich & Kennedy, 2014). This data also suggests that when considering the importance of building rapport in a classroom, teachers should take the anxiety levels of their students into account (Young, 1991). One primary goal for teachers in establishing rapport with students should be the reduction of anxiety around language performance, as this is shown to improve classroom participation and thus learning (Frisby et al., 2017; Macintyre, 2007). These data seem to suggest a natural link between affective states and L1-L2 interactions, affirming Krashen's affective filter hypothesis (Krashen & Mason, 2020), which emphasizes the role of emotional connection in language teaching. It is also possible that our anxiety results demonstrate a mirroring effect, meaning that there could be a calming impact from one interaction partner to the other, without necessarily improving rapport. Further research is needed to clarify how speech accommodation is related to anxiety; even so, language learning is often an anxiety-inducing activity from the outset. If students mirror their teacher's anxiety levels, teachers may need to find creative ways to set a supportive emotional tone for the classroom rather than purely relying on accommodative practices. Additional experimental research could test teachers in similar instruc-

tional contexts and add biophysiological measures of anxiety (e.g., heart rate, skin conductance) to relate the effects to language learning.

Taken together, our data suggest that speech accommodation navigates complex factors that could influence its use in and outside of the classroom. To support L2 learners' language acquisition, it's important to strike a balance between 1) modifying speech to facilitate understanding, 2) exposing learners to a range of language structures and vocabulary to increase fluency, and 3) providing a supportive environment that mitigates anxiety. Crucially, our data suggest that some speech adjustments are present prior to any explicit pedagogical training. What is currently missing is an understanding of how instructors who are themselves an L2 speaker navigate teaching the L2 target language. This is crucial because in many countries, where the dominant language is not English, L2 English speakers serve as teachers. Thus, navigating this prevalent learning environment should be the focus of future speech accommodation research.

One primary goal for teachers in establishing rapport with students should be the reduction of anxiety around language performance, as this is shown to improve classroom participation and thus learning.

While research on speech accommodation typically focuses on dyad interactions, teachers often address their class as a group. When students present with varying levels of L2 proficiency, a language teacher may be required to make communicative choices in the group context that vary from habits they follow when interacting with just one student. Even so, research into one-to-one interaction is highly valuable to discern and raise awareness for the training that could help teachers understand what their class needs. As previously mentioned, the goal of research into CAT in the language classroom is to establish a reliable method to apply speech accommodation for improved language acquisition. However, studying classroom dynamics re-

garding L2 speech accommodation can be challenging because of the number of variables at play (e.g., individual differences in students regarding learning needs). Other factors that can complicate the estimation of communicative needs in the classroom are stereotypes or biases, which may be best addressed through practical experience or training. One factor that needs to be studied in future experiments is likeability between interaction partners. Social impressions, stereotypes, and individual preferences can influence accommodative behavior (Gallois et al., 2005; Rothermich et al., 2023), and amicability studies in the context of CAT have been shown to increase convergence during conversations (Schweitzer et al., 2017). One way to simulate classroom interactions for teacher training in low-stakes environments would be to use virtual reality classroom software, e.g., Mursion (Kamhi-Stein et al., 2020). In Mursion and similar tools, the teacher in training could address a virtual group of student avatars. Importantly, the avatars can be changed based on physical characteristics, linguistic factors such as accent or proficiency, and special needs. Future work with technology such as this will provide access to highly relevant experimental conditions and training opportunities to target improving communicative self-awareness among teachers (see Cornillie et al., 2012).

Conclusion

At its best, communication accommodation is a negotiation between a speaker and their conversation partner. In classroom contexts, teachers would ideally respond dynamically to the communicative needs of their students. When a teacher is aware of their accommodation habits, they can choose aspirational lexical items at the right frequency and diversity to be appropriate for their classroom. Additionally, language instructors can use this knowledge to equip themselves to modify their speech during teaching to best facilitate understanding. Ultimately, language teachers should strive to create a supportive language learning environment, reducing anxiety in individual interactions with students to improve their language learning experience. While more research is needed to increase awareness around natural L2 speech accommodation and what proper pedagogic instruction would include, accommodation may be most effectively considered as a discourse management tool in the tool kit. The more informed a teacher is about how to use it and when, the more they will succeed in connecting with their students and encouraging language engagement. It is important for teachers to be sensitive to their audience's needs and to be intentional about how they speak.

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